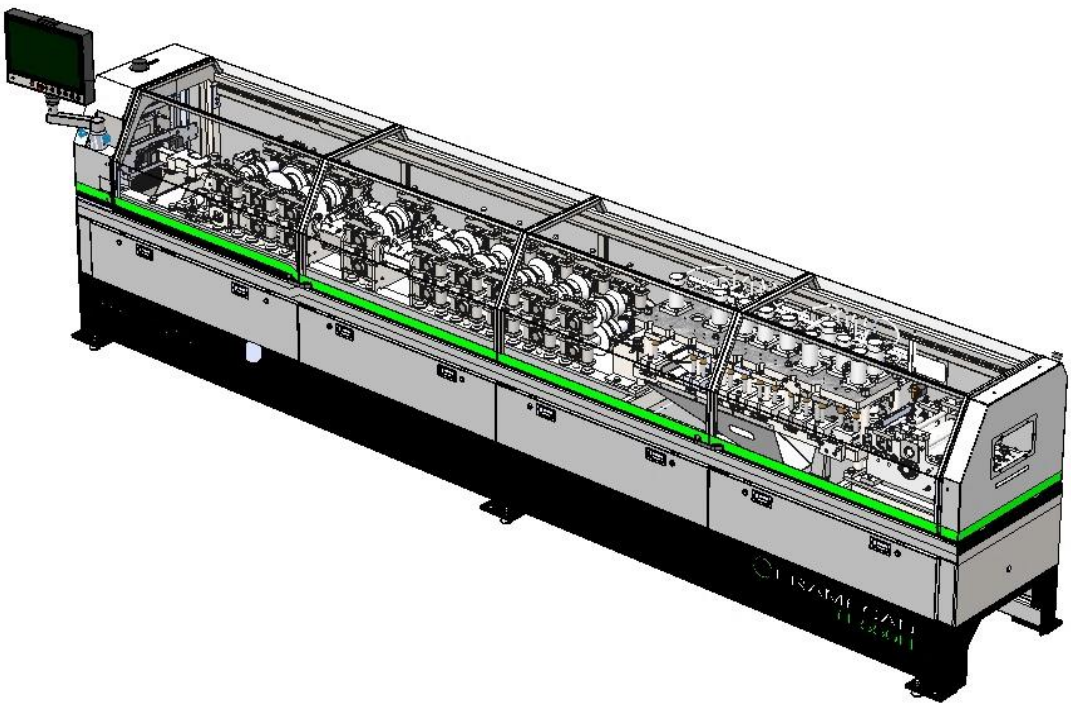
FRAMECAD®

FRAMECAD TF550H

Operating Manual

(SX32i) Printer Series ONLY



Release notes

Release	Description	Author
12122019	First Release	VT
06052020	Datum point changed from Dimple Tool to Flange Cut Tool	KL
06052020	Strip Lubricant examples added	KL
13052020	Lip forming station procedure added	VT
29062020	Lubrication system updated	VT
10082020	Printer system updated	SW
23052022	UL AC and DC cabinet setup added	SW

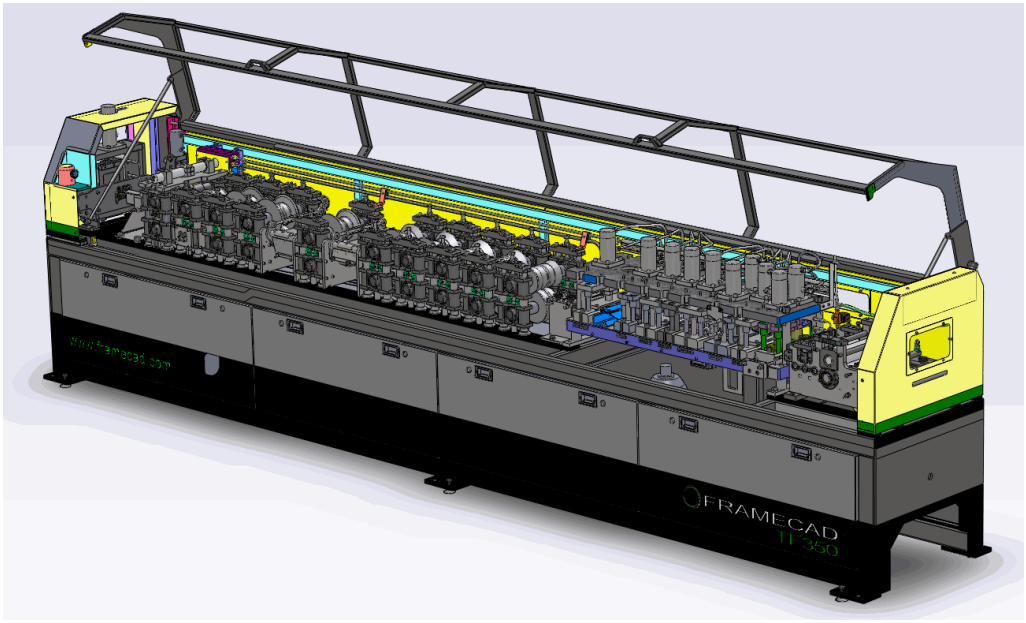
Disclaimer

Intellectual Property Notice

Confidentiality

1 Contents

2 Introduction



2.1 A Brief Overview

The FRAMECAD TF550H is an advanced manufacturing solution for producing light gauge steel wall and truss frames. The FRAMECAD® system comprises a suite of design, manufacturing, and engineering software products. Together with the FRAMECAD TF550H machine these provide a high-volume precision frame and truss manufacturing system.

Steel strip is fed to the TF550H in-feed rollers via a powered Decoiler with a "dancing arm" speed controller. A light film of lubrication fluid is then applied to the steel strip to allow it to process through the FRAMECAD TF550H efficiently and with minimal surface and tooling wear. A sequence of punch and forming operations are performed on the steel strip in accordance with information encapsulated in a manufacturing “job” file (.RFY) and interpreted by the machine control system and software. The steel strip then continues into the roll forming section where the "C" profile is formed over a number of rolling stations. At the out-feed end, an Ink printing system marks individual identifying information on each *stick* (the term used to define various sub-frame components manufactured in the machine). The completed stick is then ejected from the FRAMECAD TF550H in a logical assembly order ready to assemble or "flat pack" to efficiently transport to site.

2.2 Purpose of this Manual

This manual provides general safety, installation, operation and maintenance information for the FRAMECAD TF550H.

PLEASE NOTE!

THIS MANUAL INCLUDES PHOTO’S AND IMAGES THAT MAY DIFFER TO THOSE USED ON SOME MACHINES. WHERE A SETUP AND CONFIGURATION PROCEDURE IS DEFINED, EVERY EFFORT HAS BEEN MADE TO COVER ALL VARIATIONS AND VERSIONS WHERE POSSIBLE.

2.3 How to use this Document

This manual contains important information on the installation, setup, configuration and maintenance of the FRAMECAD TF550H.

All personnel who are required to operate and or service the FRAMECAD TF550H must review all the information contained herein. It is particularly important that all personnel involved are aware of any potential hazards and how to manage these to both ensure the safety of themselves and others.

The manual is deliberately structured to provide the general specifications, safety, and an introduction to the various components *first*. The chapters that then follow describe the installation, power-up and operating instructions of the machine and software. The remaining chapters provide detail on the tuning the FRAMECAD TF550H to correct any product errors along with general service and maintenance information.

Scattered through-out this manual, you will also find various hyperlinks that will allow you to quickly jump to a cross-reference item elsewhere within the manual.

2.4 Symbols Used

The following symbols may be present throughout this manual. An explanation of each symbol is shown.

Icon/Text	Meaning	Consequences if disregarded
PLEASE NOTE!	An important note highlighting a critical requirement	• The procedure or task may not perform as well as expected • Damage may be done to equipment or property • Minor injury may result
CAUTION!	Possible dangerous situation	Minor injuries and/or equipment/property damage
WARNING!	Possible dangerous situation	Severe or fatal injury
DANGER!		
ELECTRIC SHOCK HAZARD!	Possible electric shock hazard	Severe or fatal injury
TIP!	Useful tip or information to help simplify a task or procedure	

3 FRAMECAD Warranty Terms & Conditions

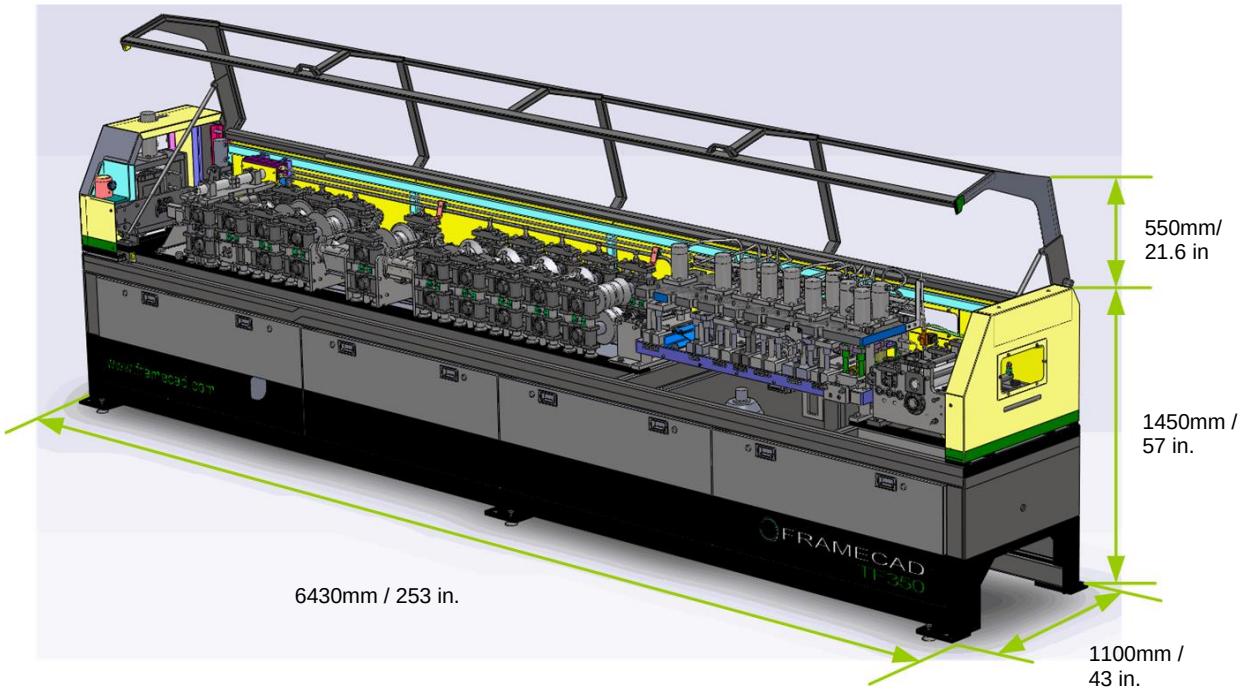
Please refer to your Sale and Purchase Agreement for full Terms and Conditions of sale, including warranty on parts and equipment. For further information please contact your regional FRAMECAD office.

4 Specifications

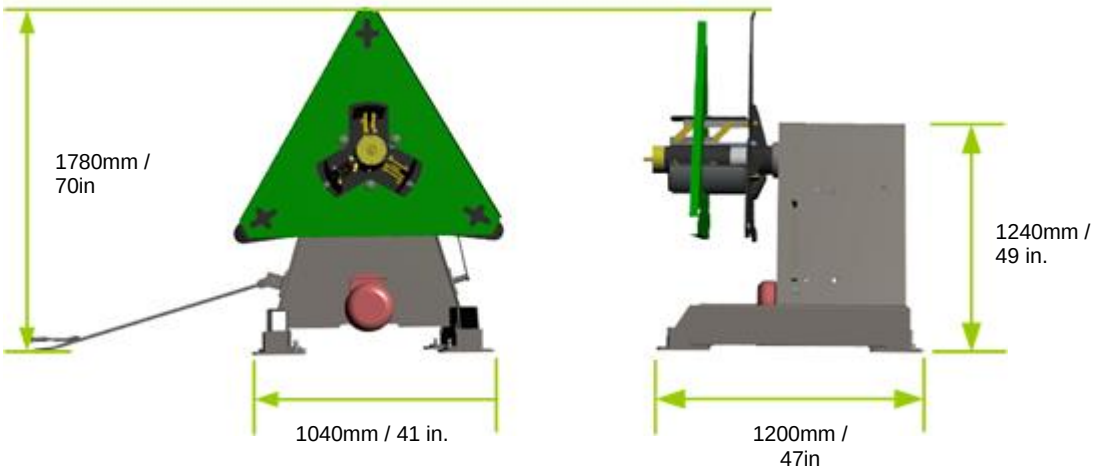
The following section is providing information on the specifications for the FRAMECAD TF550H.

4.1 Basic Dimensions & Weight

Specifications	
FRAMECAD TF550H Weight	4800kg / 10580 lbs (TF550H)
FRAMECAD TF550H Height	1450mm / 57in. (Machine)
FRAMECAD TF550H Length	6430mm / 228 in.
FRAMECAD TF550H Width	1100mm / 43 in.
Decoiler (3T) Weight	680 kg / 1500 lbs
Decoiler (3T) Height	1780mm / 70 in.
Decoiler (3T) Length	1040mm / 41 in.
Decoiler (3T) Width	1200mm / 47 in.



FRAMECAD TF550H



FRAMECAD Decoiler Dimensions (3T Unit)

4.2 Electrical Supply Requirements

Specifications	
Voltage	**380VAC to 480VAC 3-Phase**
Frequency	50 / 60Hz +/- 1%
Current[1)]	
• **TF550H**	40A
Connection Type	3-Phase + Protective Earth (TN-C)
Cable Type	3-Phase + Protective Earth (No Neutral conductor required),
Cable Sizing	Maximum permissible voltage drops along cable <2.5%. Cable to be sized according to current rating above, distance to machine and ambient temperature.
Special Protection Requirements	• Over-load and Short-circuit Protection • All cables to be mechanically protected from damage (excessive heat, insulation cuts, crush etc)

1) Maximum supply requirement.

WARNING!

THE ELECTRICAL SUPPLY INSTALLATION IS THE SOLE RESPONSIBILITY OF THE CUSTOMER. CONFORMITY OF THE ELECTRICAL INSTALLATION WITH LOCAL SUPPLY REGULATION AND LEGISLATIVE REQUIREMENTS MUST BE CERTIFIED BY AGENTS ACTING ON BEHALF OF THE CUSTOMER AND RECOGNIZED UNDER LAW IN THE COUNTRY OF INSTALLATION. FRAMECAD WILL NOT WARRANT OR ASSUME ANY RESPONSIBILITY THEREIN FOR THE APPROPRIATENESS, SAFETY OR LEGAL FITNESS OF THE ELECTRICAL SUPPLY INSTALLATION. FAILURE TO CONNECT AND/OR CONDUCT SAFE WORKS MAY RESULT IN DAMAGE TO THE MACHINE OR SUPPLY NETWORK, SERIOUS INJURY OR EVEN DEATH. FAILURE TO COMPLY WITH ALL STATUTORY REQUIREMENTS MAY RESULT IN FINES AND/OR PENALTIES BEING IMPOSED BY AUTHORITIES IN THE COUNTRY OF INSTALLATION.

Earthing Requirements:
The machine must be effectively bonded to a suitably sized and low impedance protective earth network. All machines are equipped with protective earth termination points inside the AC-electrical Cabinet.

If the machine is to be powered by a generator, it is typical practice to connect the neutral star point to protective earth. As earthing regulations can vary, to ensure compliance please consult with the local electrical supply authority on the approved earthing requirements for 3-phase transformers.

Electrical Supply Protection Requirements:
Over-load and Short-circuit protection must be installed on the supply to the machine. If an RCD (*Residual Current Device*) is to be used, this must be a *Type B RCCB* and suited to industrial applications where there is a possibility of both AC and DC fault conditions.

Voltage supply fluctuations (dips or spikes in voltage) can cause damage to the FRAMECAD™ TF550H 's electronic equipment. If supply reliability is a concern, seek advice from electricity service provider on protection and/or supply conditioning measures that can be implemented to avoid serious damage.

The full load power requirement of this machine is approximately 40kVA. As the machine incorporates a 7.5kW (400VAC/50Hz) hydraulic power-pack utilising a *Direct-Online Induction Motor* (DOL), it is important when selecting *circuit protection* or *supply transformer* equipment to take the "start-up" capability of this motor into consideration when calculating *short-circuit* capacity.

Generator Considerations:
If the machine is to be supplied by a generator, it is important to ensure that the generator is sufficiently sized according to the *type* of load present and ***not*** just the full-load currents as stated above.

All FRAMECAD machines utilize high-speed switching devices such *as Variable Speed (Frequency) Controllers* (VFC) and incorporate *Direct-Online Induction Motors* (DOL) with demand peaks during operation that can vary substantially according to the type of production being undertaken. This equipment by design will introduce non-linear currents and high transient peaks of short duration both during start-up and in normal operation, and it is important to ensure the generator can accommodate these short-burst requirements.

For the **TF550H,** FRAMECAD typically recommend a 40kVA (power factor = 0.8) generator set with a maximum permissible overload/transient state of up 60kVA(1) for a period of 10seconds.

(1) This is based on a maximum starting condition of approximately 56kVA with allowance for climatic and switched mode input transient deration values.

4.3 Ambient Temperature & Humidity

Specifications	
Temperature Range	0 - 40 ºC (32-102 F°)
Humidity	Maximum 86%
Special Requirements	If the ambient temperature/humidity is outside this range, it will be necessary to locate the FRAMECAD TF550H in a climate-controlled room.

4.4 Steel Strip Thickness & Tensile Strength

Specifications	
Steel Strip Thickness (TCT) – TF550H	1.2 (0.05”) – 2.0mm (0.08”)
Steel Strip Tensile Strength	350 - 550Mpa (50-80 ksi)

TCT = *Total Coated Thickness (base metal + applied top and bottom coating thickness)*

WARNING!

RUNNING OUT OF SPECIFICATION MATERIAL THICKNESS WILL DAMAGE THE MACHINE. ALWAYS USE A CALIBRATED MICROMETER OR VERNIER CALIPER TO CHECK THICKNESS OF THE SUPPLIED STEEL STRIP.

4.5 Steel Coil Dimensions

Steel coil to be used on the FRAMECAD TF550H Decoiler must meet the following requirements:

Specifications	
Maximum Weight (kg)	<3000kg (6613 lbs)
Inside Diameter (mm) **Maximum Outside Diameter**	508 – 530mm (20-21 in.) <1200mm (47 in.)
Strip Width	See relevant profile drawing

WARNING!

THE MAXIMUM SIZE AND WEIGHT OF COIL THAT CAN BE SAFELY MANAGED ONSITE WILL BE LIMITED BY AVAILABLE STORAGE, LIFTING AND TRANSFER CAPABILITY – NEVER ORDER STEEL COIL THAT EXCEEDS YOUR ABILITY TO SAFELY MANAGE ON-SITE.

4.6 Steel Strip Width

In order to roll the steel strip into the correct ‘C’-type profile dimensions, an ideal strip width must be calculated. The profile dimensions required are submitted when ordering the machine and each FRAMECAD TF550H is then manufactured to process the matching strip width.

Processing a wider or narrower strip width than that recommended for desired ‘C’ profile will cause the lip dimension (see section 6 – Introduction to the ‘C’ Section Profile) to vary accordingly. This can result in insufficient lip width or a lip that is ultimately too wide to be processed, the latter potentially leading to steel jam-ups inside the machine. When considering steel strip width, it is important to note that the FRAMECAD TF550H is deliberately designed with minimal clearance between the forming rollers and tooling operations.

The steel strip width must be checked using a Vernier Caliper or steel rule to ensure its suitability *prior* to commencing production.

The maximum allowable tolerance of the steel strip width is: **+0mm / -2mm** of the nominal (recommended) strip width.

4.7 Steel Strip Lubricant

Specifications	
Type	Soluble Oil
Mixture	30:1
Application	Consistent film across the strip, without oil droplets forming
Typical Example	HOCUT 787, 787 B and 795 B (supplied Houghton International Inc) SPIRIT MS 5000 (Australia, Europe, Asia, Africa, North America) SPIRIT WBF 5200 (Australia) SPIRIT WBF 5400 (New Zealand, Australia, Europe, Africa) Refer to Material Safety Data Sheet for full safety information, handling, disposal, and composition related detail.

4.8 Steel Strip Cleanliness

Specifications	
General Cleanliness	Steel strip should be *clean* and devoid of transferrable dirt, dust and/or other contaminants
General Notes	Dirty steel will eventually lead to contamination build-up on the roller and tooling surfaces inside the machine resulting in premature wearing of components and/or reduced performance. Always ensure your steel coil storage facilities are kept clean and tidy.

4.9 Dust & Airborne Contaminants

Specifications	
General Cleanliness	Avoid excessive dust, dirt, or other airborne contaminants from building up on the roller and tooling surfaces inside the machine
General Notes	A high degree of cleanliness is required to ensure maximum service life of the FRAMECAD TF550H. Failure to keep the machine clean and free of dust, dirt and other contaminants can lead to blocked ink nozzles and premature wearing of components and/or reduced performance. Always ensure the FRAMECAD TF550H is operated in a clean environment with a regular maintenance regime.

4.10 Hydraulic Oil

Specifications	
Oil Type	ISO46(1) Hydraulic Oil
Oil Capacity (Reservoir)	100litres
Maximum Oil Temperature	65 ºC (149° F)
Maximum Operating Pressure	195 Bar (2828 psi)
Nominal Operating Pressure	165 Bar (1740 psi)
Accumulator Pressure	120 Bar (1740 psi)
Factory Supply	Total Azolla ZS 46 Refer to Material Safety Data Sheet for full safety information, handling, disposal and composition related detail
General Notes	Always ensure the FRAMECAD TF550H is operated in a clean environment with a regular maintenance regimen.

(1) Fully synthetic or semisynthetic oils are NOT RECOMMENDED.

WARNING!

Under any circumstances DO NOT MIX SYNTHETIC/SEMISYNTHETIC OIL WITH THE RECOMMENDED MINERAL HYDRAULIC OIL. Failure to follow that recommendation will result in hydraulic pump damage.

4.11 Ink and Cleaner Fluid

Specifications	
Ink Type	Matthews SCP-700 (FD) Black Matthews SCP-700C Cleaner
Delivery System Pressure	10PSI
IMPORTANT NOTE!	It is a condition of Warranty on all parts related to the Ink and Cleaner Printing System that the above Ink and Cleaner types are used. Use of an unauthorised alternative **will** void all related Warranty claims on the Printing System equipment.

⚠THE SPECIFIED INK AND CLEANER ARE CHEMICAL BASED PRODUCTS. THESE PRODUCTS ARE HIGHLY FLAMABLE AND REQUIRE SPECIAL SAFETY PRECAUTIONS WHEN HANDLING. ALWAYS CONSULT THE MATERIAL SAFETY DATA SHEET BEFORE USE.
THE INK AND CLEANER DELIVERY SYSTEM IS PRESSURISED. ALWAYS USE SAFETY GLASSES AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING ON OR NEAR THE INK AND CLEANER SYSTEM.

5 Safety

5.1 General Safety Overview

The FRAMECAD TF550H is a fast, powerful, and fully automated machine and should therefore only be operated by fully trained and competent personnel.

Whilst every effort has been made to minimise potential risk and harm, Operators must read and familiarise themselves with the information contained within this manual BEFORE installation and commencing production. Failure to follow the instructions and guidelines included herein may result in serious injury to personnel and/or damage to the machine.

5.2 Steel Management

Steel coils of up to a maximum 3000kg (6613lb) are used to feed strip to the FRAMECAD TF550H. Specialist coil loading equipment is required to transfer these to/from the production floor. A certified lifting gantry or other such steel coil loading system is highly recommended.

Where practical, steel coils should be stored upright in a reinforced rack system to allow for safe storage, removal and transfer to/from the Decoiler unit.

Use either **5000Kg** (11023lb) rated plastic sheathed strops ***OR*** equivalent chains to secure the steel coils to the gantry lifting hook during transfer.

When selecting the steel coil weight and diameter to be used, always consider the available storage, lifting and transfer capabilities of your site: **NEVER exceed your ability to safely manage the size and weight of steel coils ordered for production use.**

WARNING!

APPROPRIATE PERSONAL SAFETY EQUIPMENT SUCH AS CUT-RESISTANT PROTECTIVE GLOVES AND STEEL CAPPED BOOTS MUST BE WORN WHEN HANDLING STEEL PRODUCT.

THE MAXIMUM SIZE AND WEIGHT OF COIL THAT CAN BE SAFELY MANAGED ONSITE WILL BE LIMITED BY AVAILABLE STORAGE, LIFTING AND TRANSFER CAPABILITY – NEVER ORDER STEEL COIL THAT EXCEEDS YOUR ABILITY TO SAFELY MANAGE ON-SITE.

5.3 Ink and Cleaner

The FRAMECAD TF550H utilises CHEMICAL-based ink and cleaner. Please note the following:

1. Refer to Material Safety Data Sheet for full safety information (see Appendix B - Ink Material Safety Data Sheet and Appendix C – Cleaner Material Safety Data Sheet at the end of this Operating Manual), handling, disposal and composition related detail.
2. The ink and cleaner system are typically under ***pressure***. ALWAYS ensure the system is depressurised ***before*** conducting ***any*** work on the ink and cleaner system (including changing the ink and/or cleaner bottles). The following procedure describes the correct method to depressurise the ink and cleaner system.

PROCEDURE FOR DEPRESSURISING THE INK AND CLEANER SYSTEM	
Step 1	Press an emergency stop push-button on the machine (see below)
Step 2	Open the Ink and Cleaner Cabinet Door
Step 3	Makes sure there is no display on the Print Compressor display screen
Step 4	Carefully unscrew the black filter cap on either the Ink OR Cleaner bottles to gently relieve pressure in the system

3. These products are ***highly flammable*** - ALWAYS remove any potential ignition sources.
4. Always wear Personal Protective Equipment (PPE) when handling ink or working on the Printing System. At a minimum this includes safety glasses and ***Nitrile*** rubber gloves.
5. Consult your company's *hazardous materials handling policy* on how to store and/or dispose of CHEMICAL based inks and solvents.
6. Show caution when handling the ink. It is a very strong ink and will permanently mark/stain any surfaces it is spilt on.

WARNING!

THE SPECIFIED INK AND CLEANER ARE CHEMICAL BASED PRODUCTS. THESE PRODUCTS ARE HIGHLY FLAMABLE AND REQUIRE SPECIAL SAFETY PRECAUTIONS WHEN HANDLING. ALWAYS CONSULT THE MATERIAL SAFETY DATA SHEET BEFORE USE.

THE INK AND CLEANER DELIVERY SYSTEM IS PRESSURIZED. ALWAYS USE SAFETY GLASSES AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING ON OR NEAR THE INK AND CLEANER SYSTEM. CONSULT THE MATERIAL SAFETY DATA SHEET FOR MORE INFORMATION.

5.4 Lubricants and Oils

ALWAYS consult the Material Safety Data Sheet for specific safety information relating to the type of hydraulic oil and strip lubricant used with the machine. It is important to ensure this information is readily available by all staff operating the machine AND that they are trained in the safe handling, storage, and disposal of these products.

Typically, all FRAMECAD TF550H machines are shipped with **Total Azolla ZS46** or similar equivalent hydraulic oil. Refer to Material Safety Data Sheet for full safety information, handling, disposal and composition related detail

Typically, all FRAMECAD TF550H machines are shipped with **SPIRIT 5000** or equivalent steel strip lubricant. Refer to Material Safety Data Sheet for full safety information, handling, disposal and composition related detail.

It is important to ensure that safe storage, disposal and accidental spill management policies are in place and in accordance with the data supplied in the Material Safety Data Sheet for these products.

IMPORTANT!

ALWAYS CONSULT THE MATERIAL SAFETY DATA SHEET FOR SPECIFIC SAFETY INFORMATION RELATING TO THE TYPE OF HYDRAULIC OIL AND STRIP LUBRICANT USED WITH THE MACHINE.

IT IS IMPORTANT TO ENSURE THIS INFORMATION IS READILY AVAILABLE TO ALL STAFF OPERATING THE MACHINE AND THEY ARE TRAINED IN THE SAFE HANDLING, STORAGE AND DISPOSAL OF THESE PRODUCTS.

5.5 Emergency Stop Buttons & Reset Procedure

The FRAMECAD TF550H is fitted with 1 emergency stop push-button and 2 emergency stop pull-cord switches, located respectively on the Operator Screen Cabinet and on either side of the machine. An emergency stop push-button is also located at the Decoiler unit. For simplicity, all pushbuttons and pull-cords will hence-forth be collectively referred to as ***emergency stop switches***.

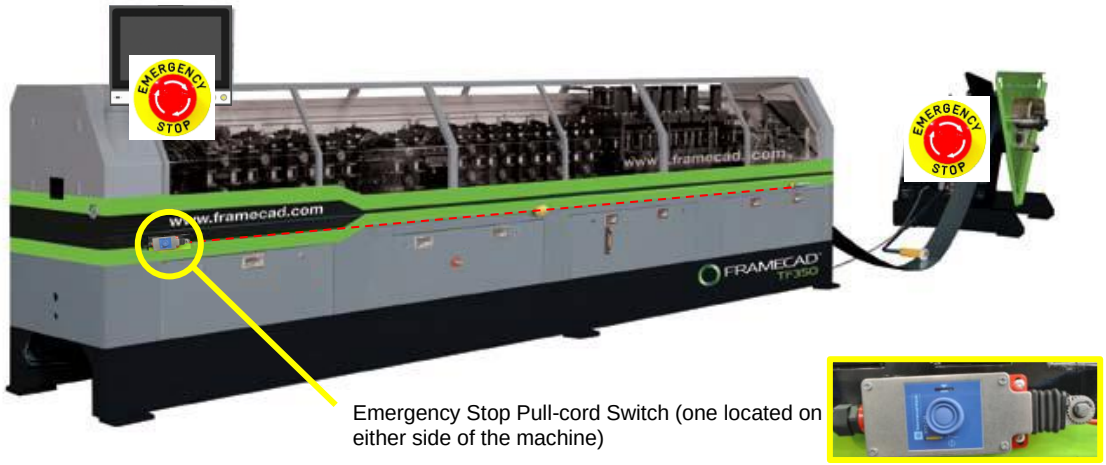
The machine safety control system is design to immediately stop production whenever an emergency stop switch is activated.

Testing of the emergency switches should be conducted ***at least once a day***. ALL emergency stop switches should be tested individually to ensure the safety control system responds accordingly and that all buttons are functioning.

When an emergency stop switch is activated:

1. The emergency stop switch should remain in a latched state so that it must be manually turned to release.
2. the FRAMECAD TF550H should stop immediately and inhibit all Automatic and Manual functions on the machine (including all rolling and hydraulic operations):
3. An Emergency Stop Alarm message should be displayed on the Operator Screen.

If any of the above is **not true** when an emergency stop switch is activated then the emergency stop switch test has ***failed*** and all production on the FRAMECAD TF550H must be suspended until a qualified Technician has re-tested and resolved the issue.



TF-Series Emergency Stop Switch and Safety Pull-cord Switch Locations

If an emergency stop switch is pressed, the safety control system can only be reset using the following procedure:

RESET EMERGENCY STOP PROCEDURE	
Step 1	Twist and release all emergency stop switches (i.e., so that none remain latched in the activated state).
Step 2	Press the SAFETY RESET push-button located on the screen cabinet to reset the safety control system 1) Do not confuse the SAFETY RESET push button with the standard *SOFTWARE RESET* push-button. The latter is used for software resetting only.  **Correct - Safety Reset Push-button**  **Wrong! – Software Reset ONLY Push-button**
Step 3	Acknowledge any Emergency Stop alarms displayed on the Operator Touch Screen

WARNING!

EVEN WITH AN EMERGENCY STOP SWITCH PRESSED ALWAYS ASSUME THAT THERE IS RESIDUAL HYDRAULIC AND/OR MECHANICAL ENERGY IN THE MACHINE.

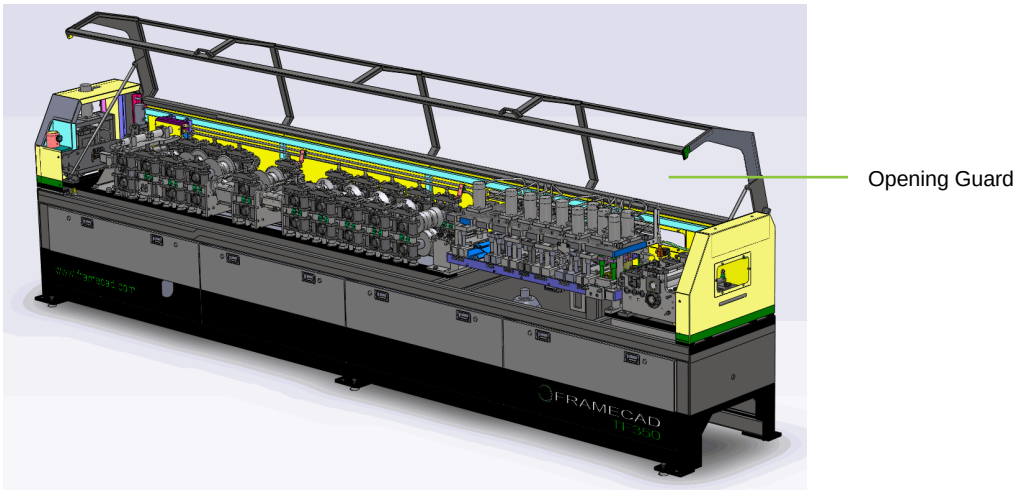
NEVER RELY ON A SAFETY CIRCUIT TRIP (E.G. EMERGENCY STOP PUSH BUTTON OR GUARD SWITCH) TO PROVIDE ISOLATION FOR MAINTENACE, SERVICE OR REPAIR WORK TO THE MACHINE!

5.6 Protective Covers

FRAMECAD TF550H is supplied with fitted covers to protect Operators of the machine from moving parts that will cause serious injury if bodily contact is made.

The machine also has one opening guard cover (see picture below) at the top to allow for setup access to the machine. This opening guard incorporates a safety switch that is electrically interlocked with the machine. Opening the machine guard will cause the machine to halt.

Extreme care must always be taken with the guard open. **ALWAYS** assume that there is residual hydraulic pressure and/or mechanical energy in the machine tooling and rolling sections.



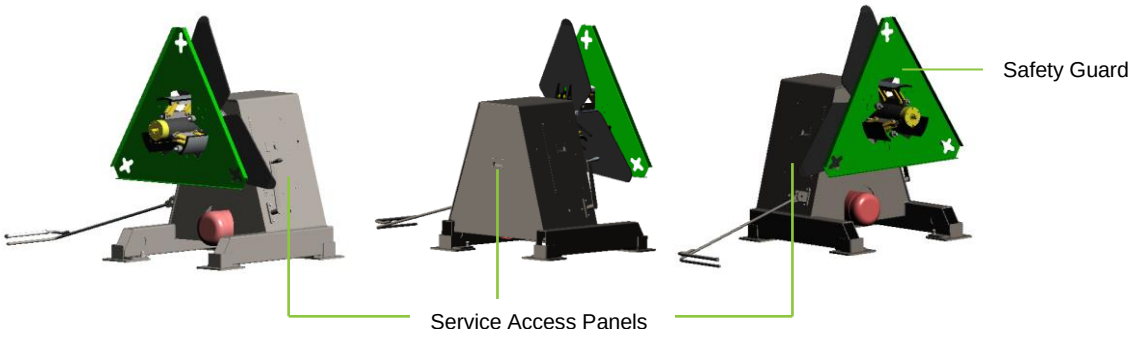
FRAMECAD TF550H Opening Guard

⚠ WARNING!

ALWAYS ASSUME THAT THERE IS HYDRAULIC AND/OR MECHANICAL ENERGY IN THE MACHINE AND TAKE EXTREME CARE WITH THE TOP GUARD OPEN.

NEVER OPERATE THE FRAMECAD TF550H WITH ANY OF THE PROTECTIVE COVERS REMOVED!

The Decoiler is also fitted with a safety guard(s)(1) and x3 service access panels.



Decoiler Safety Guard and Service Panels

Note that the function of the safety guard is to prevent the steel coil from sliding off the Decoiler mandrel during rotation.

Additional safety guarding MUST BE included around the Decoiler machine itself to prevent serious injury to personnel from the rotating mass.

(1) Some Decoiler units utilise safety guards that are designed to slide over and be attached to the mandrel shoe plate. Functionally both types are designed for the same purpose – to prevent the steel coil from sliding off the mandrel assembly during operation.

WARNING!

NEVER OPERATE THE DECOILER WITH ANY OF THE COVERS REMOVED!

ALWAYS ENSURE THE SAFETY GUARD IS ATTACHED TO PREVENT STEEL COIL FROM SLIPPING OFF THE DECOILER MANDREL.

ADDITIONAL SAFETY GUARDING MUST BE INCLUDED AROUND THE DECOILER MACHINE ITSELF TO PREVENT SERIOUS INJURY TO PERSONNEL FROM THE ROTATING MASS.

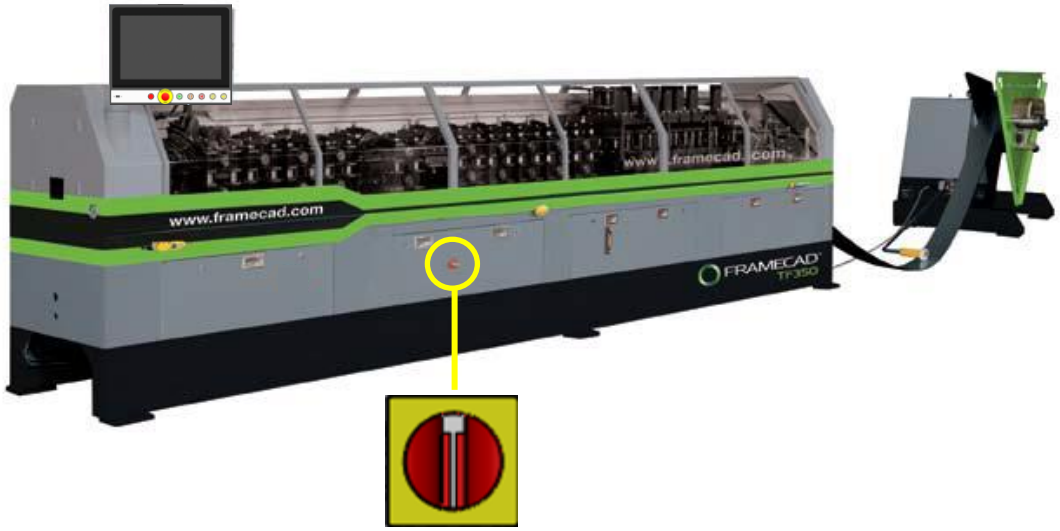
ELECTRIC SHOCK HAZARD!

DANGEROUS VOLATGES ARE PRESENT BENEATH THE SERVICE PANELS! ALWAYS ENSURE THAT THE DECOILER IS UNPLUGGED AND ELECTRICALLY ISOLATED FROM SUPPLY BEFORE REMOVING PANELS FOR SERVICE WORK.

5.7 Electrical Isolation Switch

The FRAMECAD TF550H must be electrically isolated (disconnected) at the either the isolation switch located on the machine (see picture below) **OR** at the point of supply to the machine when:

1. Any maintenance or service work is to be undertaken.
2. Once production is complete – NEVER leave the machine ***powered*** and ***unattended***.
3. If the machine is to be moved.



Electrical Isolation Switch

ELECTRIC SHOCK HAZARD!

EVEN WITH THE ISOLATION SWITCH MOUNTED ON THE MACHINE IN THE OFF POSITION, DANGEROUS VOLTAGES STILL EXIST INSIDE THE ELECTRICAL CONTROL CABINETS. THE FRAMECAD TF550H MUST BE ELECTRICALLY ISOLATED FROM THE *SUPPLY SOURCE* TO THE MACHINE (E.G. AT THE CUSTOMER'S DISTRIBUTION BOARD) BEFORE ANY ELECTRICAL SERVICE WORK CAN BE UNDERTAKEN.

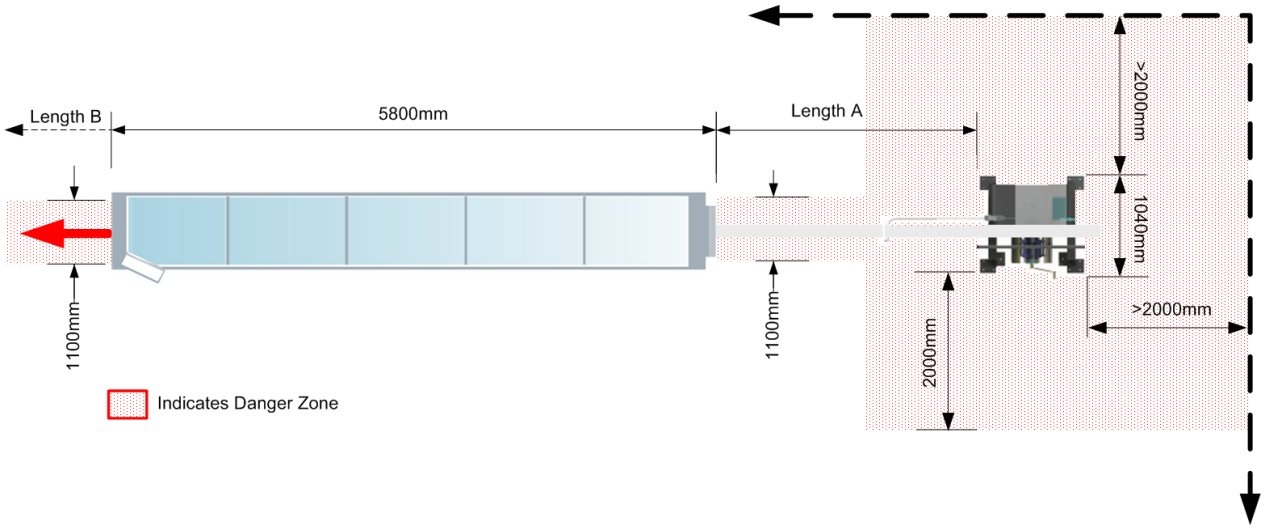
ALWAYS USE A LOCK-OUT TAG SYSTEM WHEN UNDERTAKING ANY SERVICE/MAINTENANCE WORK ON THE MACHINE TO PREVENT ACCIDENTAL RECONNECTION.

NEVER RELY ON A SAFETY CIRCUIT TRIP (E.G. EMERGENCY STOP PUSH BUTTON OR GUARD SWITCH) TO PROVIDE ISOLATION FOR MAINTENANCE, SERVICE OR REPAIR WORK TO THE MACHINE!

5.8 Danger Zones

The FRAMECAD TF550H and Decoiler are fully automated, high-speed machines. Extreme care must be taken to ensure that ***Danger Zones*** are highlighted and that all Operators are fully trained in the potential hazards in and around the machine.

The following machine floor plan is provided to indicate the Danger Zones. Under no circumstances should access be permitted to the areas indicated during production.



Danger Zones

WARNING!

NO ACCESS IS PERMITTED IN THE IDENTIFIED DANGER ZONES WHILE EITHER THE FRAMECAD TF550H OR DECOILER IS IN A RUNNING STATE!

ADDITIONAL SAFETY GUARDING MUST BE INCLUDED AROUND THE DECOILER TO PREVENT SERIOUS INJURY TO PERSONNEL FROM THE ROTATING MASS.

EXTREME CARE MUST BE TAKEN WHILST STANDING NEAR THE OUT-FEED END OF THE FRAMECAD TF550H. FRAMING CAN BE EJECTED FROM THE MACHINE AT HIGH-SPEED WHICH WILL CAUSE SERIOUS INJURY TO PERSONS ENTERING THIS AREA DURING MACHINE OPERATION.

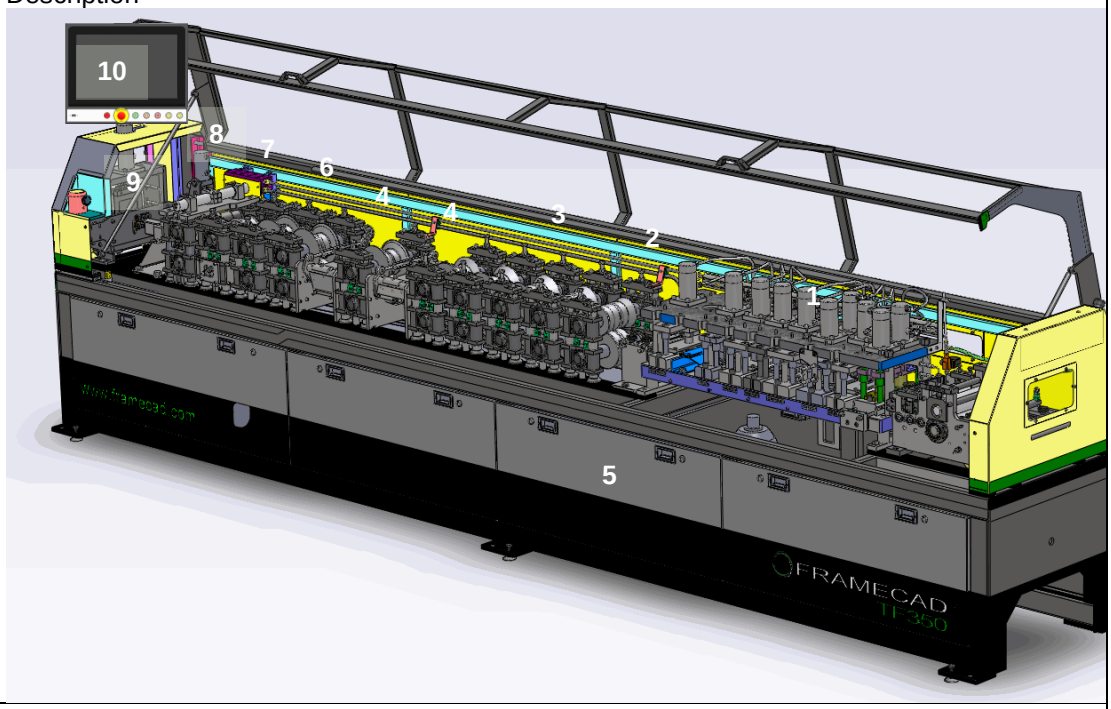
6 Introduction to the FRAMECAD TF550H

6.1 Key Assemblies of the FRAMECAD TF550H Machine

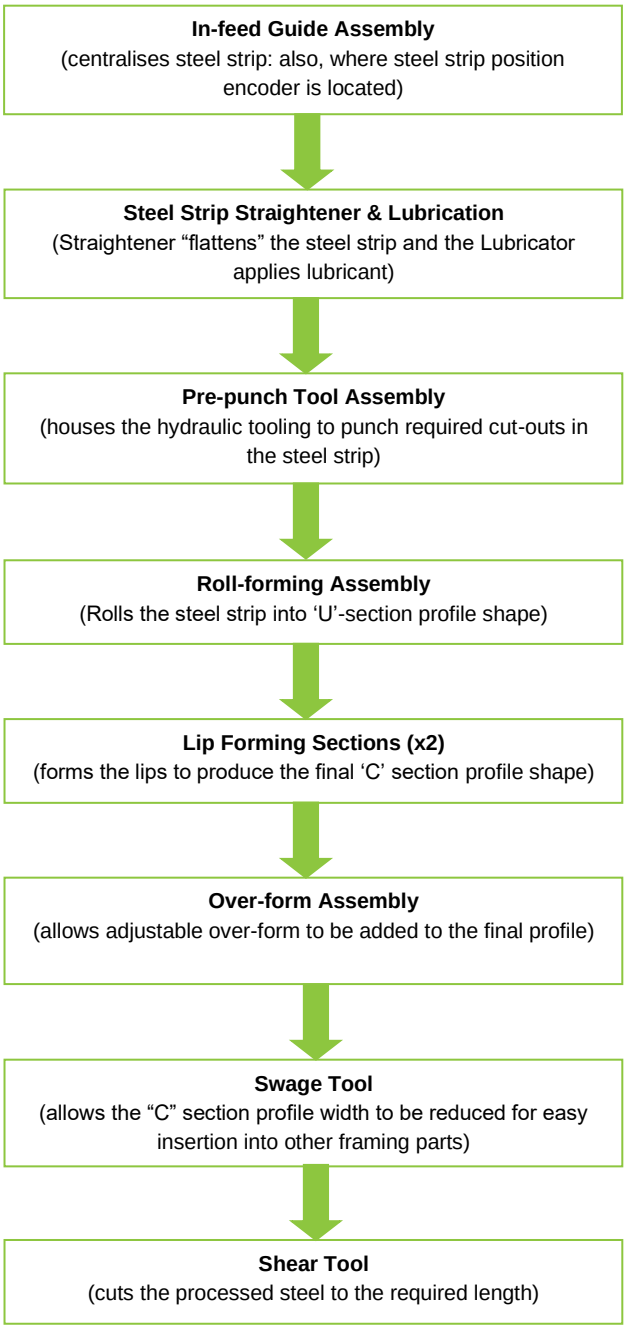
The FRAMECAD TF550H machine is a highly automated and advanced steel processing machine. By integrating the latest computer technology with advanced hydraulic, roll-forming, punch-tooling, and ink-jet printer control systems, the FRAMECAD TF550H is essentially a complete roll-forming factory in one package.

The following highlights some of the key assemblies on the machine.

The TF550H Machine

Item	Description
	
1	In-feed Guide, Straightener and Lubricator Unit
2	Pre-Punch Tool Block Assembly
3	Roll-forming Stations (Sections)
4	Lip Forming Sections (x2)
5	Electrical Control Cabinets
6	Over-form Section
7	Swage Unit
8	Drive out Station
9	Shear Tool
10	Operator Screen and Controls

The basic process of rolling steel strip into a “C” section profile is shown below:



6.2 Introduction to the ‘C’ Section Profile

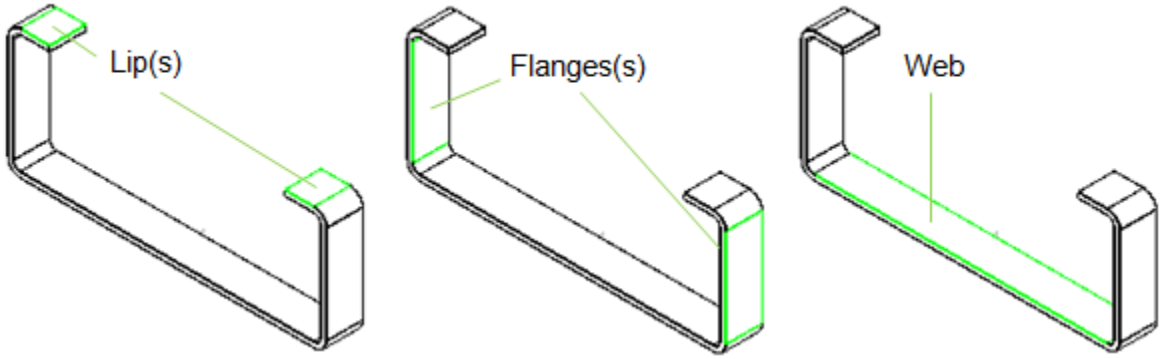
The FRAMECAD TF550H is designed to roll steel strip into a “C” section profile. As the steel strip is progressed through the roll-forming section, the strip is incrementally folded into the typical “C” section.

“C” Section Profile Progression

“C” section Parts:

The diagram below highlights the terminology used when referencing the various dimensions (or “parts”) of the “C” section profile, including:

- Web
- Lip(s)
- Flanges(s)



“C” section Profile Parts

Boxable vs. Symmetrical "C" section:

The FRAMECAD TF550H can be ordered to produce either "***Boxable***" or "***Symmetrical***" "C" section profiles.

The Boxable configuration allows one "C" section profile to be overlapped with another to form a uniform boxed section as shown below.

Boxable Configuration

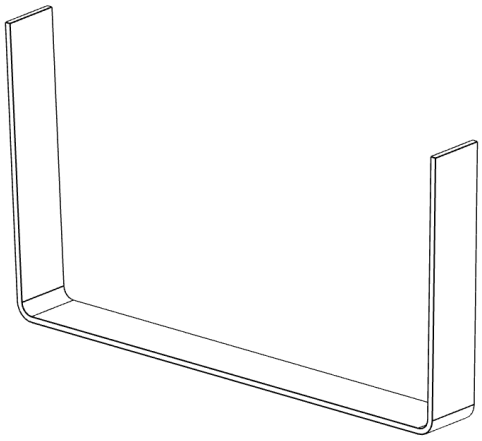
In order to achieve a boxable configuration, one of the *flanges* is folded slightly longer than the other. This is to allow one "C" section profile to be overlapped with the second.

The standard configuration has one flange (Flange A) 2mm **longer** than the other (Flange B).

In a ***symmetrical*** configuration the two flanges are equal length (hence the term symmetrical) and cannot be overlapped together.

"U" section Profile:

The FRAMECAD TF550H can also manufacture *"U" section profile*. This is achieved by mechanically disengaging the Lip Section operation and all FRAMECAD TF550H machines can be configured this way.



"U" Section Profile

Tooling Operations:

The FRAMECAD TF550H will also perform the various hydraulic tooling operations required as defined in the *job file* and interpreted by the machine control system. These tooling operations will *punch* the steel in the shape of the cut-out required.

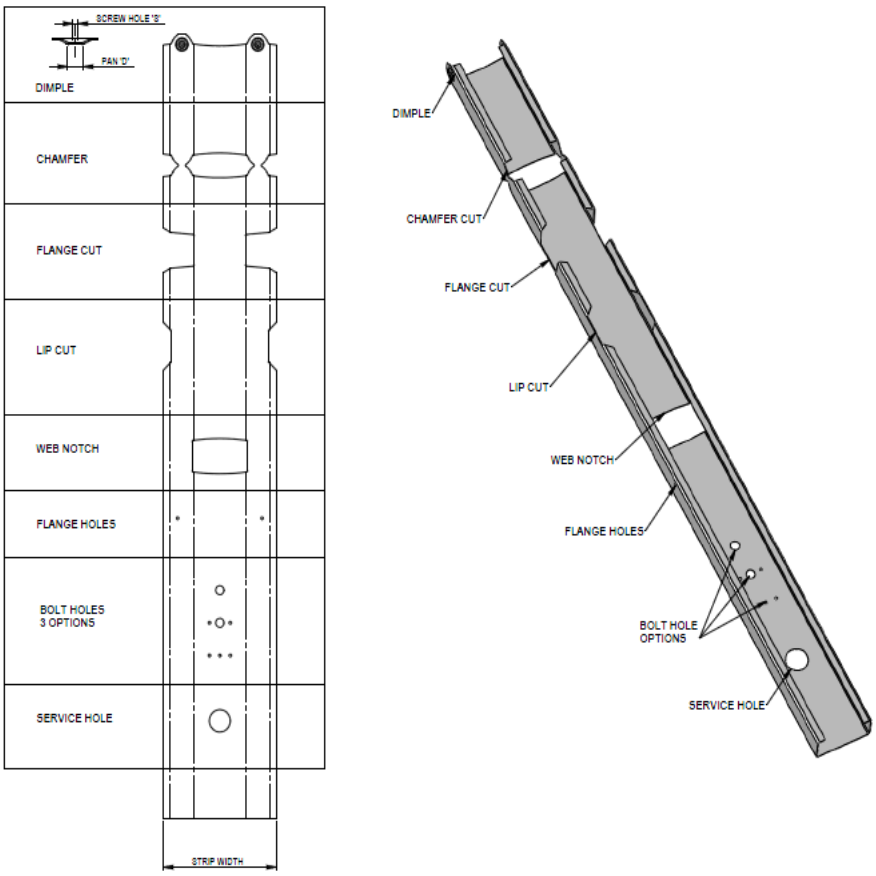
Standard FRAMECAD TF550H tool functions include:

- Service Hole
- Bolt Hole
- Web Notch
- Flange Cut
- Lip Cut
- Chamfer Cut
- Dimple Hole
- Shear (cutting blade)

The figure below shows the typical cut-out shapes as performed by the various tooling options.

IMPORTANT NOTE!

THE BELOW TOOLING OPTIONS ARE SHOWN FOR INFORMATION ONLY. THESE MAY VARY DEPENDING ON THE CONFIGURATION/MACHINE TYPE SPECIFIED. PLEASE REFER TO THE SPECIFICATION SHEET SUBMITTED AT ORDER PLACEMENT FOR THE EXACT OPTIONS INCLUDED ON YOUR MACHINE.

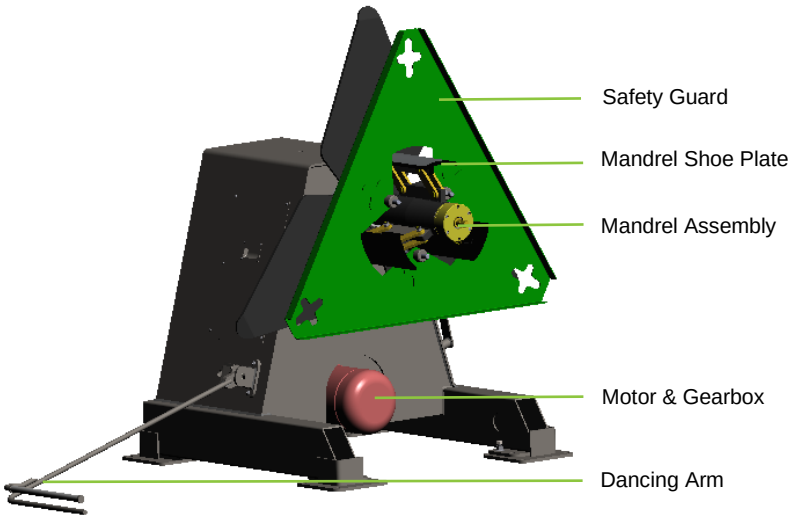


Typical "C" Section Tooling Options

6.3 The Decoiler

The FRAMECAD TF550H uses a powered Decoiler unit to supply the steel strip to the in-feed of the machine.

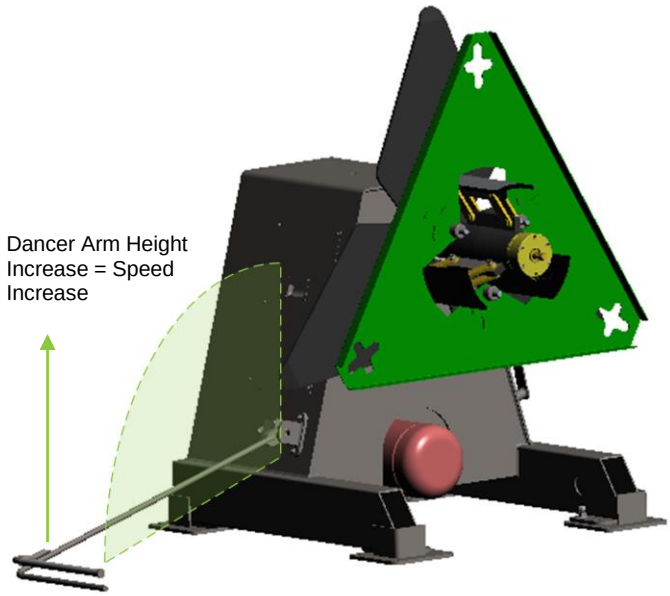
The Decoiler is electrically connected to the FRAMECAD TF550H by a cable and plug system. This supplies electrical power to the Decoiler along with various control signals to manage the Decoiler's operating state.



Typical FRAMECAD TF550H Decoiler Unit

Each Decoiler is fitted with a **VFC** (Variable Frequency Controller) that is used to control the speed of Decoiler's rotation and therefore the feed-rate into the FRAMECAD TF550H.

The *Dancing Arm* set-up is designed to move up and down with the steel strip.



Dancing Arm Rotation

As the Dancing Arm is raised, the speed at which the Decoiler will rotate the steel coil ***increases***.

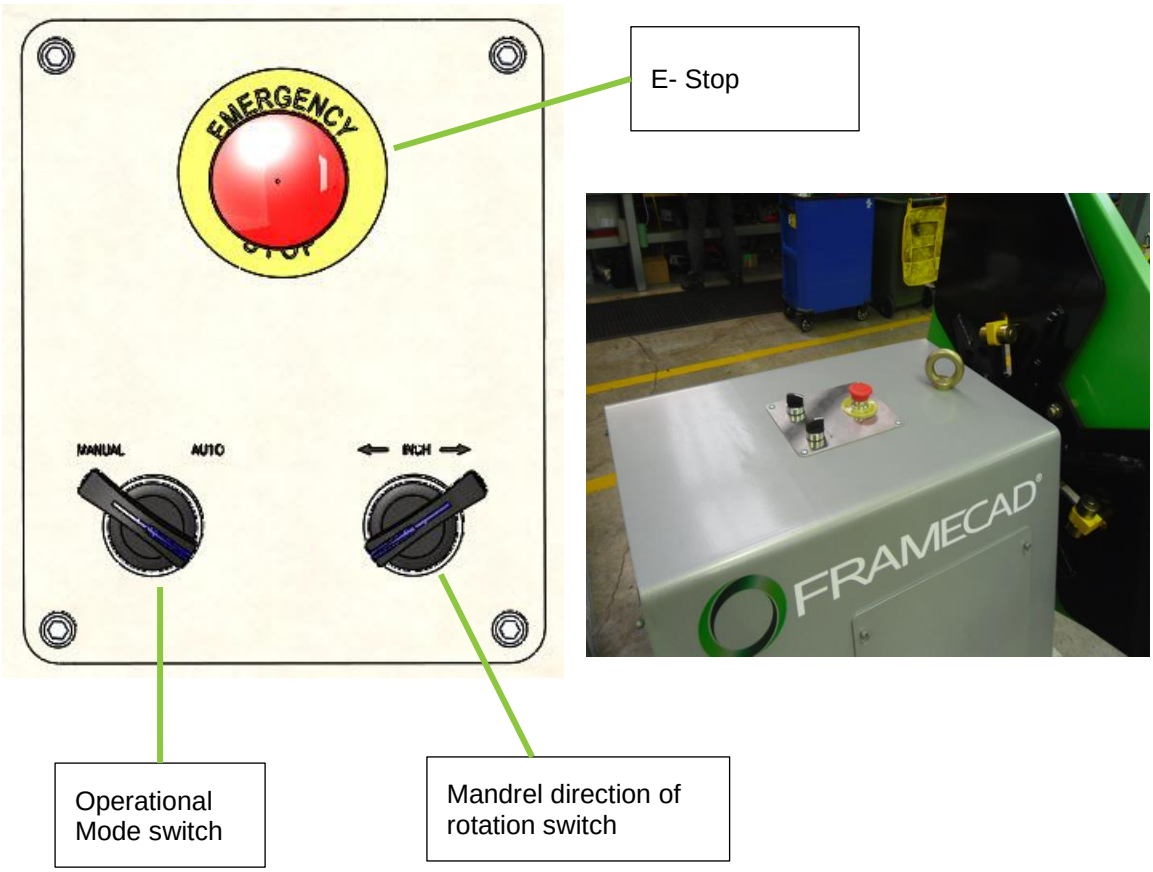
As the Dancing Arm is lowered, the speed at which the Decoiler will rotate the steel coil will ***decrease***.

In this way the Decoiler will speed up and down depending on the demand from the FRAMECAD TF550H. For example, as the FRAMECAD TF550H *speeds* up the steel strip at the in-feed to the machine will tend to lift and in doing so raise the Decoiler Dancing Arm and therefore the Decoiler speed.

To make sure the Decoiler Dancing Arm system operates correctly the Decoiler must be *calibrated* (see section 9 - Check Calibration of Decoiler Dancer Arm).

6.3.1 Decoiler Electrical Controls

The Decoiler incorporates an Emergency Stop push-button, Manual / Auto Mode switch and mandrel rotation direction control switch as shown below:



Decoiler Emergency Stop push-button, operation mode and mandrel rotation controls

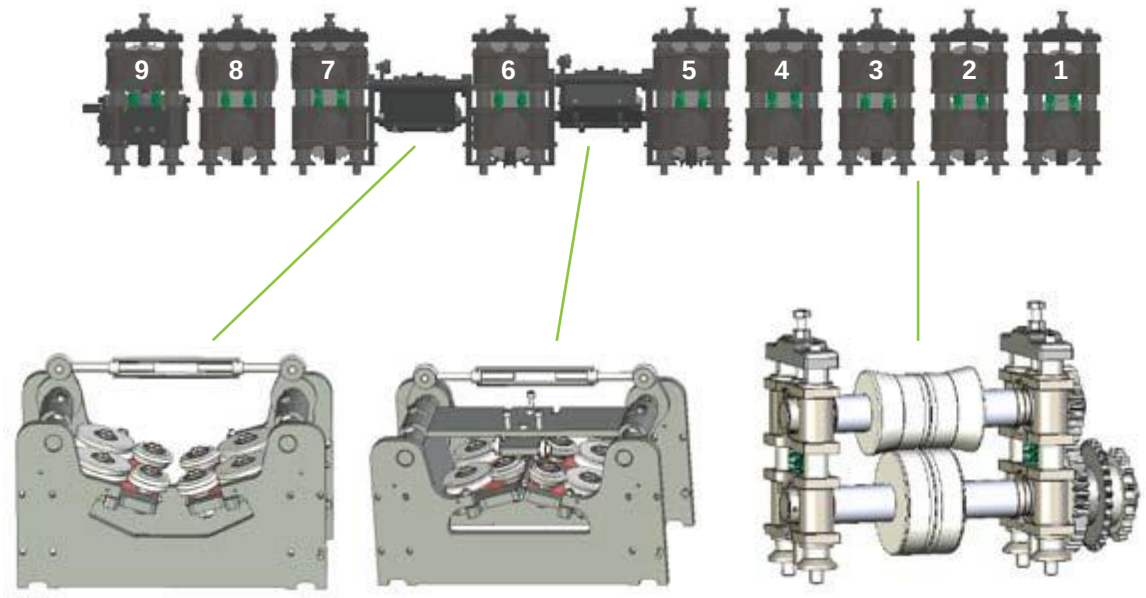
The FRAMECAD TF550H is prevented from starting until the Decoiler is powered and the Emergency Stop circuit has been reset. “Emergency Stop” and “Decoiler Not Ready” alarms will be present on the Operator Interface Screen until the Decoiler is powered and the Emergency Stop push-button reset. Inside the Decoiler the VFC unit is mounted as shown below:

Decoiler VFC (Variable Frequency Controller)

ELECTRIC SHOCK HAZARD!

DANGEROUS VOLATGES ARE PRESENT BENEATH THE SERVICE PANELS! ALWAYS ENSURE THAT THE DECOILER IS UNPLUGGED AND ELECTRICALLY ISOLATED FROM SUPPLY BEFORE REMOVING PANELS FOR SERVICE WORK.

6.4 The Roll-forming Section



Roll-forming Section with (x2) Lip Box Control Assemblies

The FRAMECAD TF550H forms a "C" section profile by passing the flat steel strip through 9 driven roll forming stations. These progressively bend the material to the exact dimensions specified at the time of order.

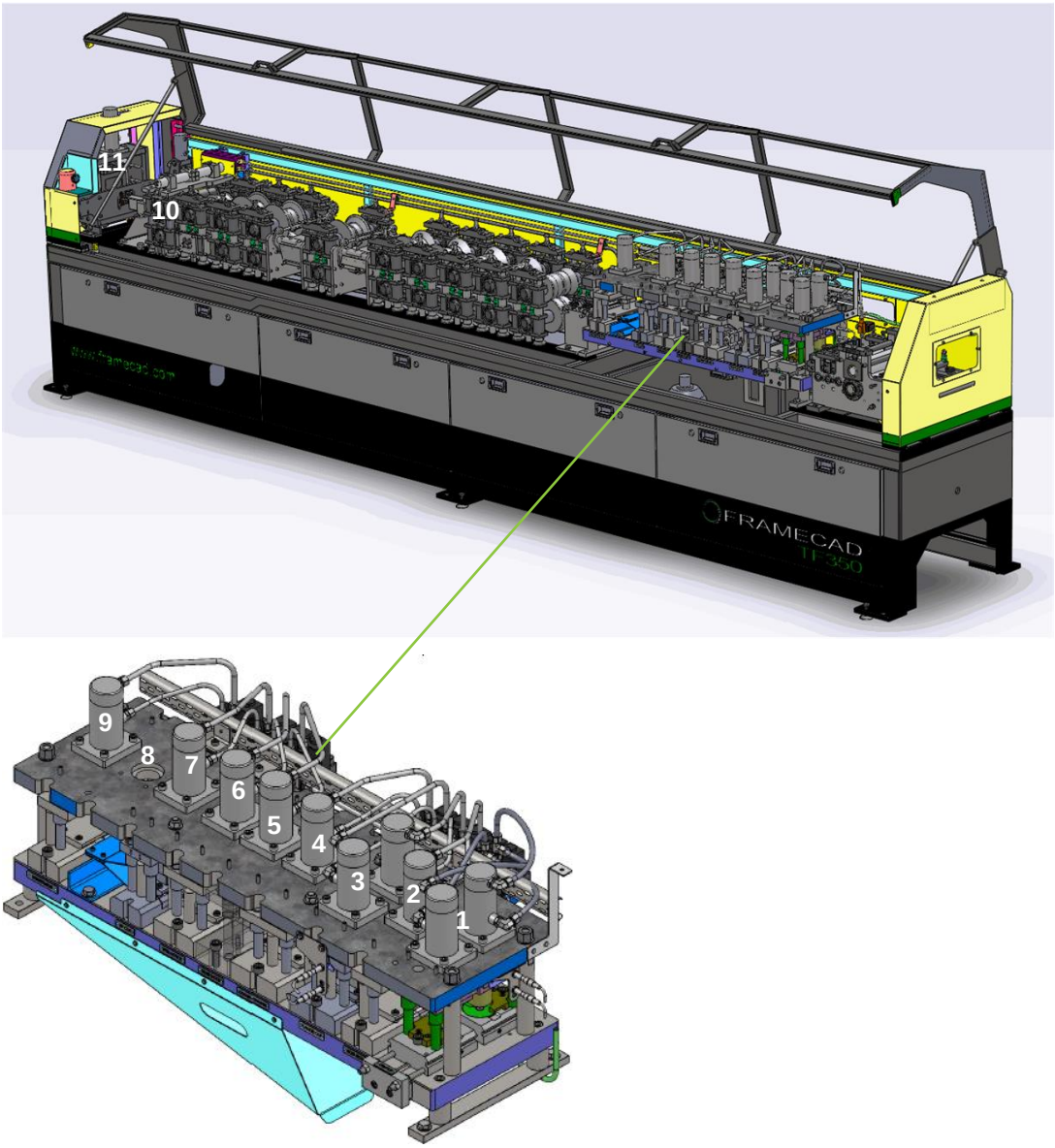
There 2 additional non-driven roller stations that form the lips of the “C” section. These are mounted in 2 lip control box assemblies that can be configured to either produce a lipped or un-lipped section ("C" or "U" section).

6.5 The Drive System

The drive system is based upon a high-torque, synchronous AC servo motor utilising a highly efficient low-backlash bevel gearbox. The geared servo motor is capable of delivering in excess of 1400Nm of rolling torque at its output shaft.

The power from the servo motor is then transmitted via multi chain drive system to the lower roll shafts. The top roll shafts are driven via meshing gears.

6.6 The Tooling Stations



Item	Description
1	Flange Cut Station
2	Flange Hole 0.15”
3	Dimple Tool Station
4	Chamfer Cut Tool Station
5	1.0” Web Hole Tool Station
6	Web Notch Tool Station
7	Lip Cut Tool Station (x2)
8	Web Triple Hole Tool Station
9	Service Hole Tool Station
10	Swage Tool Station
11	Shear (including Side Crimps) Tool Station

The tooling stations *punch* the forms, holes and cut outs required by the design to allow the simple assembly of walls, joists, and trusses.

There are 11 separate hydraulically driven tooling operations on the TF550H. These tools punch, cut or form the details in the steel strip, to allow the various frame components to be precisely assembled into the finished frame.

The first 9 tool stations are located at the start or in-feed of the machine and housed in an assembly termed the ***pre-punch*** block. These tools are located before the roll forming section and therefore process the steel strip while it is still flat (hence the term “pre-punch”).

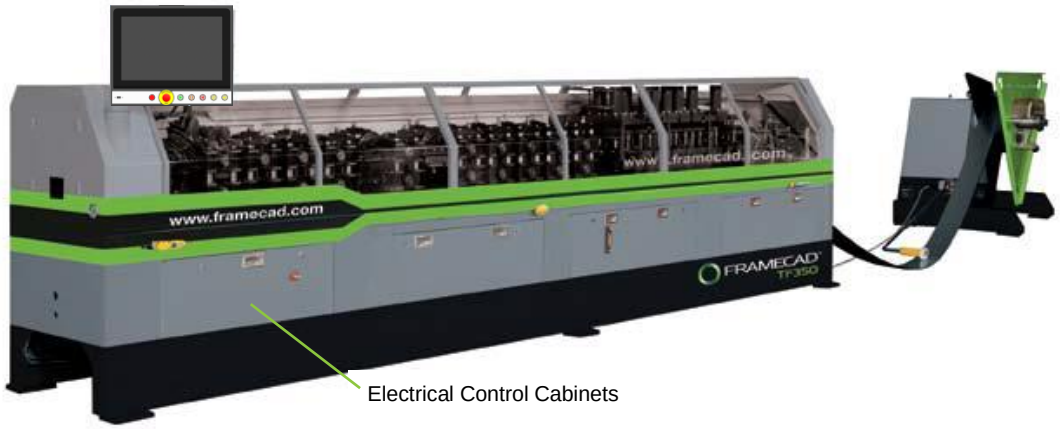
Some of the tool stations have adjustment capability built into them, whilst others are fixed. Tooling adjustment may be required if the finished product is out of specification. Some of these adjustments will be explained in the latter sections of this Manual.

The Swage[1)] and Shear tool stations are located at the out-feed end and operate on the profile after the roll forming section. The Shear is a "crimp shear" type, meaning that side “crimps” hold the “C” section profile whilst the shear (cut-off) operation is completed. This side-crimping shear operation is designed to reduce the natural tendency of the side flanges to want to “flare” outwards during the cut sequence, allowing for easier and more efficient assembly of the “C” section parts.

(1) The swage tool does not actually cut the steel but rather re-forms the section at the swage point to reduce the web width for easy insertion into other steel sections. On the TF550H the Swage is a rolling type, meaning that it is formed by the meshing of a top and bottom roller set, allowing the steel strip to continually roll forward whilst the Swage operation takes place.

6.7 The Electrical Controls

The electrical controls for the FRAMECAD TF550H are located behind the side cover at the out-feed end of the machine as shown below:



AC & DC Electrical Cabinet Cover

There are two cabinets mounted side by side: one for the 400VAC electrical controls, the other for the 24VDC electrical controls.

WARNING!

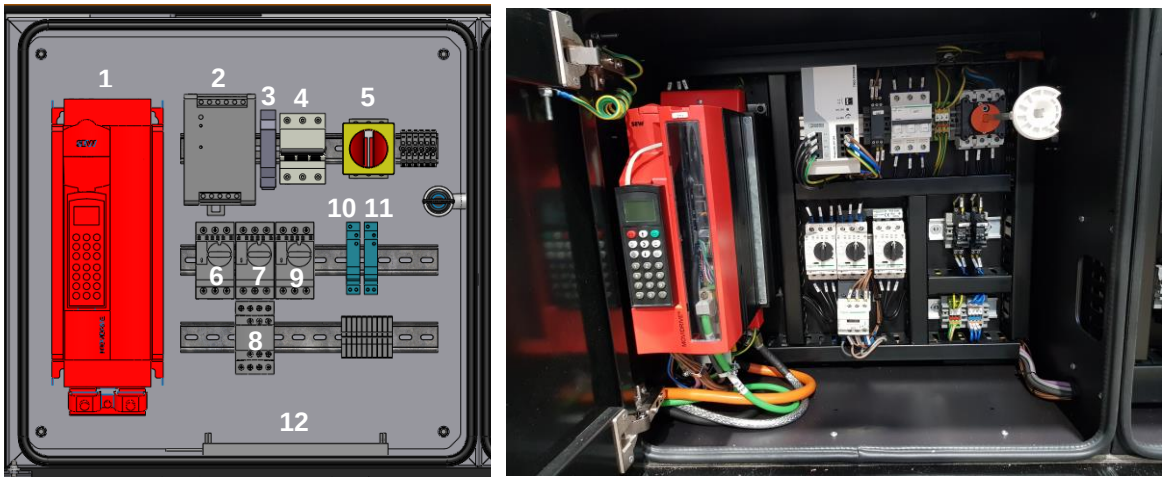
EVEN WITH THE ISOLATION SWITCH MOUNTED ON THE MACHINE IN THE OFF POSITION, DANGEROUS VOLTAGES STILL EXIST INSIDE THE ELECTRICAL CONTROL CABINETS. THE FRAMECAD TF550H MUST BE ELECTRICALLY ISOLATED FROM THE *SUPPLY SOURCE* TO THE MACHINE (E.G. AT THE CUSTOMER'S DISTRIBUTION BOARD) BEFORE ANY ELECTRICAL SERVICE WORK CAN BE UNDERTAKEN.

ALWAYS USE A LOCK-OUT TAG SYSTEM WHEN UNDRTAKING ANY SERVICE/MAINTENACE WORK ON THE MACHINE TO PREVENT ACCIDENTAL RECONNECTION.

NEVER RELY ON A SAFETY CIRCUIT TRIP (E.G. EMERGENCY STOP PUSH BUTTON OR GUARD SWITCH) TO PROVIDE ISOLATION FOR MAINTENACE, SERVICE OR REPAIR WORK TO THE MACHINE!

6.7.1 AC Electrical Cabinet

The primary components of AC electrical cabinet are highlighted below.



AC Electrical Cabinet Components

1. VFC (Variable Frequency Controller) – 2T1

The FRAMECAD TF550H VFC has two primary functions: the first is to control the position, speed and acceleration of the roll-forming servo motor and thereby the steel strip inside the machine. It does this by interpreting the speed and position feedback signals from the strip encoder and an encoder (resolver) connected to the roll-forming servo motor. The VFC receives speed and position ***target*** data from the computer control system and returns ***actual*** speed and position data back to the computer system.

The second function of the VFC is to act as a local digital input/output controller for various devices located within the AC or DC electrical control cabinets. For example, digital ***output*** signals to control items (such as the hydraulic pump motor start contactor) are sent to the VFC from the computer. The VFC will then switch on/off those items depending on the required logic state. Likewise, digital ***input*** signals such as that from the emergency stop safety controller will be connected to the VFC which will in turn transfer the logic state of these inputs back to the computer system.

The VFC receives all it control instructions from the computer system via a CANbus communication network. This is detailed further below.

2. 24VDC Power Supply – 5G1

24VDC power Supply. The power supply unit supplies the 24VDC control voltage for both AC and DC electrical cabinets as well as the computer and touch screen. The power supply uses a 400VAC input and provides a 24VDC output.

3. Hydraulic Pump Phase Rotation Relay – 5K1

This relay is used to prevent the 3-phase hydraulic pump motor from rotating in the wrong direction and causing damage. As the direction of rotation is determined by the phase sequence of the incoming 3-phase supply, this relay will prevent the hydraulic motor/pump from starting if the sequence is reversed.

4. 24VDC Power Supply Circuit Breaker – 5F7

This circuit breaker provides overload protection for the 400VAC/24VDC power supply

5. 400VAC Isolation Switch – 1Q1

Main electrical power supply Isolation switch.

WARNING!

EVEN WITH THE ISOLATION SWITCH IN THE OFF POSITION, DANGEROUS VOLTAGES STILL EXIST INSIDE THE ELECTRICAL CONTROL CABINETS. THE FRAMECAD TF550H MUST BE ELECTRICALLY ISOLATED FROM THE *SUPPLY SOURCE* TO THE MACHINE (E.G. AT THE CUSTOMER'S DISTRIBUTION BOARD) BEFORE ANY ELECTRICAL SERVICE WORK CAN BE UNDERTAKEN.

6. VFC Control Circuit Breaker – 2F1

VFC motor circuit breaker: this circuit breaker provides overload and short-circuit protection for the VFC unit and is set to **22Amps**.

This relay controls the hydraulic cooling fan at the out-feed end of the machine. This relay turns ON the hydraulic cooling fan whenever the hydraulic motor is started.

7. Hydraulic Motor Control Circuit Breaker – 3F1

Hydraulic motor circuit breaker: this circuit breaker provides overload and short-circuit protection for the hydraulic pump motor and is set to **15Amps**.

8. Hydraulic Motor Contactor – 3Q1

The hydraulic motor start contactor is fitted to the bottom of the hydraulic motor circuit breaker to allow stop/start control via the VFC and a control interface relay (see 10 below).

9. Decoiler Control Circuit Breaker – 4F1

Decoiler circuit breaker: this circuit breaker provides overload and short-circuit protection for the Decoiler and is set to **7.5Amps**.

10. Hydraulic Motor Contactor Control Interface Relay – 3K1

Whenever the computer control system requires hydraulic pressure, it will signal the VFC to turn on a digital output that will energise this relay. The relay will then supply a ***start signal*** to the hydraulic motor contactor, turning on the contactor and allowing the hydraulic motor (and therefore pump) to start. The relay simply acts as an interface between the low current output from the VFC and the higher current requirements of the hydraulic motor contactor starting coil.

11. Hydraulic Cooling Fan Control Interface Relay – 3K2

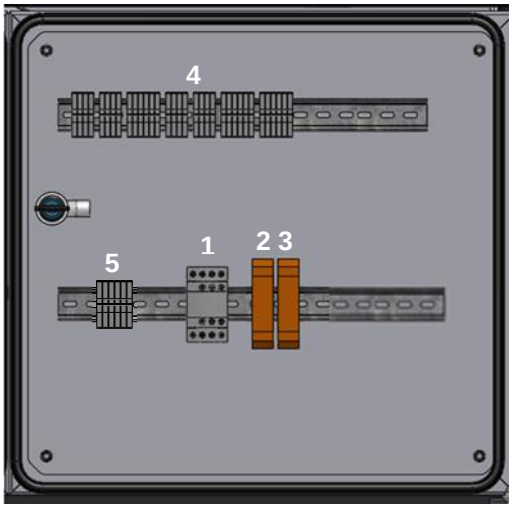
Whenever the computer control system requires hydraulic pressure, it will signal the VFC to turn on a digital output that will energise this relay. The relay controls the hydraulic cooling fan such that when the hydraulic motor/pump is started the cooling fan motor is started at the same time. The relay simply acts as an interface between the low current output from the VFC and the higher current requirements of the hydraulic cooling fan motor.

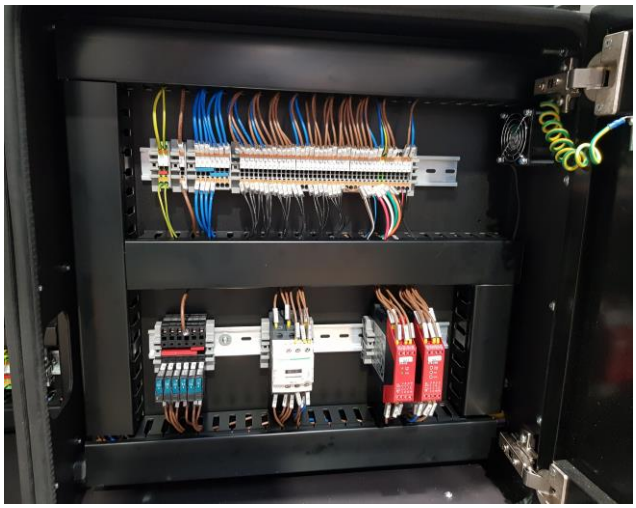
12. VFC Breaking Resistor – 2E1

The braking resistor is used to adsorb any excess energy in the servo motor system (and therefore the VFC) during rapid deceleration of the roll-former section. This excess energy must be dissipated via this resistor to prevent damage to the VFC.

6.7.2 DC Electrical Cabinet

The primary components of DC electrical cabinet are highlighted below.





DC Electrical Cabinet Components

1. Safety Contactor – 8K1

The Safety Contactor is used to switch on or off the 24VDC control voltage to devices where there is a potential safety risk or hazard associated with the functional operation of that device. The safety contactor is controlled by the Emergency Stop and/or Guard safety controllers. In the event of an Emergency Stop or safety Guard switch activation, the safety contactor will be de-energised, interrupting the 24VDC control voltage and rendering output devices such as the VFC and all hydraulic circuit components inoperable.

2. Emergency Stop Safety Controller – 8A1

The Emergency Stop safety controller monitors the emergency stop push-button circuit (including the Decoiler). If this circuit is interrupted by the activation of an emergency stop push-button, the emergency stop safety controller will de-energise the safety contactor (see item 1 above), switching off the 24VDC control voltage for output devices.

3. Guard Switch Safety Controller – 8A2

The Guard Switch safety controller monitors the safety cover magnetic switches. If either of these circuits is interrupted by the opening of the safety cover, the guard switch safety controller will de-energise the safety contactor (see item 1 above), switching off the 24VDC control voltage for output devices.

4. DC Cabinet Terminal Rail – X1

All 24VDC field wiring (that is wiring between the electrical control cabinets and external devices) are connected to the DC Electrical Control Cabinet via this termination rail.

5. 24VDC Circuit Protection Fuses – 5F1 to 5F6

24VDC Circuit Protection fuses are utilised to provide overload and short-circuit protection for the 24VDC circuits. The associated fuse for each circuit is shown below:

24VDC Circuit Protection Fuses

5F1 (6A) – 24VDC Computer & Screen Power Supply
5F2 (2A) - 24VDC Safety Controllers & Distributed I/O Module Power Supply
5F3 (6A) – 24VDC Outputs Supply (via Safety Contactor)
5F4 (2A) – 24VDC Ink Jet Printer Controller Power Supply
5F5 (2A) – 24VDC Roll-former Servo Motor Cooling Fan
5F6 (10A) – 24VDC Hydraulic Cooling Fan

6.7.3 AC UL Certified Electrical Cabinet

The primary components of the UL certified AC electrical cabinet are highlighted below.

AC Electrical Cabinet Components

1. VFC (Variable Frequency Controller) – 2U1

The VFC has two primary functions. the first is to control the position, speed and acceleration of the roll-forming servo motor and thereby the steel strip inside the machine. It does this by interpreting the

speed and position feedback signals from the strip encoder and an encoder (resolver) connected to the roll-forming servo motor. The VFC receives speed and position *target* data from the computer control system and returns *actual* speed and position data back to the computer system.

The second function of the VFC is to act as a local digital input/output controller for various devices located within the AC or DC electrical control cabinets. For example, digital *output* signals to control items (such as the hydraulic pump motor start contactor) are sent to the VFC from the computer. The VFC will then switch on/off those items depending on the required logic state. Likewise digital *input* signals such as that from the emergency stop safety controller will be connected to the VFC which will in turn transfer the logic state of these inputs back to the computer system.

The VFC receives all it control instructions from the computer system via a CANbus communication network. This is detailed further below.

2. 24VDC Power Supply – 29V1

24VDC power Supply. The power supply unit supplies the 24VDC control voltage for both AC and DC electrical cabinets as well as the computer and touch screen. The power supply uses a 400VAC input and provides a 24VDC output.

3. Hydraulic Pump Phase Rotation Relay – 28K7

This relay is used to prevent the 3-phase hydraulic pump motor from rotating in the wrong direction and causing damage. As the direction of rotation is determined by the phase sequence of the incoming 3-phase supply, this relay will prevent the hydraulic motor/pump from starting if the sequence is reversed.

4. 24VDC Power Supply Fuses 3off – 29F1

This circuit breaker provides overload protection for the 400VAC/24VDC power supply

5. 400VAC Isolation Switch – 10Q1

Main electrical power supply Isolation switch.

6. VFC Control Fuse 3off – 12F2

VFC motor circuit breaker: this circuit breaker provides overload and short-circuit protection for the VFC unit.

This relay controls the hydraulic cooling fan at the out-feed end of the machine. This relay turns ON the hydraulic cooling fan whenever the hydraulic motor is started.

7. Hydraulic Motor Control Circuit Breaker – 24Q1

Hydraulic motor circuit breaker: this circuit breaker provides overload and short-circuit protection for the hydraulic pump motor and is set to 12Amps.

8. Hydraulic Motor Contactor – 24K1

The hydraulic motor start contactor is fitted to the bottom of the hydraulic motor circuit breaker to allow stop/start control via the VFC and a control interface relay (see 10 below).

9. De-coiler Control Fuse 3off – 28F1

De-coiler circuit breaker: this circuit breaker provides overload and short-circuit protection for the De-coiler – see electrical drawing for fuse size

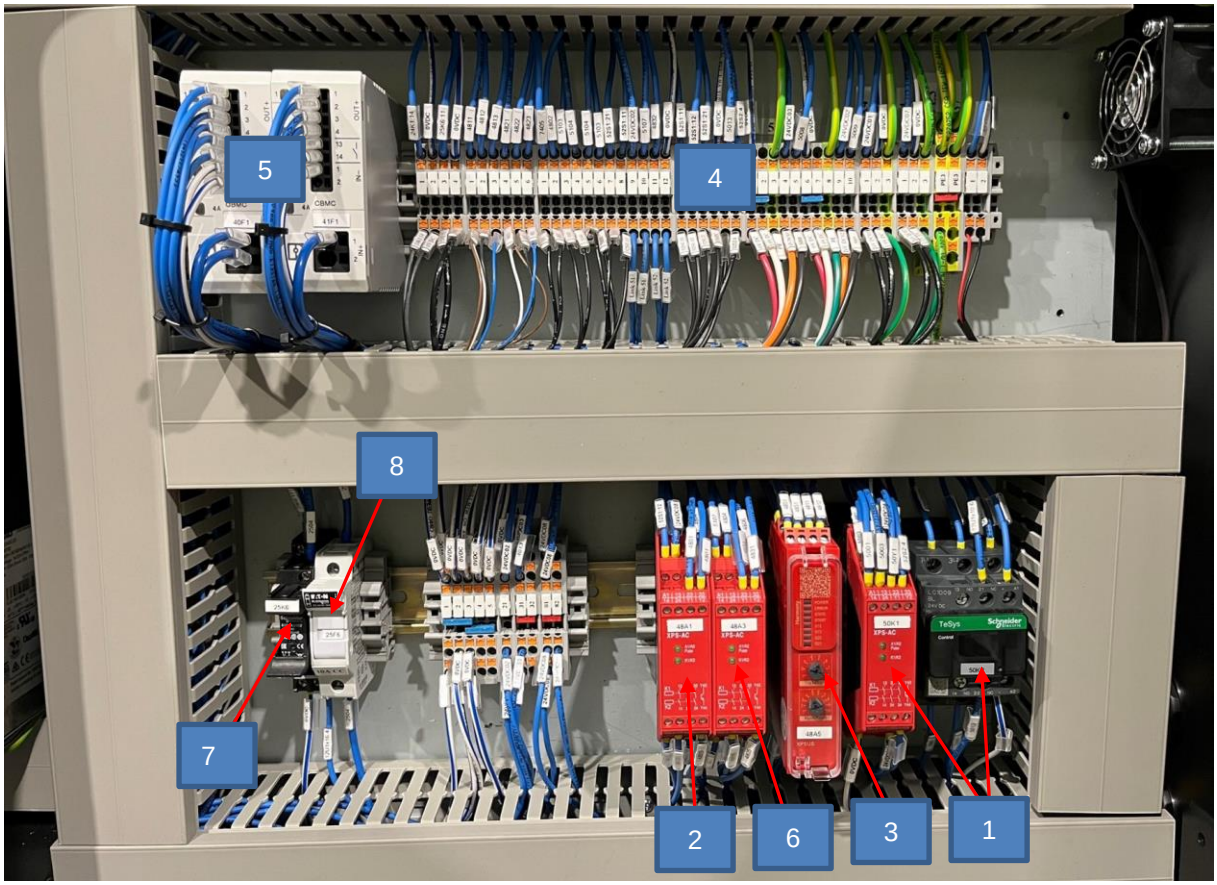
10. Hydraulic Motor Contactor Control Interface Relay – 24K2

Whenever the computer control system requires hydraulic pressure, it will signal the VFC to turn on a digital output that will energise this relay. The relay will then supply a *start signal* to the hydraulic motor contactor, turning on the contactor and allowing the hydraulic motor (and therefore pump) to start. The relay simply acts as an interface between the low current output from the VFC and the higher current requirements of the hydraulic motor contactor starting coil.

11. VFC Breaking Resistor – 2E1

The braking resistor is used to adsorb any excess energy in the servo motor system (and therefore the VFC) during rapid deceleration of the roll-former section. This excess energy must be dissipated via this resistor to prevent damage to the VFC

6.7.4 DC UL Certified Electrical Cabinet



1. Safety Contactor – 50K1-50K2

The Safety Contactor is used to switch on or off the 24VDC control voltage to devices where there is a potential safety risk or hazard associated with the functional operation of that device. The safety contactor is controlled by the Emergency Stop and/or Guard safety controllers. In the event of an Emergency Stop or safety Guard switch activation, the safety contactor will be de-energised, interrupting the 24VDC control voltage and rendering output devices such as the VFC and all hydraulic circuit components inoperable.

2. Emergency Stop Safety Controller – 48A1

The Emergency Stop safety controller monitors the emergency stop push-button circuit (including the Decoiler). If this circuit is interrupted by the activation of an emergency stop push-button, the emergency stop safety controller will de-energise the safety contactor (see item 1 above), switching off the 24VDC control voltage for output devices.

3. Guard Switch Safety Controller – 48A5

The Guard Switch safety controller monitors the safety cover magnetic switches. If either of these circuits is interrupted by the opening of the safety cover, the guard switch safety controller will de-energise the safety contactor (see item 1 above), switching off the 24VDC control voltage for output devices.

4. DC Cabinet Terminal Rail – X6

All 24VDC field wiring (that is wiring between the electrical control cabinets and external devices) are connected to the DC Electrical Control Cabinet via this termination rail.

5. 24VDC Circuit Protection Fuses – 40F1-45F1

24VDC Electronic Circuit Protection fuses are utilised to provide overload and short-circuit protection for the 24VDC circuits. Fuse alarm on factory2 screen. Indicators Green-OK, Red-Overload, Off-Off. Press indicator to RESET

6. Decoiler guard switch 48A3

Safety controller - optional

7. Hydraulic Cooling Fan Interface Relay

Whenever the computer control system requires hydraulic pressure, it will signal the VFC to turn on a digital output that will energise this relay. The relay controls the hydraulic cooling fan such that when the hydraulic motor/pump is started the cooling fan motor is started at the same time. The relay simply acts as an interface between the low current output from the VFC and the higher current requirements of the hydraulic cooling fan motor

8. Hydraulic Cooling Fan Fuse

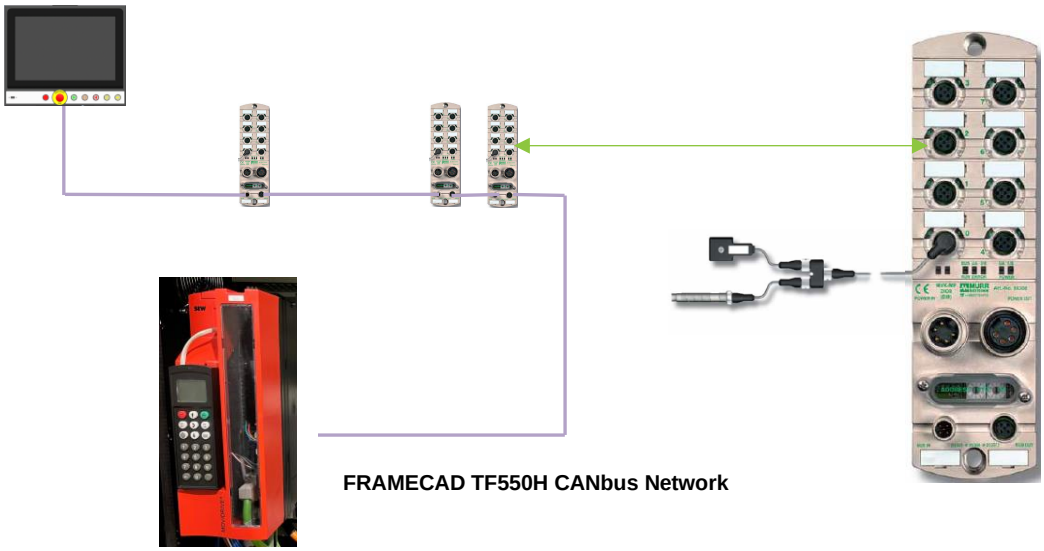
Protection fuse.

6.7.5 CANbus Communication Network

The FRAMECAD TF550H utilises a CANbus communication network. The network allows the computer control system to interface with devices such as hydraulic valves, sensors and the VFC (Variable Frequency Controller).

The computer control system incorporates a CANbus interface card that is connected via a CANbus cable to a number of digital input/output modules mounted on the machine chassis. These modules act as the interface between the computer control system and the various hydraulic valves and sensors on the machine. To activate a valve or to read the logic state of a sensor, the computer control system will communicate with these devices over the CANbus network.

The CANbus network is also connected to the VFC located in the AC Electrical Control Cabinet. In this way the computer control system can send/receive position and speed data to/from the VFC. The VFC also acts as a digital input/output controller for localised devices within the electrical control cabinets.

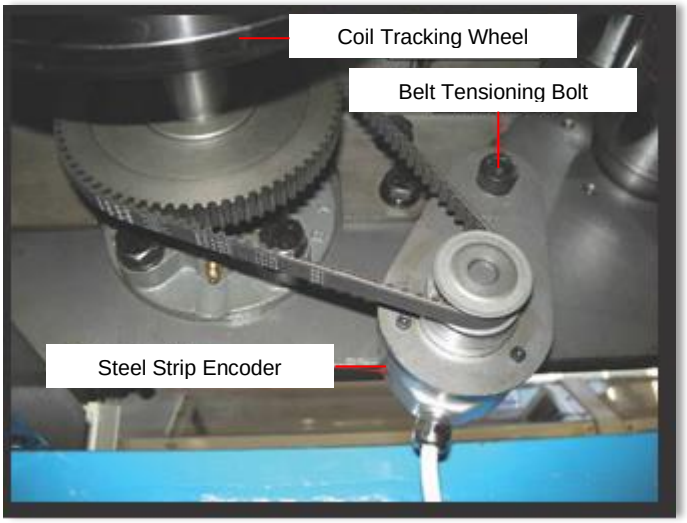


FRAMECAD TF550H CANbus Network

6.7.6 Encoder Connections

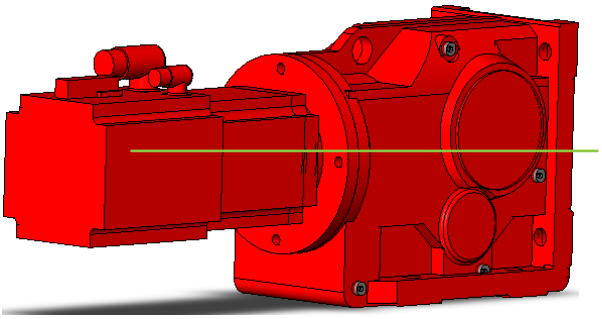
High resolution encoders provide position and speed feedback to the VFC for both the steel strip running inside the machine and the servo motor.

The steel strip encoder is mounted below the in-feed/Straightener unit of the machine. An example is shown below:



Strip Encoder – mounted below the Infeed/Straightener Unit

The VFC also requires the speed and angular position of the roll-forming section servo motor. A high-resolution encoder mounted inside the cooling fan end of the servo motor to provide this feedback.



Servo Motor Encoder/Resolver

6.7.7 End Cover Controls

Mounted at the in-feed and out-feed end of the FRAMECAD TF550H are selector switch controls for *Inching*[1)] the steel strip both Forward and in Reverse. This function is only permitted in ***manual*** operation.

Inch Selector Switches – located at either end of the machine (i.e. In-feed and Out-feed ends)

(1) The term *Inching* here relates to the method of applying a signal via a selector switch to the computer control system which in turn will drive the roll-forming servo motor in either the forward or reverse direction (depending on the function being actuated).

The following conditions will be present:

- **The speed at which the roll-forming motor will operate at is reduced.**
- **the motor *will* continue to rotate while the Inch selector switch is activated – this is to allow accurate positioning of the steel strip using the Inching method.**
- **Inching is only possible while the FRAMECAD Factory 2 control software is in Manual control mode.**

6.8 The Hydraulic System

The hydraulic tools are operated by solenoid activated hydraulic cylinders. The 7.5kW hydraulic motor generates pressure via a gear pump.

Hydraulic Pump + Motor

A nitrogen pressurised 10litre accumulator tank provides additional capacity during tooling operations to allow the hydraulic system to run at higher efficiency and speed.

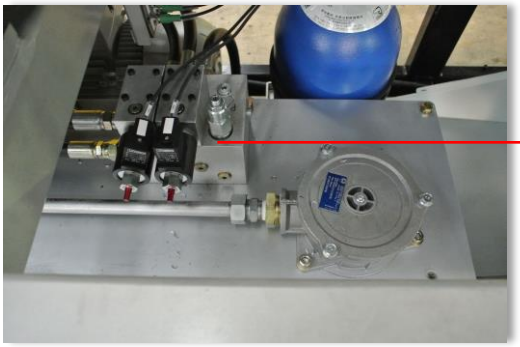
10ltr Nitrogen Charged Accumulator

The hydraulic tank (reservoir) stores surplus oil. This excess volume assists with cooling the oil due to the increased surface area provided by the tank. The system has a Hydraulic Cooling Radiator situated next to the hydraulic tank. This provides additional cooling for the hydraulic oil by means of an electrically operated fan that removes heat from the return circuit.

Hydraulic tank with level indication

The FRAMECAD TF550H hydraulic system has an electrically actuated pressure un-loader valve and an Enable valve (also referred to as a Dump valve) located in a mono-block housing on top of the hydraulic tank. These control the operating pressure range of the system. Whenever there is a call for hydraulic pressure, both these valves will energise to allow pressure to build. Once the pressure reaches the ***unload*** set-point (typically 190Bar) the Un-loader valve will be turned OFF to allow the pressure to drop to a value of approximately 180-185Bar, at which point it will be turned back ON again. The Un-loader valve is therefore turned ON and OFF to regulate the system pressure between 180-190Bar.

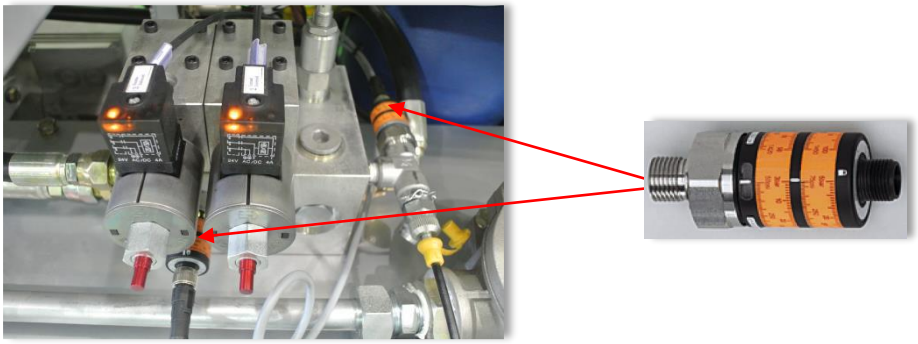
In addition to the Electric Enable and Unloader solenoid valves, the Unloader Block also incorporates a Pressure Relief valve to prevent over-pressurising the system.

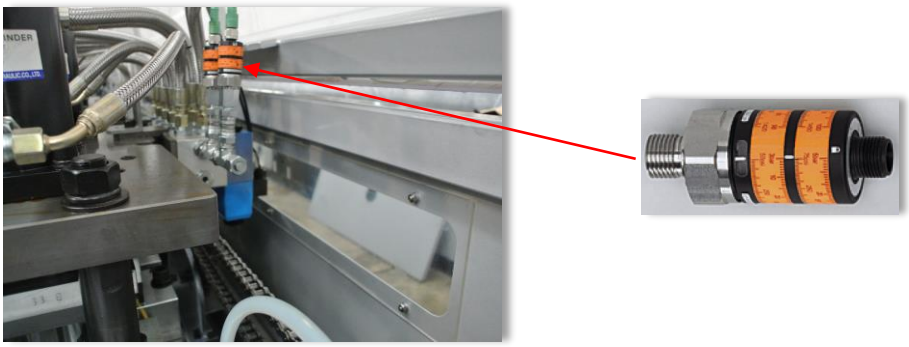


Unloader Block:
This includes Electric Unloading and Enable (Dump) solenoid valves and a pressure relief valve

Unloader Block + Return Filter

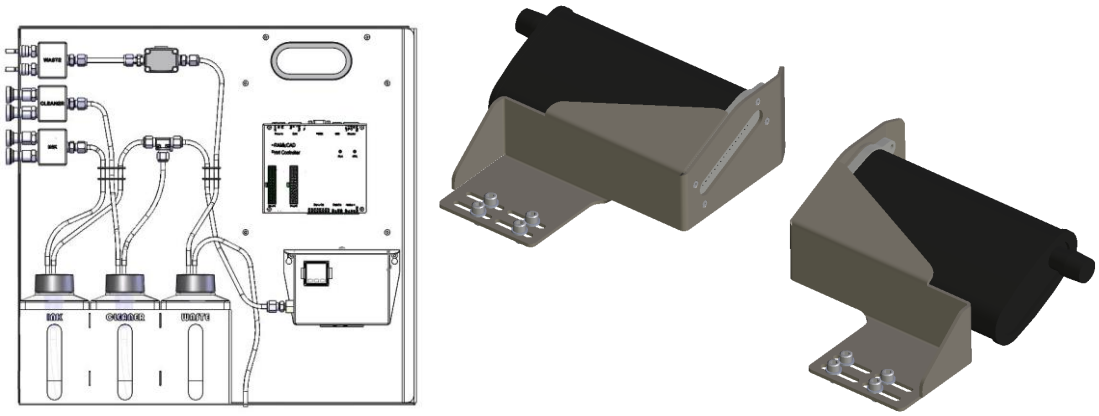
System pressure feedback is provided by ***two*** pressure switches (typically mounted on the Unloader Block **OR** on the top pre-punch tool manifold). Examples of these mounting positions are shown below:





Pressure Switch Mounting Options: Top – Pressure Switches mounted on Unloader Block, Bottom – Pressure Switches mounted on Pre-punch Tool Manifold

6.9 The SX32I Printer Control System



SX32I Printer Delivery System and Print Controller Cabinet (Left) and the SX32I Jet Printer Heads (Right)

The FRAMECAD TF550H is fitted with a pressurised SX32I jet printing system that incorporates a print controller (which provides the interface between the computer system and the printer heads) and two 16 port printer heads placed either side of the stick.

The printing system allows individual identification text to be printed on every stick. Less specific User text can also be printed, and this may include general information about a manufacturers/customer's website, contact information or even a manufacturing date.

IMPORTANT!

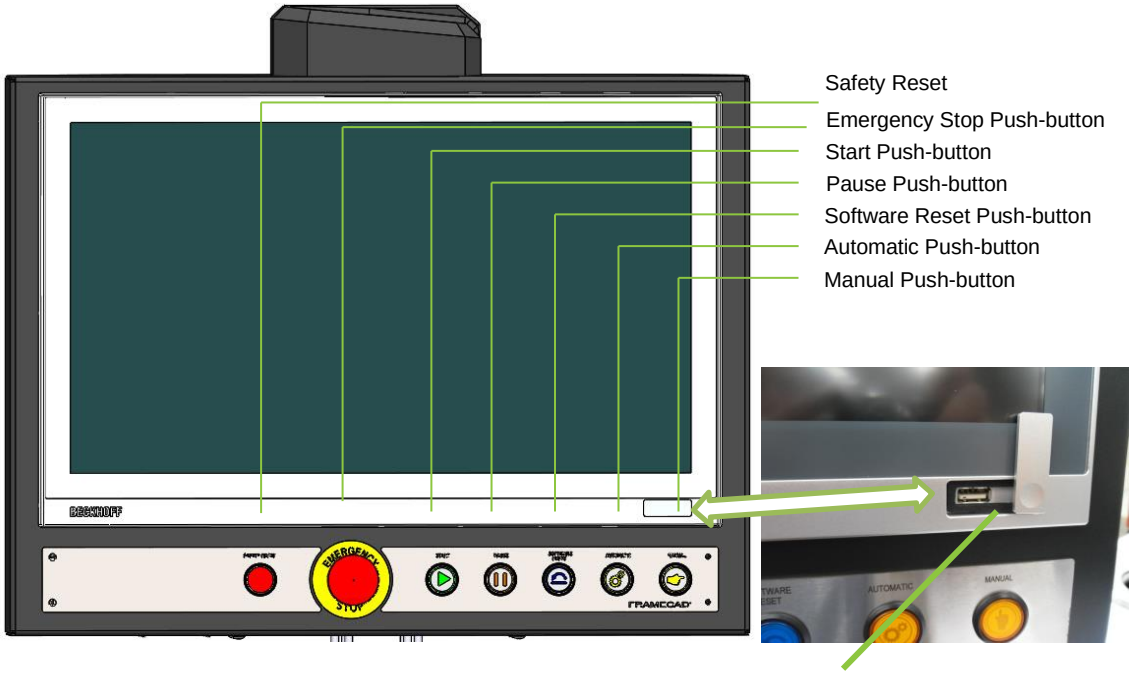
IT IS A CONDITION OF WARRANTY ON ALL PARTS RELATED TO THE INK AND CLEANER PRINTING SYSTEM USE INK AND CLEANER TYPES SPECIFIED IN SECTION 4 – INK & CLEANER FLUID.

PLEASE ALSO NOTE THAT THE INK AND CLEANING PRINTER SYSTEM REQUIRES A REGULAR CLEANING AND MAINTENANCE REGIME NN (SEE SECTION 13 FOR MORE INFORMATION)

6.10 Computer System & Operator Screen Controls

ALL FRAMECAD TF550H machines use a 21.5” touch sensitive screen for the Operator control interface. The Operator Screen allows the FRAMECAD TF550H to be configured and jobs to be managed along with other various setup and control options.

The main computer controller is housed in the rear of the Operator Screen cabinet.



TF550H Operator Screen

The computer system incorporates solid-state technology to both simplify the system architecture and improve reliability.

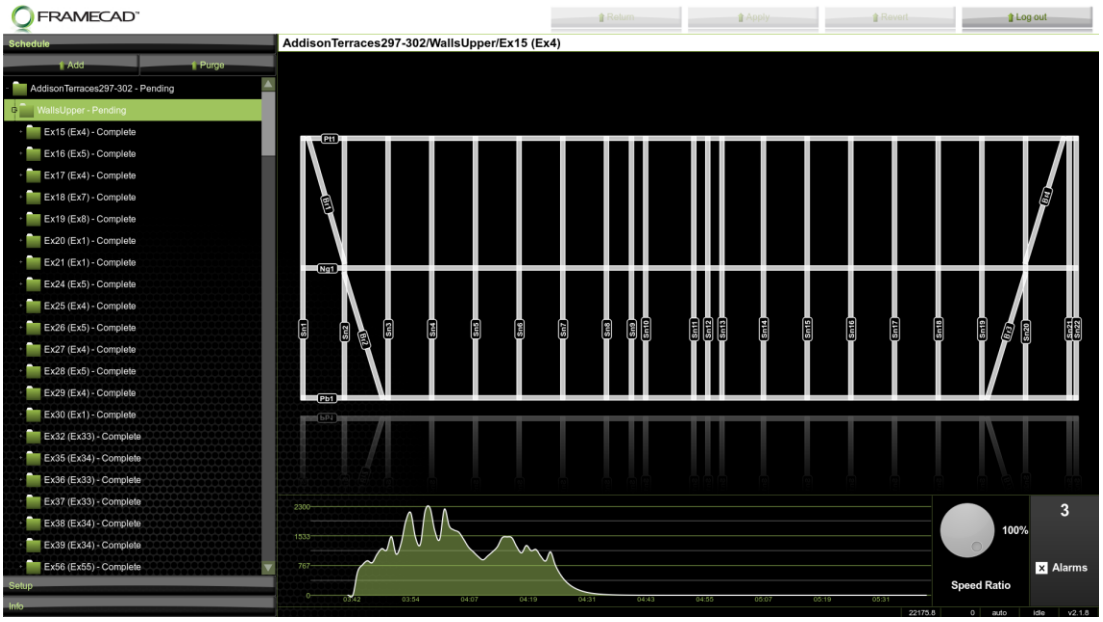
The computer system communicates with the VFC and digital Input/output modules via a CANbus network. This network allows the computer to manage speed and position, receive the input state of all the push buttons and sensors, and control the hydraulic valves/motor and indicator lights on the machine.

6.11 FRAMECAD Factory Software

The FRAMECAD TF550H is controlled by licensed and proprietary FRAMECAD Factory Software. A job “project” that is comprised of frame assembly and manufacturing data (.RFY) is loaded via a USB memory stick or network connection into the machine computer. This information is then translated by the software into the various tooling operations and stick lengths to produce the required framing components.

The FRAMECAD Factory software also allows the operator to:

- Reconfigure the manufacturing order of panel assemblies in the “job” schedule
- Add / Remove tooling operations
- Collect diagnostic information on items such as material produced, waste produced, tool operation counts and an operation log
- Calibrate the machine for stick length accuracy and tool operation placement accuracy
- View the shape and status of the current frame being produced
- Manage the overall speed and acceleration of the machine
- Manually operate the machine and all its tooling operations
- View the status of the electrical Input/output for troubleshooting purposes
- Set the up/down times for each tool operation
- Trend various operating parameters in near real time.



Example of a FRAMECAD Factory 2 Automatic Production Job

IMPORTANT NOTE!

THE DETAILED DESCRIPTION OF THE FRAMECAD FACTORY 2 SOFTWARE IS PRESENTED IN ‘FRAMECAD FACTORY 2 V2.9.6 SUPPLEMENTARY MANUAL’

7 Installation

This Section details the installation requirements of the FRAMECAD TF550H machine. It also includes *pre-delivery* considerations that will assist with initial planning and longer-term management of your FRAMECAD TF550H.

CAUTION!

ALL PROCEDURES DETAILED IN THIS SECTION ARE DESIGNED TO BE COMPLETED WITH ELECTRICAL POWER ISOLATED TO THE MACHINE AND WITHOUT STEEL STRIP INSERTED.

IT IS HIGHLY RECOMMENDED THAT A FRAMECAD TECHNICIAN IS PRESENT TO ASSIST WITH THE PROCEEDURES DESCRIBED HEREIN.

DAMAGE DONE TO THE MACHINERY AND/OR DELAY'S IN PRODUCTION STARTUP DUE TO INCORRECT INSTALLATION IS THE RESPONSIBILITY OF THE CUSTOMER OR CUSTOMER'S AGENTS.

7.1 Pre-delivery Checklists

Prior to the machine being delivered, you will have been sent a *pre-delivery checklist*. The primary objective of the checklist is to avoid any unnecessary delays in the commissioning of the FRAMECAD TF550H machine.

It also acts as a guide to the kind of things that must be planned and managed post-commissioning. Essential questions around resource training and raw materials, consumables and the like are all critical to the success of any long-term production plan.

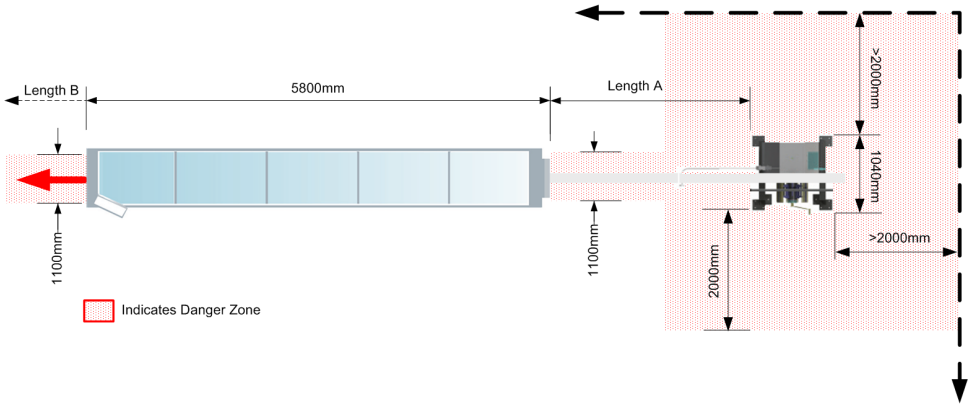
Some of the items that must be considered prior to commissioning the FRAMECAD TF550H machine are:

PRE-DELIVERY CONSIDERATIONS	
Steel Coil	Has the correct specification steel been ordered? Is the steel strip width correct for the machine specification? Is the thickness and tensile strength correct for the machine specification? Has enough steel stock been ordered and will it be available in time for commissioning the machine (depending on location there can be significant delays between order and delivery of steel)?
Fastenings & Consumables	Typically, a *Starter Kit* (see Appendix A for a standard list of items) will be supplied with the machine that includes a sample of fasteners and other consumables (examples may include screws and plastic grommets for electrical cable protection inside of wall panel service holes) as an initial guide to the type recommended for general purpose frame assembly. However, the correct quantity and type will depend on the projects being undertaken and preference by those assembling. It is important to ensure the right type and quantity is available to suit *your purposes*. For further information, please consult with your local FRAMECAD Office or contact our support Helpdesk.
Framing Tools	Typically, a *Starter Kit* (see Appendix A for a standard list of items) will be supplied with the machine that includes a number of frame assembly tools as an initial guide to the type recommended for general purpose frame assembly. This is a very basic kit that with experience may need to be developed and extended to suit your requirements and/or preference.

Continued	The following is an example of the type of tools that should be considered as part of a more extensive framing tool-kit – please note that many of these items are not included in the standard *Starter Kit*. • Sheet steel shears (“tin snips”). These need to be high quality and capable of cutting the steel thickness being used. For steel >0.8mm thick, electric cutting shears are recommended. • Cordless (battery-powered) Impact Drivers, one per Assembler is required. These should be high torque, reliable and lightweight (good examples are Hitachi WH14DL / WH18DL). • Calibrated and high accuracy Vernier Caliper, digital or manual, capable of measuring up to 200mm. • 100mm Engineers Square. • 8-meter Measuring Tape. • 300mm Steel Rule. • Steel Scribe. • Snub-nose Pliers • Chalk-line, Stringline • Engineers Steel Hammer. • 2.4m Spirit Level.
Steel Coil Management	How will steel coil stock be stored? How will the steel coil stock be moved around the factory and loaded onto the Decoiler? Without the right kind of storage and lifting equipment, managing steel coil can be extremely dangerous. FRAMECAD recommend a certified rolling gantry with block and tackle setup for the safe lifting of steel coil. The gantry should be rated to safely lift the heaviest steel coil to be used. Due consideration should also be given to the lifting height and transference of coil to/from the Decoiler.
Electrical Supply	Ensure that the Electrical Supply has been installed and is appropriately sized. Cables should be protected from mechanical damage and/or interference: this includes the connection cable between the Decoiler and FRAMECAD TF550H. Make sure that safe earth bonding practice has been followed and the installation has been certified compliant to local standards by a registered Electrician.
Factory Layout	One of the most frequently overlooked considerations is the *factory* layout. The location and orientation of the FRAMECAD TF550H and Decoiler needs to be properly allowed for to ensure efficient operation. The physical footprint of the machines and equipment along with the length of the assemblies to be made all need to be allowed for. Safe access to the Decoiler for loading steel coil is another key consideration. The Decoiler for example, can be ordered as either ***left*** or ***right*** loading.

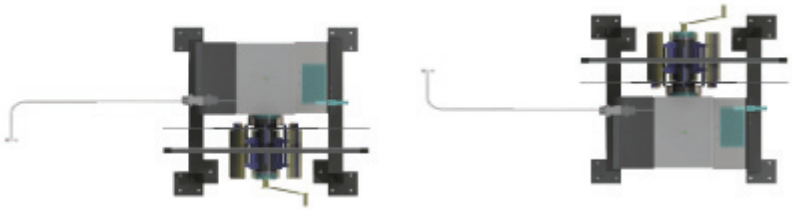
The following machine floor plan highlights the basic machine layout configuration.

NOTE!
Allowance must be made safe working access. Recommended clearance to boundary walls and space around the machine is shown below:



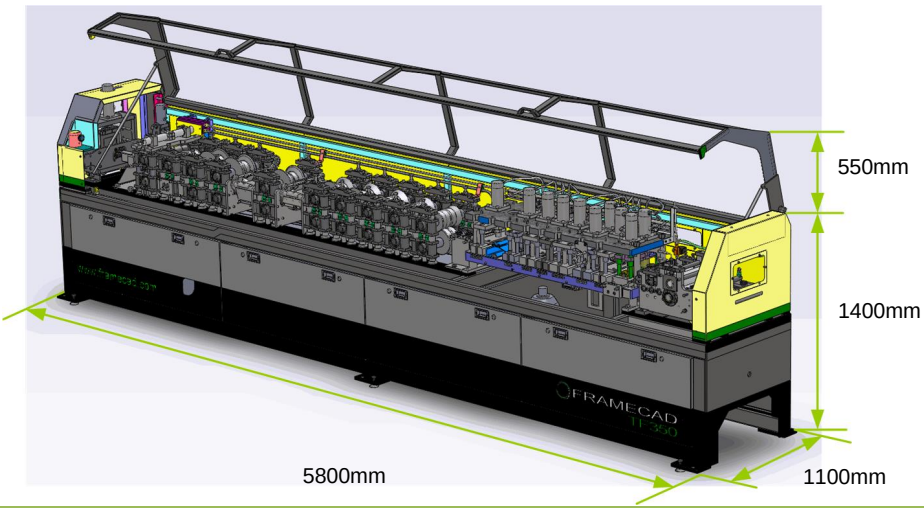
Length A (minimum distance Decoiler to FRAMECAD TF550H in-feed):
Length A for <1mm Steel Thickness = 3000mm
Length A for =>1mm Steel Thickness = 4000mm

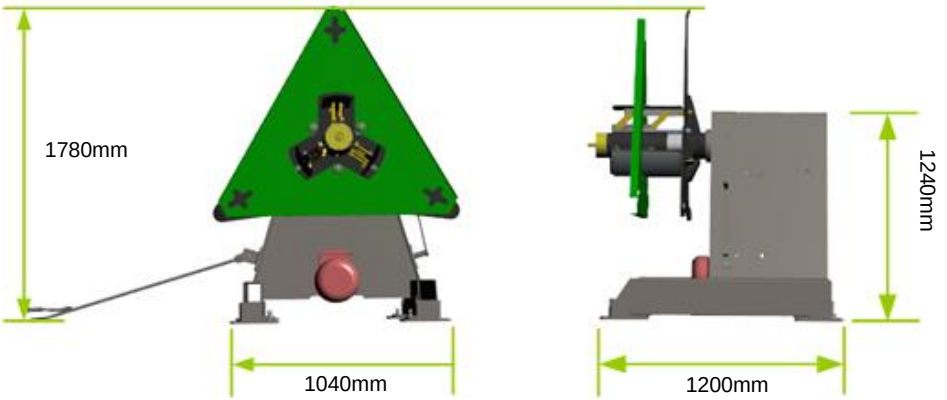
Length B (out-feed distance):
Length B is dependent on the length of frame assemblies being manufactured



***Left* and *Right* loading orientation for Decoiler**

Full machine dimensions are shown below:



	FRAMECAD TF550H  **FRAMECAD Decoiler Dimensions (3T Unit)**
Lubricants	Ensure lubricant for steel strip has been provided (typically a 20litre drum mixture is sufficient as a start). Also ensure that you have the following general maintenance lubricants available: • Chain Lubricant. • Grease. • General Machine Oil
Spare Parts	Recommended spare parts and management of these is detailed in Section 15 - Recommended Spares
Machine Tools	A basic tool kit is supplied with every FRAMECAD TF550H for general day to day service and maintenance. It is important to replace these tools as they wear. It is also recommended to have a source of compressed air to assist with keeping the machine clean and free of debris.

7.2 Unloading the FRAMECAD TF550H

WARNING!

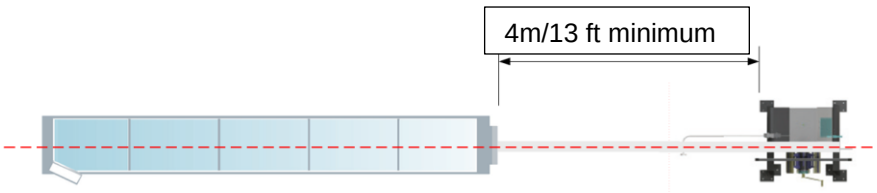
FRAMECAD HIGHLY RECOMMENDS THE USE OF SPECIALIST MACHINERY MOVING CONTRACTORS TO ENSURE THE SAFE UNLOADING AND TRANSFER TO FINAL INSTALLATION AREA.

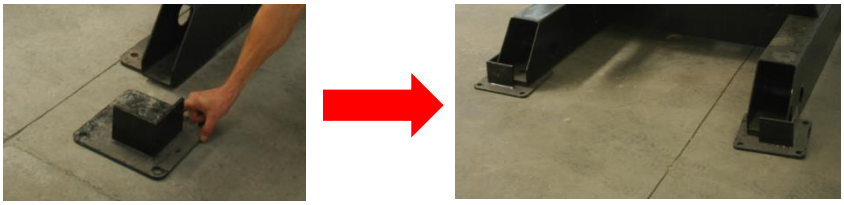
ENSURE THAT THE STAFF INVOLVED IN THE MOVING OF THE FRAMECAD TF550H ARE FULLY TRAINED AND COMPETENT FOR THIS PURPOSE. USE ONLY CERTIFIED AND APPROPRIATELY SIZED MOVING EQUIPMENT.

Unpacking	
Tools Required	• Fork Hoist with a lifting capacity of at least 5000kg • 1 Tonne Shackle and Chain • Specialist machinery moving equipment (such as dollies) for transporting the machines to the required factory location
Safety	The FRAMECAD TF550H and Decoiler will typically arrive in shipping container. • ALWAYS unload the machines in a clean and dry location, free of dust, moisture, dirt, or other airborne contaminants that become entrapped inside the equipment. • ENSURE that any Fork Hoist Operators are fully licensed and experienced in moving heavy loads • Take extreme care when moving/lifting machines and/or crates • Use caution when extracting packaging screws/nails • Where possible, FRAMECAD will use recyclable packaging – do not dispose to landfill – always consider the environmental impact of waste material
Unloading the FRAMECAD TF550H	1. Take extreme care when removing the machine from the container. Use caution to avoid damage to the computer screen, protective covers and other auxiliary items. FRAMECAD strongly recommends the use of a specialist machinery moving contractors who will have the right equipment and know-how to perform this task. 2. Move the FRAMECAD TF550H as close as practical to the final installation area – be sure the floor area is flat:
Unloading the Decoiler	Carefully lift the Decoiler using the eyebolt mounted on top of the main body, using a shackle and chain rated to 1Tonne. Transfer the Decoiler as close as practical to the final installation area – be sure the floor area is flat.  Decoiler Lifting Eye Bolt

	WARNING! **NEVER LIFT THE DECOILER WITH A STEEL COIL LOADED ONTO THE MANDREL!**

7.3 Positioning the FRAMECAD TF550H and Decoiler

POSITIONING THE FRAMECAD TF550H AND DECOILER	
Tools Required	• Screwdriver • Chalk lines • Anchor Bolts suitable for fixing Decoiler corner plates down • Electric hammer drill • 4x 16mm x 80mm expanding anchor bolts + masonry drill bit • Metric Socket set • Metric spanner set
Safety	• ENSURE that any Fork Hoist Operators are fully licensed and experienced in moving heavy loads • Take extreme care when moving/lifting machines
Positioning FRAMECAD TF550H & Decoiler	1. Mark up the intended location of the FRAMECAD TF550H and Decoiler using a centre chalk line. 2. Position the FRAMECAD TF550H and Decoiler using the chalk line to align the machines. The chalk-line should mark the centre of the steel strip as it comes off the Decoiler. This means the Decoiler needs to be positioned such that the centre of the steel coil as it will be loaded onto the Decoiler mandrel, is centred above the chalk-line. Likewise, the FRAMECAD TF550H should be positioned so that the in-feed guide is centred above the chalk-line. There should be a gap of *at least* 4m between the Decoiler and the FRAMECAD TF550H. 3.  4. Place the supplied corner brackets on each corner of the Decoiler base and bolt them to the floor using concrete bolts. The brackets should be located 1-3mm off the corner. These brackets ensure that the Decoiler will remain aligned with the FRAMECAD TF550H. 5. Place the supplied corner brackets on each corner of the Decoiler base and bolt them to the floor using expanding anchor bolts. Lift the Decoiler to locate the base on top of the corner brackets. The brackets should be located 1-3mm off the corner. These brackets ensure that the Decoiler will remain aligned with the FRAMECAD TF550H.



Decoiler Corner Brackets

6. Connect the Decoiler power cable to the plug on the side of the FRAMECAD TF550H AC Electrical Cabinet.

   CAUTION: The exposed cable (between the Decoiler and the FRAMECAD TF550H) must be protected by either a cable trench or a protective cap.

Insert Decoiler Plug into side of AC Electrical Cabinet

ELECTRIC SHOCK HAZARD!

NEVER INSERT OR REMOVE DECOILER PLUG WITH MAINS ELECTRICAL POWER TO THE MACHINE SWITCHED ON. ENSURE THAT THE ELECTRICAL CABLE BETWEEN THE DECOILER AND FRAMECAD TF550H IS PROTECTED BY EITHER A CABLE TRENCH OR PROTECTIVE CAP.

7.4 Levelling the FRAMECAD TF550H

LEVELLING THE FRAMECAD TF550H	
Tools Required	• Engineer's Spirit level • 24mm Spanner
Safety	• ISOLATE electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection:
Levelling FRAMECAD TF550H	1. Start by winding all the mounting feet fully in. 2. Place the spirit level accurately on top of the machine bed.  Wind in or out the mounting feet using a 24mm spanner until the FRAMECAD TF550H is level in both directions (width as well as length-ways).  **CAUTION!** **IT IS IMPORTANT THAT THE FRAMECAD TF550H IS ACCURATELY LEVELLED TO ENSURE THE CORRECT PROFILE IS MANUFACTURED.**

7.5 Checking Hydraulic Reservoir Level

The hydraulic system must be checked prior to running the machine. It is essential that the hydraulic pump is never operated without oil. The Hydraulic Reservoir has a combined sight glass and temperature gauge fitted to the side of the tank. The level must be not less than 80 litres.

Fill Point

The Hydraulic Reservoir has a fill point cap situated on top of the tank. Simply unscrew the cap to remove. The oil level is displayed on the sight glass that is on the side of the when the hydraulic level is at the top of the glass then the tank will be at 80 litres (this is the recommended level), the hydraulic motor must not be running for this check. After running the hydraulic pump, the level may drop by 5%. This is normal.

Hydraulic Reservoir Fill Cap and Sight Glass

7.6 Connecting Power to the FRAMECAD TF550H

Power connections to the FRAMECAD TF550H

NOTE! Colour codes shown are for descriptive purposes ONLY – actual colour code may vary depending on region and/or legislative compliance.

The 3-Phase electrical supply to the FRAMECAD TF550H machine is connected directly to the Isolation switch as shown above.

Cable should be sized to ensure <2.5% voltage drop across the full length.

CAUTION!

PLEASE PAY PARTICULAR ATTENTION TO EARTHING REQUIREMENTS.

WARNING!

THE ELECTRICAL SUPPLY INSTALLATION IS THE SOLE RESPONSIBILITY OF THE CUSTOMER. CONFORMITY OF THE ELECTRICAL INSTALLATION WITH LOCAL SUPPLY

REGULATION AND LEGISLATIVE REQUIREMENTS MUST BE CERTIFIED BY AGENTS ACTING ON BEHALF OF THE CUSTOMER AND RECOGNIZED UNDER LAW IN THE COUNTRY OF INSTALLATION. FRAMECAD WILL NOT WARRANT OR ASSUME ANY RESPONSIBILITY THEREIN FOR THE APPROPRIATENESS, SAFETY OR LEGAL FITNESS OF THE ELECTRICAL SUPPLY INSTALLATION. FAILURE TO CONNECT AND/OR CONDUCT SAFE WORKS MAY RESULT IN DAMAGE TO THE MACHINE OR SUPPLY NETWORK, SERIOUS INJURY OR EVEN DEATH. FAILURE TO COMPLY WITH ALL STATUTORY REQUIREMENTS MAY RESULT IN FINES AND/OR PENALTIES BEING IMPOSED BY AUTHORITIES IN THE COUNTRY OF INSTALLATION.

8 Initial Setup

This section will introduce the basic setup requirements of the FRAMECAD TF550H machine.

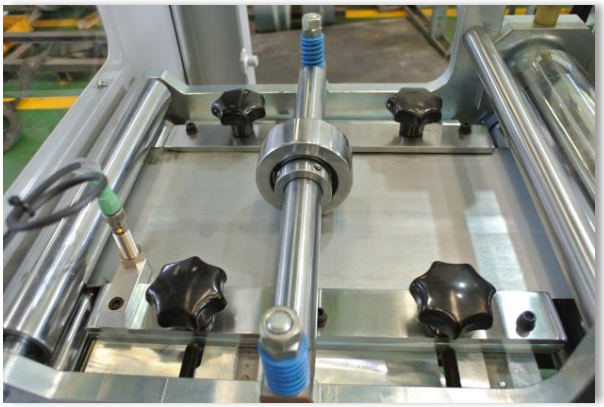
Typically, the process of initial setup commences at the in-feed of the machine and progresses to the out-feed.

WARNING!

ALL PROCEDURES DETAILED IN THIS SECTION ARE DESIGNED TO BE COMPLETED WITH ELECTRICAL POWER ISOLATED TO THE MACHINE AND WITHOUT STEEL STRIP INSERTED.

8.1 In-feed Guide Setup (Including the Steel Strip Sensor and Encoder)

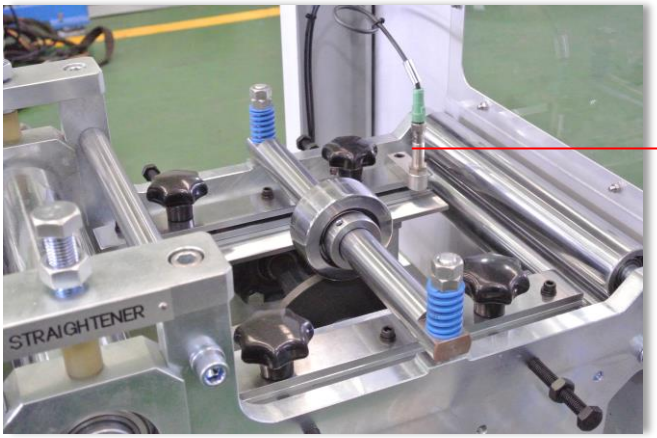
The In-feed guide is housed in the same assembly as the Straightener and Lubrication unit. The in-feed guide is designed to assist with centralising the steel strip inside the machine. Apart from centralising the steel strip, the in-feed guide also incorporates a steel strip sensor along with top and bottom guide wheels for the strip encoder.



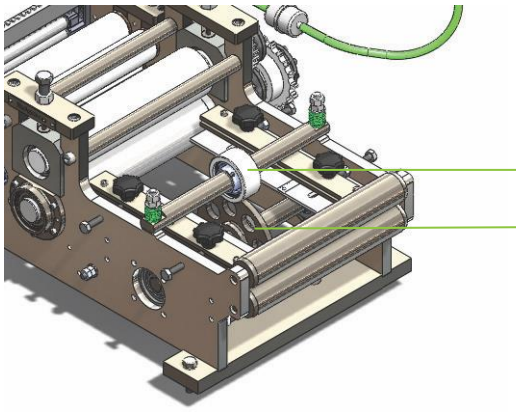
TF550H In-feed Guide

- **Designed to centralise steel strip as it is fed into the machine.**
- **The In-feed Guide unit also incorporates the steel strip detection sensor and guide wheels for the position encoder.**

The following procedure details the setup requirements of the in-feed guide including adjustment of the steel strip sensor, encoder guide wheels and the encoder belt tension.

SETUP OF THE FRAMECAD TF550H IN-FEED GUIDE	
Tools Required	• 15mm Spanner • 16mm Spanner • 150mm Engineers Ruler
Safety	• **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection. • **DO NOT** have steel sheet loaded into the machine:
Check Height of Steel Strip Sensor	The steel strip sensor is used to detect steel loaded into the FRAMECAD TF550H. The sensor is a 12mm barrel-type and is threaded through a bracket attached to the in-feed guide. There is a locknut on the topside of the bracket that holds the sensor in position.  **Steel Strip Sensor Location** If the sensor it is set too high up in the bracket, it may not detect the presence of steel: if set too low it may be damaged during the feeding of steel strip into the machine. Check that the tip of the sensor is at least 5mm *above* the *lower* in-feed guide(s) surface (this is the surface that the bottom-side of steel strip will slide on). If adjustment is required, unplug the sensor cable first, then using a 15mm spanner to loosen the locknut and wind the sensor either up or down. Make sure the locknut is re-tightened. **WARNING!** **ALWAYS MAKE SURE THE TIP OF STEEL STRIP SENSOR IS AT LEAST 5MM ABOVE THE LOWER IN-FEED GUIDE(S) SURFACE TO PREVENT DAMAGE TO THE SENSOR WHEN FEEDING STEEL STRIP INTO THE MACHINE!**

Check In-feed Guide Wheel Setup

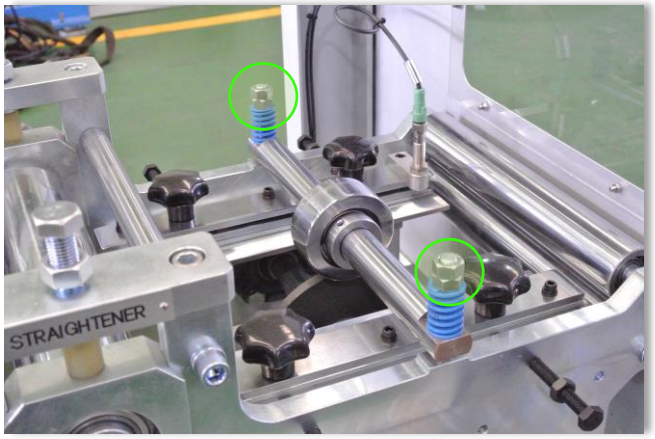


The in-feed guide assembly includes a *Top* and *Bottom* guide wheel. Both wheels are designed to make contact with the steel strip (top and bottom surface of the steel).

The bottom guide wheel is mounted onto a shaft so that as the wheel rotates, so does the shaft. The bottom guide wheel shaft is ultimately coupled to the *steel strip encoder* via a toothed belt. In this way, as steel strip is progressed through the machine, its movement and therefore position is measured by the encoder.

The top guide wheel is designed to apply downwards pressure to the top surface of the steel strip which in turn is forced down onto the bottom guide wheel. The surface friction created between the two guide wheels must be such that the steel strip cannot slip between them and introduce position measurement errors:

1. Check top guide wheel and shaft is level with the in-feed base.
2. Hold the bottom guide wheel while rotating the top guide wheel. The top guide wheel should have ***moderate*** resistance during rotation. This ensures that when steel in inserted between the two it will make positive contact while not slipping or deforming on the steel strip.
3. Once steel strip is loaded into the machine some minor adjustment may be required to ensure that the top guide wheel does not slip on the steel (or that it is not overly tight). This can be achieved by adjusting the top guide wheel shaft adjustment nuts. These can be either tightened or loosened depending on the type of adjustment required. It is important to make sure that the top guide wheel shaft remains ***level*** to the bottom of the in-feed guide (i.e. both sides are equal height) AND that it is not over tightened which can cause deformation in the steel strip AND/OR in-feed assembly.



Top Guide Wheel Adjustment Nuts

WARNING!

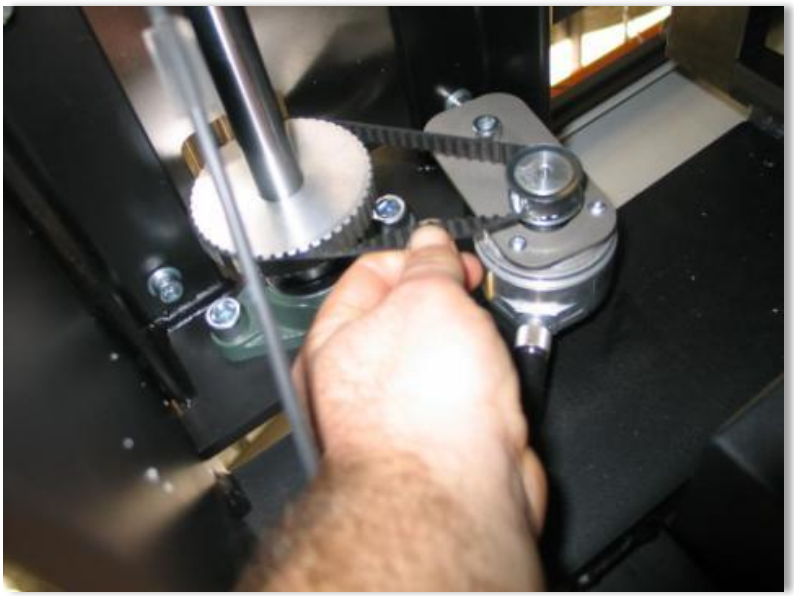
DO NOT OVER-TIGHTEN THE TOP GUIDE WHEEL SHAFT AND ENSURE THE SHAFT REMAINS LEVEL WITH THE BASE OF THE IN-FEED UNIT.

Check Encoder Belt Tension

To prevent inaccurate position measurements of the steel strip inside the FRAMECAD TF550H, it is important to check that *encoder* is securely coupled to the bottom guide wheel shaft.

The encoder input shaft has a pulley mounted on the end of it which in turn is coupled to the bottom guide wheel shaft via a toothed belt.

With a *belt-coupled* encoder it is important to check the belt tension is sufficient to eliminate any slipping of the belt around the encoder pulley. The best method to achieve this is by pinching the belt at the longest point (as shown in the picture below) and twisting 90º. The optimal belt tension is when the belt is firm to 90º but cannot twist any further.



Encoder Belt Tension Test

If the belt needs to be tensioned, loosen the locknuts on the belt tensioner adjustment bolt on the side of the in-feed assembly (see below). Gently pull-down on the encoder until sufficient belt tension is reached then re-tighten the tensioning adjustment bolt and locknuts.

DO NOT over-tension the belt as this may stretch the belt and/or do damage to the encoder shaft.

⚠ WARNING!

DO NOT OVER-TENSION THE BELT AS THIS MAY STRETCH THE BELT AND/OR DAMAGE ENCODER.

Check In-feed Guide Strip Width and Alignment Setup

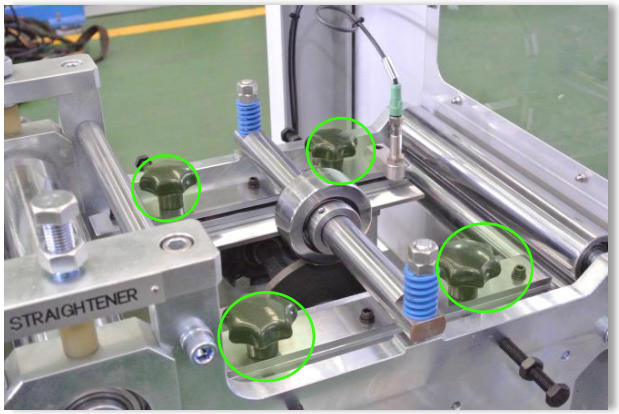
The primary purpose of the in-feed guide is to centralise the steel strip. The guide essentially acts like a "rudder" steering the steel into the machine. It is therefore critical that the in-feed guide is:

a. Adjusted for the correct steel strip width and

b. Configured so that the steel strip is centrally aligned prior to entering the Straightener section.

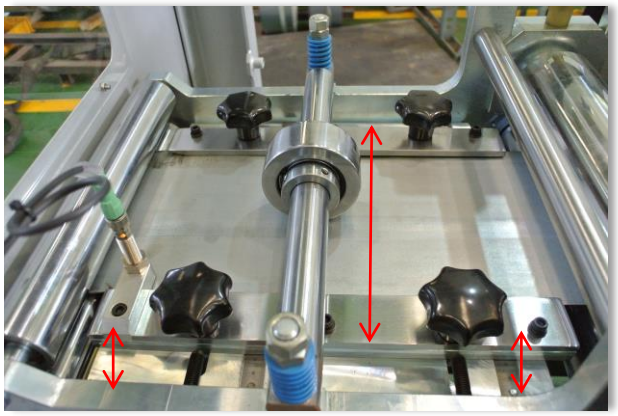
1. Measure the actual strip width of the steel sheet to be used.

2. Loosen the 4 top lock screws (x2 on each side) so that the guides are free to move.



Lock Screws

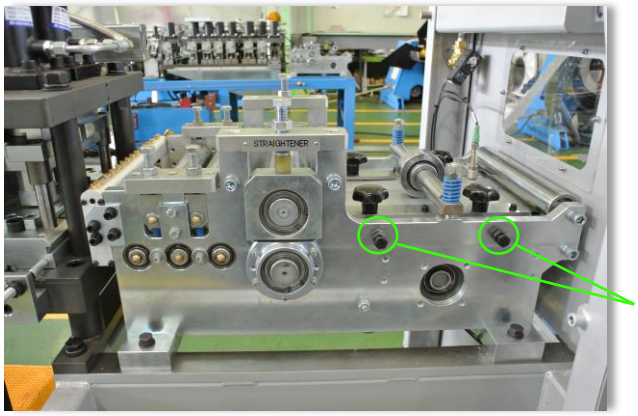
3. Loosen the side-adjustment bolt locknuts.
4. Using a 16mm spanner, wind the side-adjustment bolts in or out until.
    a. The distance between the edge of the guide and the In-feed assembly side plate is the same for both the left and right sides and from the front to the rear.
    b. The distance between the left and right side of the guides = the steel strip width. The steel strip should be a snug fit within the guide without being overly tight or with excessive side to side movement.



NOTE!

A calibrated reference scale is built into the in-feed guide to assist with setting the strip width.

5. Once set, retighten the side-adjustment locknuts and the top lock screws



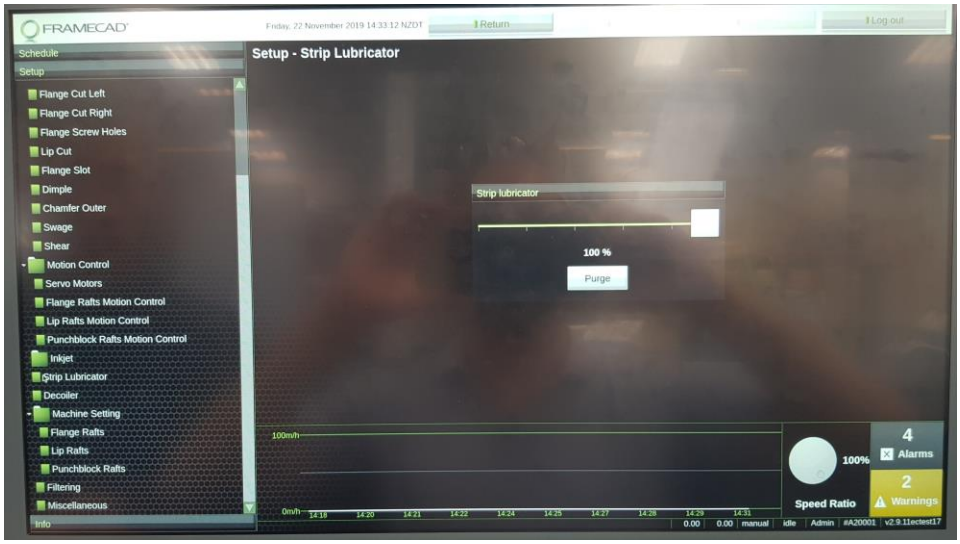
In-feed Guide Side Adjustment Bolts

6. Fine tuning of the In-feed guide may be required once steel strip is feed into the machine.

8.2 Check Lubrication Level & Lubricator Adjustment

CHECK LUBRICATION UNIT & LUBRICATION TANK LEVEL	
Tools Required	• Nil
Safety	• **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection. • Refer to Lubricant Material Safety Data Sheet for full safety information, handling, disposal, and composition related detail:
Check Lubrication Tank Level	The FRAMECAD TF550H lubrication system is designed to reduce friction during the roll-forming and hydraulic tool punching operations. The application of a water-based oil lubricant (30:1 mixture) will: 1. Increase the life of the hydraulic punching tools. 2. Reduce roll-forming load on the drive-chain and main roll-forming servo motor. 3. Reduce galvanized steel deposits on the roll-forming rollers. Lubrication is applied via 2 felt rollers on both sides of the steel strip. The lubrication is pumped from a 20L container located under the In-feed guide/Straightener unit. The flow of lubricant is controlled by software and regulated by adjustable nozzles distributed across the lubrication unit felt rollers. The nozzles can be adjusted to achieve the desired amount and distribution across the width of the steel strip. ***NOTE!*** ***The lubricant pump will only be activated whilst steel strip is being rolled in the machine.*** **WARNING!** **IT IS IMPERATIVE THAT LUBRICATION IS APPLIED WHILST ROLLING STEEL. ALWAYS CHECK THE LEVEL OF LUBRICANT IN THE CONTAINER AT THE START AND DURING PRODUCTION TO ENSURE SUFFICIENT AVAILABILITY.**

Lubricator Feed Rate setup



The lubricator electric pump out and feeding rate of the Lubricator is adjusted via GUI of the Factory 2 software.

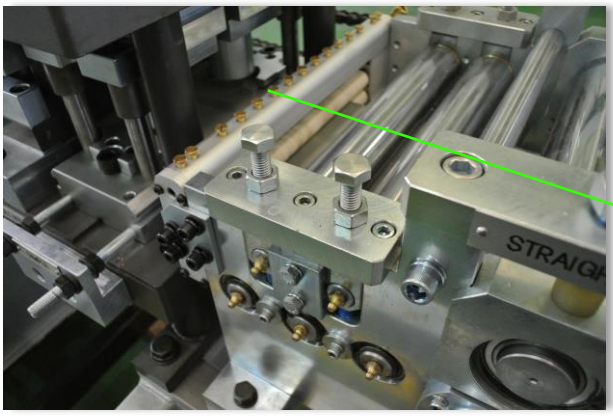
Select the Setup-Strip Lubricator window and adjust the feed rate by sliding the bar.

It is recommended to perform 'Purge' operation if the machine was out of use for extended period of time, or if clogging of lubricant feeding system is observed. Push the **Purge** button to purge the system.

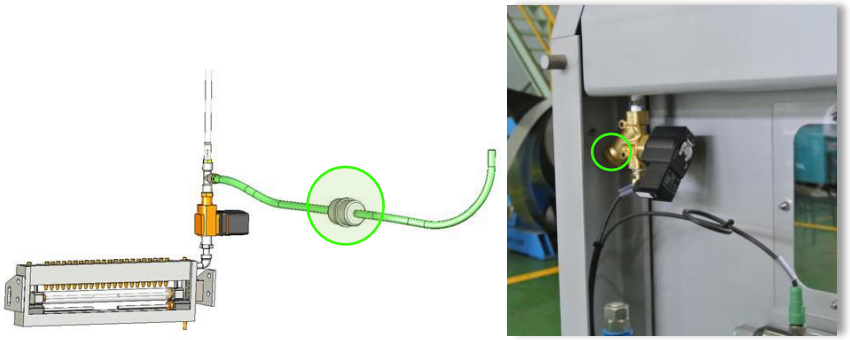
Adjusting Lubricator

The flow of lubricant is controlled by a solenoid and regulated by adjustable nozzles distributed across the lubrication unit felt rollers.

The lubricator is factor set prior to shipment however fine tuning can be made as required by adjusting the nozzles using a flat blade screwdriver. The amount of lubricant and the distribution across the strip width can be altered by winding the required nozzle(s) in or out.

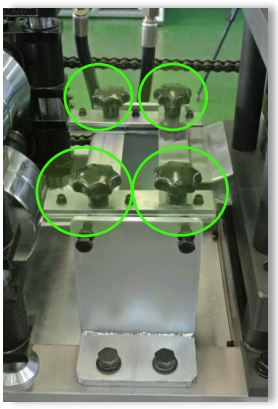


The amount and distribution of lubricant can be fine-tuned by adjusting the applicable lubricator nozzle(s)

Check Lubricator In-Line Solenoid Valve Filter	An in-line filter is included either in the lubrication delivery solenoid valve *OR* in the tubing to the lubricator unit. The filter is designed to remove any dirt or debris that may be in the bottom of the tank from entering the lubricator and potentially blocking the nozzles. The two methods are shown below: in either case no special tools are required to remove the filter element and check that it is clean and free of debris. The filter element in the base of the delivery solenoid can be removed and cleaned by simply undoing the nut on the bottom of the valve.  **The two types of filtering used on the TF550H lubricant: left – in-line filter, right – filter in base of lubricant delivery solenoid**

8.3 Centre Guide Setup

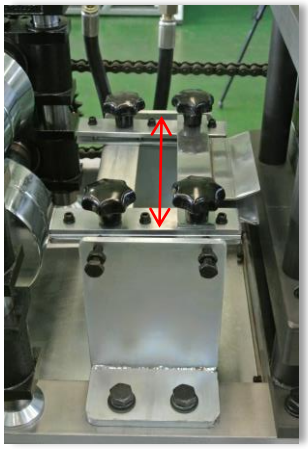
In conjunction with the In-feed guide, the centring guide directs the steel strip in a straight line through the roller stations and out-feed end of the machine.

CHECK CENTRE GUIDE SETUP	
Tools Required	• 16mm Spanner • 150mm Engineers Ruler
Safety	• **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection. • Refer to Lubricant Material Safety Data Sheet for full safety information, handling, disposal and composition related detail:
Check Centre Guide Strip Width and Alignment Setup	Located between the pre-punch tool block and the roll-forming section, the primary purpose of the centre guide is to *centralise* the steel strip. It is therefore critical that the in-feed guide is: a. Adjusted for the correct steel strip width and b. Configured so that the steel strip is centrally aligned prior to entering the Straightener section. 1. Measure the actual strip width of the steel sheet to be used. 2. Loosen the 4 top lock screws (x2 on each side) so that the guides are free to move.  **Lock Screws**

3. Loosen the side-adjustment bolt locknuts.

Side Adjustment Bolts

4. Using a 16mm spanner, wind the side-adjustment bolts in or out until:
    a. The distance between the edge of the guide and the side angle bracket is the same for both the left and right sides and from the front to the rear.
    b. The distance between the left and right side of the guides = the steel strip width + 1mm (i.e. +0.5mm on either side of the steel strip). The steel strip should be a loose fit within the guide without being overly tight or with excessive side to side movement.



Set Steel Strip Width

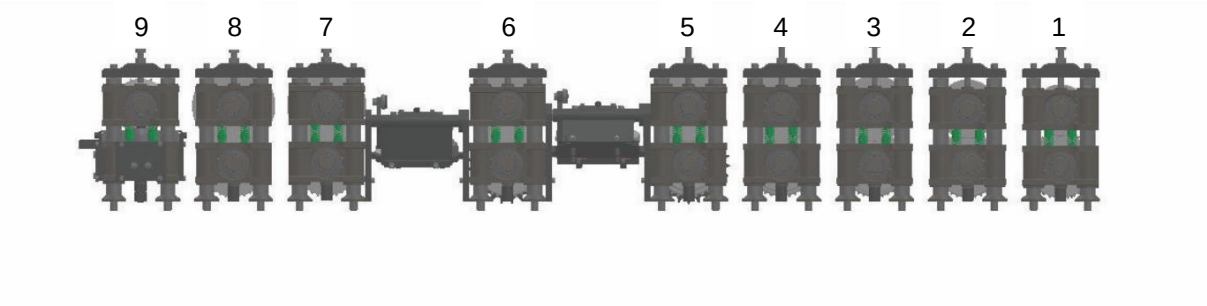
5. Once set, retighten the side-adjustment locknuts and the top lock screws.

6. Fine tuning of the In-feed guide will be required once steel strip is feed into the machine.

8.4 Roll-forming Section Setup

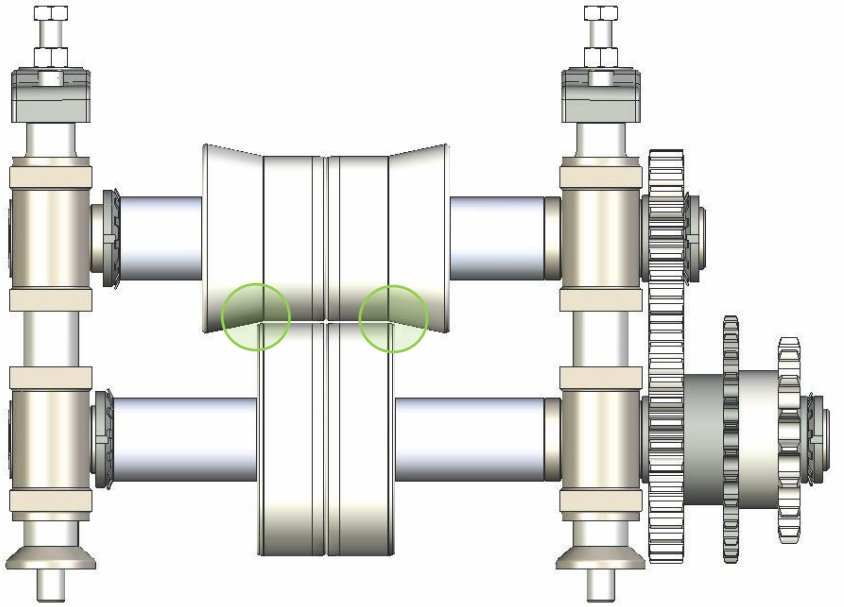
It is important to set the correct clearance between the top and bottom rollers in the rolling section for the material thickness being run in the machine. This is absolutely critical to ensure the “C” section profile is produced to the right tolerances AND to prevent damage to the FRAMECAD TF550H.

Each combination of top and bottom roller assembly is referred to as a *roller station* and are numbered sequentially from 1 to 9, starting with the first station directly following the pre-punch tooling block:



The following procedure details the setup requirements of the roller section.

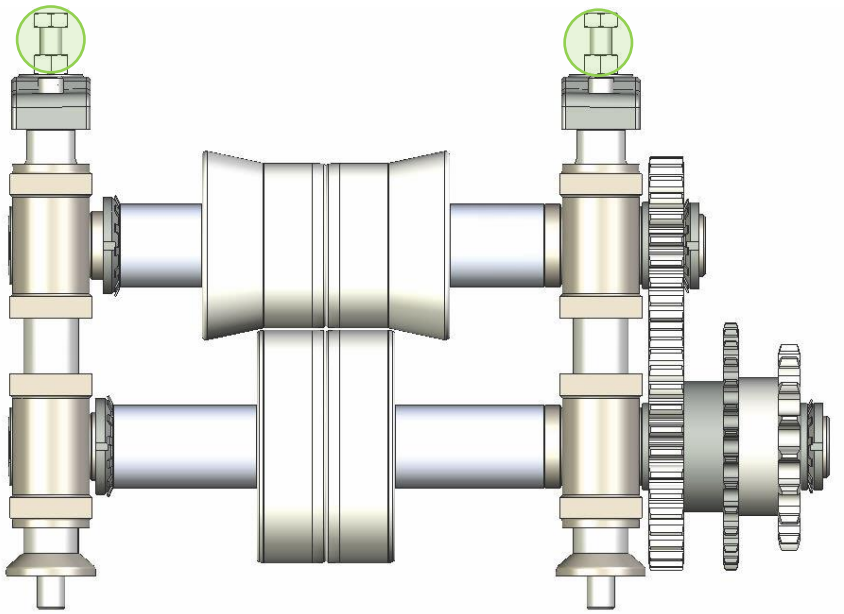
SETUP OF THE FRAMECAD TF550H ROLL-FORMING SECTION	
Tools Required	• 150mm long, 0.05mm to 1mm metric feeler gauge set (or an imperial equivalent for non-metric sheet steel) • 24mm Spanner
Safety	• **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection. • **DO NOT** have steel sheet loaded into the machine:
Setting the Roller Clearances	The first step is to establish the material thickness of the steel strip to be processed in the machine. The accepted method is to use the Base Metal Thickness1) (BMT) as the starting reference value. Steel strip is typically ordered on this basis and so the BMT of the steel strip being used should be easy to ascertain. BMT or Base Metal Thickness defines the uncoated steel thickness and is used as the base reference for all structural design calculations using steel. Always start with the first roller station (Station 1). Select a feeler gauge that is 0.05mm less than the BMT of the steel strip. For example, if the BMT of the steel strip being used is 0.75mm, select a 0.70mm feeler gauge, if BMT is 0.95 use a 0.90mm feeler gauge and so on. Inset the feeler gauge between the top and bottom rollers at the forming edges (i.e. the bottom corner edge of the top roller).



The feeler gauge should be a “snug fit”: in other words, the feeler gauge should feel tight to push in and out between the rollers without having to use excessive force.

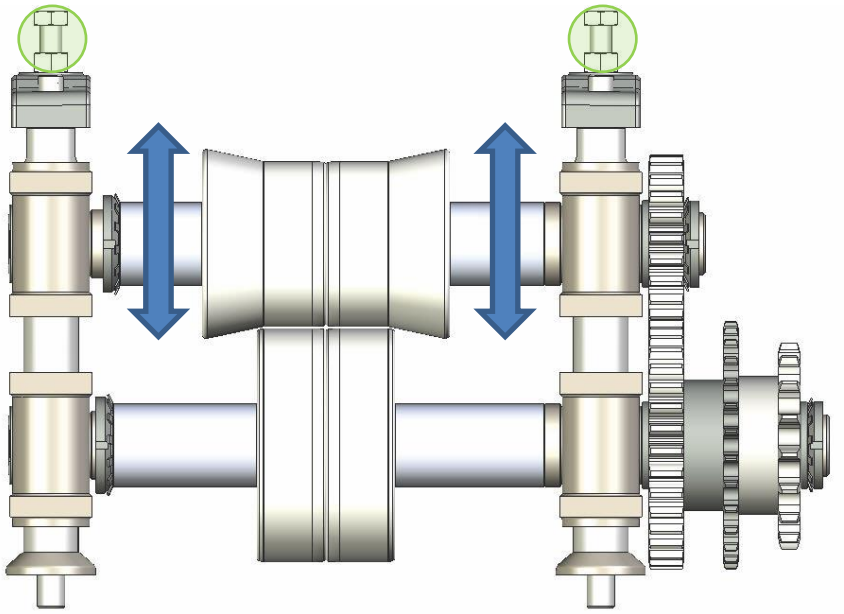
If the clearance is too loose or tight, the roller clearances will need to be reset.

Loosen the locknuts on the top bearing cap adjustment bolts (there is one on either side of the top roller assembly for each station) using the 24mm spanner.



Using the adjustment bolts, adjust both sides of the top roller until the feeler gauge is a “snug fit”: in other words, the feeler gauge should feel tight to push in and out between the rollers without having to use excessive force.

NOTE! Adjust the clearances on both sides so that they are the same.



Repeat the above steps for the remaining roller stations.

IMPORTANT NOTE!

TAKE YOUR TIME! IT IS IMPORTANT THAT BOTH SIDES OF THE TOP ROLLER IN EACH STATION ARE SET THE SAME. IF ONE SIDE IS MORE LOADED THAN THE OTHER IT WILL CAUSE THE TRACKING OF THE STEEL STRIP THROUGH THE MACHINE TO VEER (BE PULLED) TO ONE SIDE.

SET ALL ROLLFORMING STATIONS TO SAME TOP AND BOTTOM ROLLER CLEARANCE (BMT – 0.05MM)

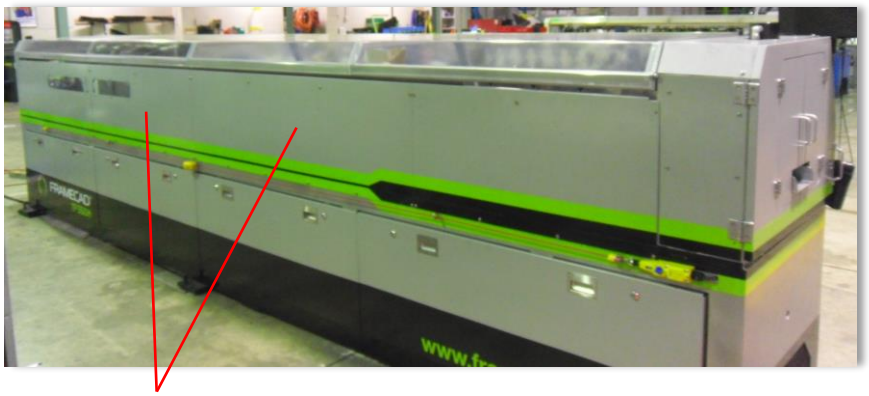
IF THE ROLLER CLEARANCE IS SET TOO TIGHT FOR THE BMT OF THE STEEL STRIP BEING USED, THIS MAY CAUSE THE MACHINE TO FAULT, PRODUCE OUT OF SPECIFICATION PRODUCT, REDUCE PRODUCTION PERFORMANCE AND/OR IN SEVERE CASES, CAUSE DAMAGE TO THE MACHINE.

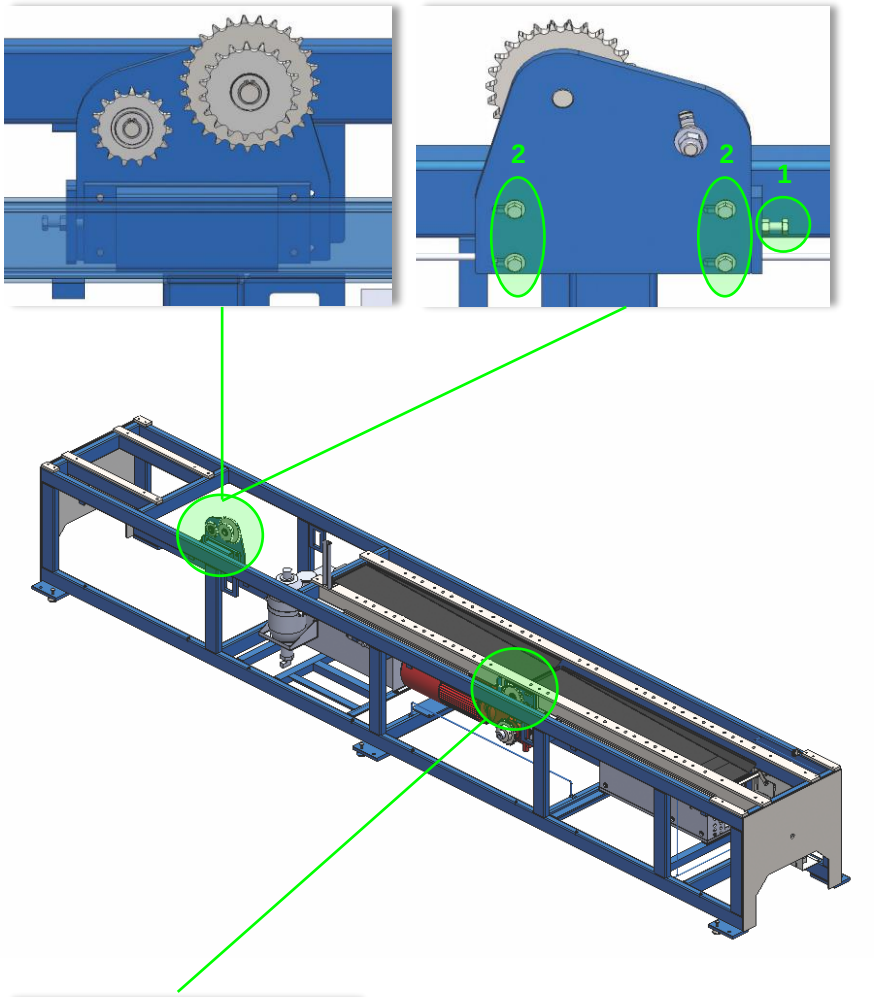
IF THE ROLLER CLEARANCE IS TOO LOOSE FOR THE BMT OF THE STEEL STRIP BEING USED, THIS WILL CAUSE THE STEEL TO SLIP INSIDE THE ROLLFORMING SECTION AND MAY CAUSE THE MACHINE TO FAULT.

8.5 Check Chain Tension

The drive chain tension on the FRAMECAD TF550H should be checked regularly to make sure that it is not loose. Before commencing production, it is always a good idea to make sure that that the chains are not loose.

There are two chain tensioning adjustors on the FRAMECAD TF550H . The following procedure details the drive chain setup requirements.

ADJUSTMENT OF THE FRAMECAD TF550H DRIVE CHAIN	
Tools Required	• Phillips screwdriver • 16mm Spanner
Safety	• **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection. • **DO NOT** have steel sheet loaded into the machine:
Check the Drive Chain Tension	1. Remove the top side covers from *the drive chain side* of the machine (non-Operator side) using an appropriate screwdriver.  Drive Chain Side Top Covers 2. There two primary drive chains: one located towards the in-feed end of the machine and the other just over half-way towards the out-feed end. 3. Check the tension of both drive chains by moving each chain up and down at *the longest section of the chain*. The total movement of the either chain should be no more than approximately 18-20mm. If adjustment is required, loosen the locking bolts on the tensioner sliding plate and the lock nut on the adjustment bolt. Wind the adjustment bolt to tension the chain then re-tighten tensioner sliding plate and adjustment bolt locking nuts.



1. Adjustment Bolt
2. Tensioner Sliding Plate

If either drive chain has more than **18-20mm** of movement it will need to be tensioned (tightened). Be sure to re-tighten all lock nuts once finished.

4. Re-mount the top side covers.

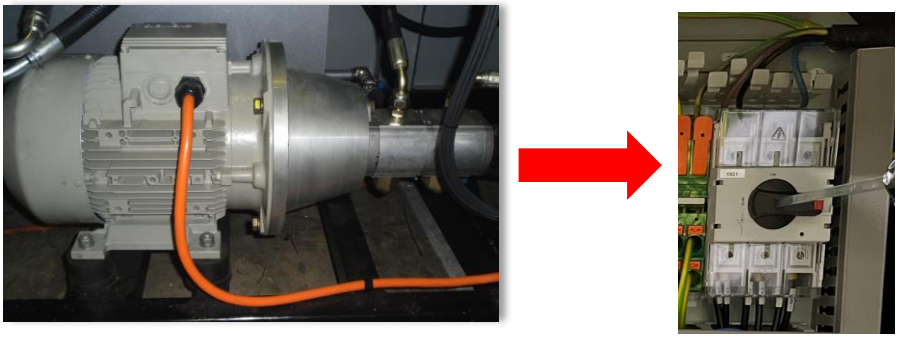
WARNING!

NEVER LEAVE ANY SIDE COVERS OFF THE MACHINE! ALWAYS RE-FIT TO PREVENT INJURY FROM MECHANICAL, HYDRAULIC OR ELECTRICAL EQUIPMENT.

8.6 Check Pump Rotation

Before running the machine, it is essential to ensure the hydraulic motor is turning in the correct direction otherwise the pump may be damaged. The correct direction of rotation is Factory set before shipping the machine. However, as the direction of rotation in a 3-Phase induction motor is determined by the phase sequence of the electrical supply, it is possible for a *different phase sequence at the point of installation* to cause the motor to run in reverse. To prevent damage to the hydraulic pump ALL FRAMECAD TF550H machines have a built-in phase detector which will prevent the motor from running in reverse if the phase sequence at the supply is not correct.

When the power is first connected AND a manual tooling or Inch Forward operation is performed (either of these two actions will result in a *call for pressure* and start the hydraulic pump), if the hydraulic motor/pump **DOES NOT TURN ON** have a qualified Electrician swap over any **2** of the 3 incoming supply phase wires to the isolator switch on the machine.



If the Hydraulic Pump does not turn on when there is a call for hydraulic pressure, reverse any 2 of the in-coming supply phase wires to the isolator switch on the machine

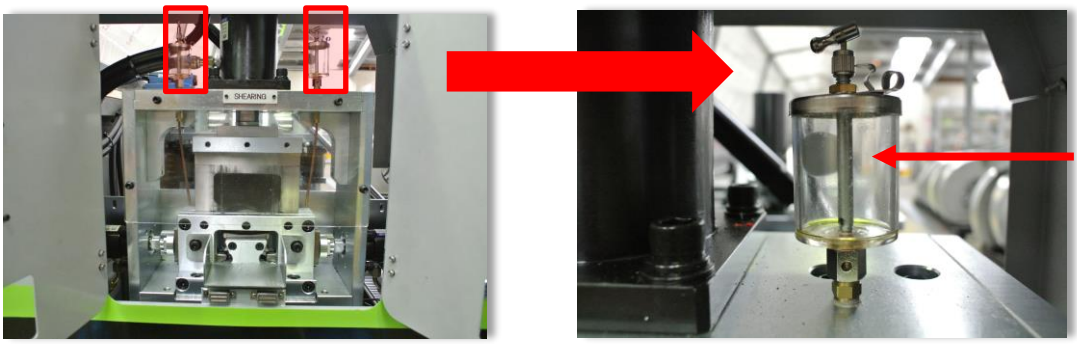
8.7 Shear Blade Lubrication

It is important that the Shear blade remains well lubricated. Automatic oilers are provided on top of the Shear tool assembly. It is important to ensure that oil is always available and checking the level should be done on a routine basis during production.

To check the Shear blade automatic oilers, open the two out-feed end covers.

Open the two out-feed end covers

Locate the two automatic oilers and make sure the On/Off lever on the top is in the horizontal (flat) position and the oilers are full of oil prior to production commencing.



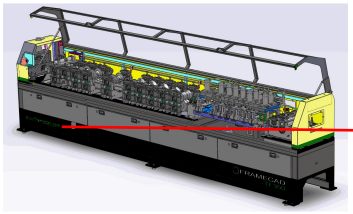
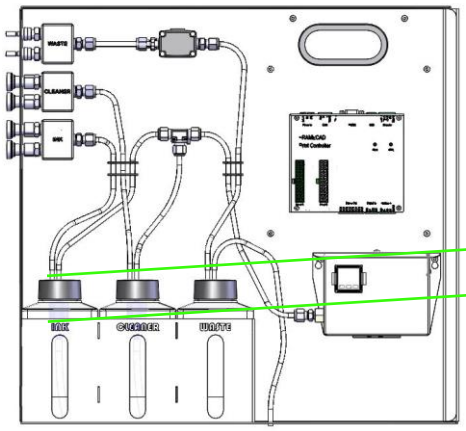
Shear Blade – Automatic Oilers

The amount of lubricant applied can be adjusted by winding the adjustment nut either up or down.

⚠ IMPORTANT NOTE!

THE SHEAR BLADE ASSEMBLY SHOULD REMAIN WELL LUBRICATED. ALWAYS ENSURE THE AUTOMATIC OILERS HAVE OIL INCLUDED. USE A LIGHT GRADE MACHINE OIL.

8.8 Insert Ink & Cleaner

INSERT INK	
Tools Required	• Clean rags (to catch any residual ink) • Sharp Knife
Safety	• **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection:
Insert Ink	1. Remove the Operator side out-feed end cover to find the Printer Storage Cabinet.  Ink/Cleaner Bottle Location 2. Locate the empty ink bottle. Carefully unscrew the black filter-cap and withdraw this from the bottle (if the machine has been powered previously, the bottle may be pressurised – remove cap slowly to release pressure), using a clean rag to catch any residual ink. Before removing the bottle completely, close with a spare cap to prevent any accidental spills of residual ink in the bottle.  Ink Bottle Filter Cap Ink Bottle 3. Carefully remove the empty ink bottle. 4. Insert replacement ink bottle and remove cap. If the replacement ink bottle is new and has not been opened before, the top will be sealed. DO NOT try to peel the seal off – doing so may leave remnants of the seal stuck to the top of the bottle, causing air leaks when the system is pressurised. **NOTE! DO NOT try to peel the seal off the top of new (unopened) ink OR cleaner bottles.** 5. Using a knife, carefully cut the seal in an “X” shaped pattern.

TIP!

TAKE CARE NOT TO CUT OR DAMAGE THE EDGES AROUND THE BOTTLE OPENING AS THIS MAY PREVENT A RELIABLE SEAL FROM BEING ATTAINED WHEN THE FILTER-CAP IS PUT BACK ON.

6. Replace the filter-cap and tighten.
7. Repeat the above procedure for the cleaner bottle

8.9 Loading Coil onto the Decoiler

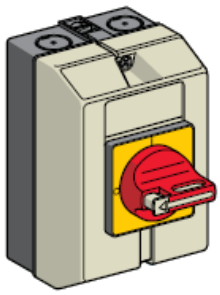
The following procedure details the loading of steel coil onto the Decoiler.

<table>
<tr><th colspan="2">LOADING COIL ONTO THE DECOILER</th></tr>
<tr><td>Tools Required</td><td>

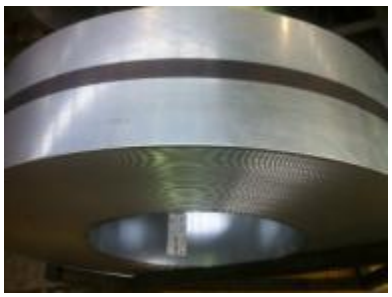
Decoiler Winding Handle
Steel Coil Lifting Equipment
Calibrated and high accuracy Vernier Caliper OR steel rule
Calibrated and high accuracy Micrometer
Cut-resistant Gloves

</td></tr>
<tr><td>Safety</td><td>

ISOLATE electrical power to the Decoiler and implement measures to prevent accidental re-connection.


Turn Decoiler isolation switch to the OFF position

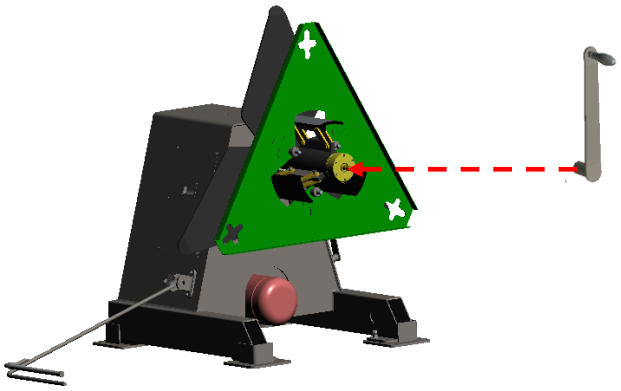
Use only certified (weight and application) lifting equipment for use on the Steel Coil.
Apply extreme care when lifting and transferring coil to the Decoiler.
Use cut-resistance protective gloves when handling steel coil strip.
Make sure that the steel coil is securely strapped so that the coil cannot spring loose and unwind itself – this is important, failure to do so could result in serious injury as the tightly wound coil will release and tend to unwind once strapping is removed.


Strapped Steel Coil
IMPORTANT NOTE!
THE SHEAR BLADE ASSEMBLY SHOULD BE LUBRICATED 4-TIMES DAILY DURING PRODUCTION, USING LIGHT GRADE MACHINE OIL.
</td></tr>
</table>

Loading Steel Coil onto the Decoiler Mandrel

1. Remove the Decoiler safety guard(s) by releasing the locking nuts holding it in place.

2. Using the mandrel winding handle, collapse the mandrel shoe-plates down to below the internal diameter of the steel coil to be loaded.



3. Check the steel coil to be loaded is the correct thickness and strip width using respectively the Micrometer and Vernier Caliper/steel rule.

4. Using appropriately certified lifting equipment, raise the new steel coil up and onto the Decoiler mandrel, ensuring that:

    a. The steel strip will feed from the top of the coil (not from the bottom):
    b. Push the steel coil on so that it is sitting against the Decoiler mandrel backing plates.
    c. Continue to support the weight of the steel coil using the lifting equipment – DO NOT drop the full weight of the steel coil onto the mandrel during this step.
    d. Ensure that the steel coil once loaded is in-line with the in-feed to the FRAMECAD TF550H machine.

5. While the weight of the steel coil is still supported by the lifting equipment, use the mandrel winding handle to firmly tighten the mandrel shoe-plates up against the inside diameter of the steel coil.

6. Remove the lifting equipment and allow the steel coil weight to be fully supported by the Decoiler mandrel.

7. Remove any banding or strapping that is holding the steel coil together. Where safe and practical use effective clamping means to hold the end of the steel strip to prevent rapid unwinding once the strapping is removed. Carefully remove the clamp while holding the end of the steel strip.

WARNING!

USE EXTREME CAUTION WHEN REMOVING ANY STEEL COIL STRAPPING OR BANDING. STEEL COIL STRIP IS TIGHTLY WOUND AND ONCE ALL STRAPPING IS RELEASED IT WILL WANT TO RAPIDLY UNWIND. WHERE SAFE AND PRATICAL, CLAMP THE END OF THE STEEL STRIP DURING THE REMOVAL OF ALL STAPPING TO ALLOW A CONTROLLED RELEASE.

8. Pull the end of the of the steel coil strip down and under the Decoiler Dancer Arm.

9. Re-attach the safety guard and tighten locking nuts to hold in place.

9 Powering up the FRAMECAD TF550H

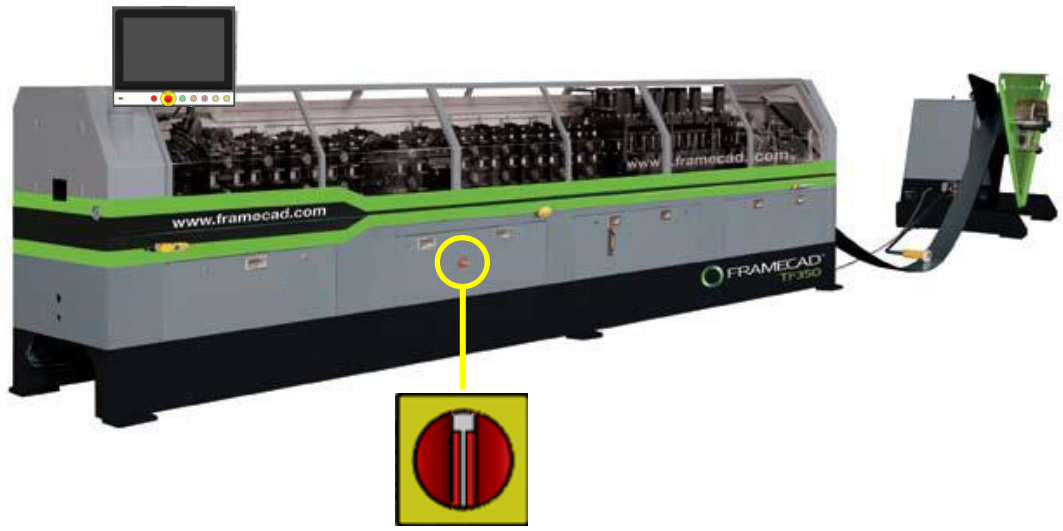
9.1 Pre-Power-up Checklist

Before switching electrical power **ON** to the FRAMECAD TF550H machine it is good practice to quickly run through the following checklist of items.

POWERING THE MACHINE FOR THE FIRST TIME	
Check 1	Check the correct steel has been ordered and is available for production. 1. The correct design thicknesses. 2. Correct strip width for the “C” section profile to be run. 3. Correct surface coating/treatment for the intended application
Check 2	If the machine has NOT been powered before, make sure that the Hydraulic accumulator tank has been fully charged to **120Bar**. If you are not sure, please discuss with your regional FRAMECAD office.
Check 3	Check that the ink has been installed.
Check 4	Check the lubricant mix is a 30:1 ratio Check that the lubricant tank is full.
Check 5	Check that the Decoiler is plugged into the FRAMECAD TF550H AC electrical cabinet.
Check 6	Ensure that ALL covers are installed and securely fitted to the machine. Make sure that the top sliding covers are fully closed. This includes all covers and guarding on the Decoiler.

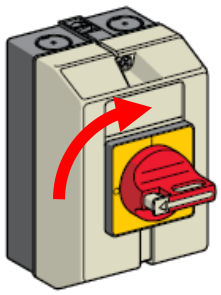
9.2 Switching on Electrical Power

Turn the isolation switch on the side of the machine to the ON position.



FRAMECAD TF550H Electrical Isolation Switch

Go to the Decoiler and make sure the end of the Dancer Arm is resting on the ground ***before powering***. Turn the isolation switch on the side of Decoiler to the ON position. ENSURE that you stand well away from the spinning mandrel back-plates when power is first connected to the Decoiler.



Decoiler Electrical Isolation Switch

WARNING!

STAND WELL BACK FROM THE SPINNING MANDREL BACK-PLATES ON THE DECOILER WHENEVER THE ISOLATION SWITCH IS TURNED ON FOR THAT MACHINE.

MAKE SURE THE END OF THE DANCER ARM IS RESTING ON THE GROUND BEFORE POWERING THE DECOILER.

9.3 Check the Safety Controls

The FRAMECAD TF550H safety controls should be regularly checked through-out the course of a given production day.

Testing the safety control system operation is achieved by:

1. Pressing each emergency stop push button respectively and resetting the safety control system before progressing to the next one (including the Decoiler). Also activate each safety pull-cord switch. Each time a safety circuit is tripped by the activation of an emergency stop push button an Alarm Message will appear on the Operator Screen and all Manual and Automatic functions inhibited. The Decoiler mandrel will also be prevented from rotating.

2. Open and close the safety guard. Each time a safety circuit is tripped by the opening of the safety guard an Alarm Message will appear on the Operator Screen and all Manual and Automatic functions inhibited. The Decoiler mandrel will also be prevented from rotating.

3. The safety control system should be reset after *each test activation* (see Section 5 – Emergency Stop Buttons & Reset Procedure).

   NOTE!
   The safety control system can only be RESET once the Decoiler has been started.

4. The Decoiler also incorporates a “Dancer Arm Too High” safety interlock such that if the Dancer Arm is raised beyond approximately 1.2m (end of Dancer Arm above the ground) then the safety control system will switch to an emergency stop activation state. This is a factory configured state.

9.4 Check Calibration of Decoiler Dancer Arm

For calibration and fine turning of the Decoiler Dancer Arm refer to the Section 11.6

9.5 Purge the SX32I Printer System with Ink

Before commencing production, it is important to ensure the printer system is ***ready to print***. In order to achieve this, the printer control system must be ***purged*** with ink. This ensures that there is a consistent flow of ink to the printer head nozzles.

See Section 12 - Purge the SX32I Printer System with Ink for the correct procedure.

10 Production

This Section details the basic procedures required to commence production on the FRAMECAD TF550H. Before starting production, ALL Operators will need to have familiarised themselves with this manual, including all safety and initial setup requirements. Failure to do so may result in damage to the FRAMECAD TF550H or severe injury.

10.1 Removing Steel from the Machine

Frequently there will be steel already in the machine that must be removed to commence production. A typical example of when this might happen is at the end of a steel coil or if the steel strip is cut-off at the in-feed to the machine for whatever reason.

The following procedure details the removal of any steel strip left in the machine:

REMOVING STEEL STRIP FROM FRAMECAD TF550H	
Tools Required Safety	• Cut-resistant Gloves • ALWAYS wear cut-resistant gloves during this procedure. • NEVER stand directly in front of the FRAMECAD TF550H out-feed unit.
Removing Steel from Machine	1. Place the machine into Manual control mode (see Section 10 – Manual, Semi-auto and Automatic Control Modes) by pressing the [Software Reset] button followed by the [Start] button: 2. Use the Inch selector switch on the end cover to slowly “Inch” the steel out of the machine. When the steel can no longer be driven forward (i.e. it is no longer riding on any driven rollers), it can be removed by hand.

Inch Selector Switch

SAFETY!

ALWAYS ENSURE THAT CUT-RESISTANT GLOVES ARE USED WHEN HANDLING STEEL.

10.2 Loading Steel coil onto the Decoiler

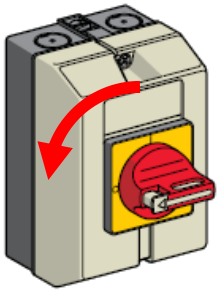
The following procedure details the loading of steel coil onto the Decoiler.

<table>
<tr><th colspan="2">LOADING COIL ONTO THE DECOILER</th></tr>
<tr><td>Tools Required</td><td>

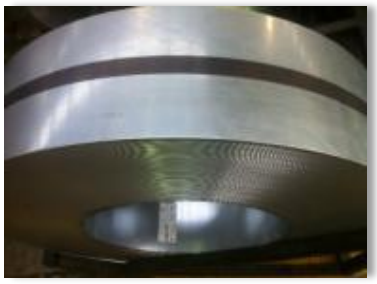
Decoiler Winding Handle
Steel Coil Lifting Equipment
Calibrated and high accuracy Vernier calliper OR steel rule
Calibrated and high accuracy Micrometer
Cut-resistant Gloves

</td></tr>
<tr><td>Safety</td><td>

ISOLATE electrical power to the Decoiler and implement measures to prevent accidental re-connection.


Turn Decoiler isolation switch to the OFF position

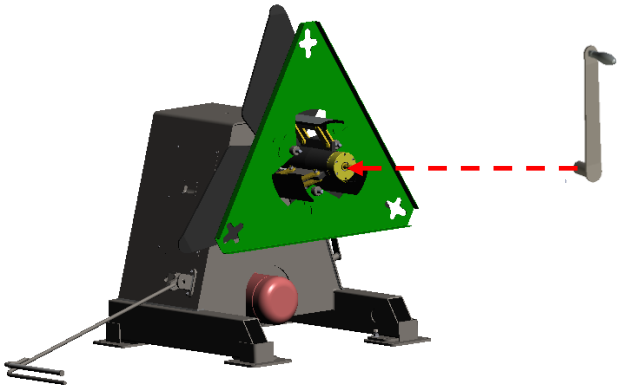
Use only certified (weight and application) lifting equipment for use on the Steel Coil.
Apply extreme care when lifting and transferring coil to the Decoiler.
Use cut-resistance protective gloves when handling steel coil strip.
Make sure that the steel coil is securely strapped so that the coil cannot spring loose and unwind itself – this is important, failure to do so could result in serious injury as the tightly wound coil will release and tend to unwind once strapping is removed.


Strapped Steel Coil
WARNING!
USE EXTREME CAUTION WHEN REMOVING ANY STEEL COIL STRAPPING OR BANDING. STEEL COIL STRIP IS TIGHTLY WOUND AND ONCE ALL STRAPPING IS RELEASED IT WILL WANT TO RAPIDLY UNWIND. WHERE SAFE AND PRATICAL, CLAMP THE END OF THE STEEL STRIP DURING THE REMOVAL OF ALL STAPPING TO ALLOW A CONTROLLED RELEASE.
</td></tr>
</table>

Loading Steel Coil onto the Decoiler Mandrel

1. Remove the Decoiler safety guard(s) by releasing the locking nuts holding it in place.

2. Using the mandrel winding handle, collapse the mandrel shoe-plates down to below the internal diameter of the steel coil to be loaded.



3. Check the steel coil to be loaded is the correct thickness and strip width using respectively the Micrometer and Vernier Caliper/steel rule.

4. Using appropriately certified lifting equipment, raise the new steel coil up and onto the Decoiler mandrel, ensuring that:

    a. The steel strip will feed from the top of the coil (not from the bottom).
    b. Push the steel coil on so that it is sitting against the Decoiler mandrel backing plates.
    c. Continue to support the weight of the steel coil using the lifting equipment – DO NOT drop the full weight of the steel coil onto the mandrel during this step.
    d. Ensure that the steel coil once loaded is in-line with the in-feed to the FRAMECAD TF550H machine.

5. While the weight of the steel coil is still supported by the lifting equipment, use the mandrel winding handle to firmly tighten the mandrel shoe-plates up against the inside diameter of the steel coil.

6. Remove the lifting equipment and allow the steel coil weight to be fully supported by the Decoiler mandrel.

7. Remove any banding or strapping that is holding the steel coil together. Where safe and practical use effective clamping means to hold the end of the steel strip to prevent rapid unwinding once the strapping is removed. Carefully remove the clamp while holding the end of the steel strip.

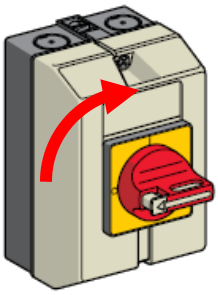
⚠ WARNING!

USE EXTREME CAUTION WHEN REMOVING ANY STEEL COIL STRAPPING OR BANDING. STEEL COIL STRIP IS TIGHTLY WOUND AND ONCE ALL STRAPPING IS RELEASED IT WILL WANT TO RAPIDLY UNWIND. WHERE SAFE AND PRATICAL, CLAMP THE END OF THE STEEL STRIP DURING THE REMOVAL OF ALL STAPPING TO ALLOW A CONTROLLED RELEASE.

8. Pull the end of the of the steel coil strip down and under the Decoiler Dancer Arm.

9. Re-attach the safety guard and tighten locking nuts to hold in place.

10. Turn the Decoiler Isolation Switch to the **ON** position.

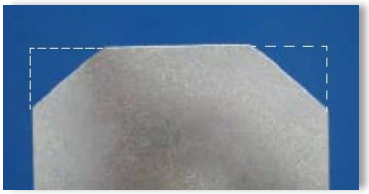


Turn Decoiler isolation switch to the ON position

10.3 Feed Steel Strip into the Machine

Once steel coil has been loaded onto the Decoiler threaded through (or under on earlier generation Decoilers) the Decoiler Dancing Arm, the steel strip will then need to be inserted into the in-feed of the FRAMECAD TF550H machine. The following procedure details the method for doing this:

Tools Required	• Cut-resistant Gloves • 18mm Spanner
Safety	• ALWAYS wear cut-resistant gloves during this procedure. • NEVER stand directly in front of the Decoiler mandrel back-plates:
Loading Steel into the In-feed Guides of the Machine	1. If the machine is not already in Manual control mode, press the [Software Reset] button followed by the [Start] button. 2. Carefully pull the end of the steel strip down and thread through (or under on some earlier Decoilers) the end of the Dancer Arm so that the arm will lift up and down with the steel strip as it is pulled through the FRAMECAD TF550H. **NOTE!** While the Decoiler is in a powered state (i.e. isolator switch ON and Emergency Stop Push-button released) and the Dancer Arm end is resting on the ground, the Decoiler will tend to resist turning making it difficult to drag the steel sheet off. There are two methods that can be adopted to simplify this: 1. Gently lift the Dancer Arm to allow the Decoiler to slowly rotate enough and allow the end of the steel strip to be feed down and through (under) the Dancer Arm. Take extreme care to avoid the spinning mandrel back-plates. 2. Stop the Decoiler by pressing the Emergency Stop push-button on top of the Decoiler. You can also simply turn OFF the isolation switch on the Decoiler. Stopping the Decoiler will allow the Decoiler mandrel to be rotated by hand. 3. Carefully feed the end of the steel strip through the In-feed guide and into the Straightener Unit. **CAUTION!** **ALWAYS TAKE CARE NOT TO DAMAGE THE STEEL STRIP SENSOR MOUNTED ON TOP OF IN-FEED GUIDE. MAKE SURE THE LEADING EDGE OF THE STEEL STRIP IS FREE OF SHARP JAGGED EDGES THAT MAY HIT THE TOP OF THE STEEL STRIP SENSOR.**



TIP!

CUTTING THE CORNER EDGES OFF THE END OF THE STEEL STRIP AT AN APPROXIMATE 45DEG ANGLE CAN ASSIST WITH FEEDING STEEL THROUGH THE ROLLERS.

4. When inserting the steel strip, check that the guides are firm on the steel but not tight. You can test this by first inserting the steel and moving it from side to side inside the guides, there should be little to no movement.
   If the in-feed guide width needs to be adjusted, refer to Section 8 – In-feed Guide Setup (Including the Steel Strip Sensor and Encoder)

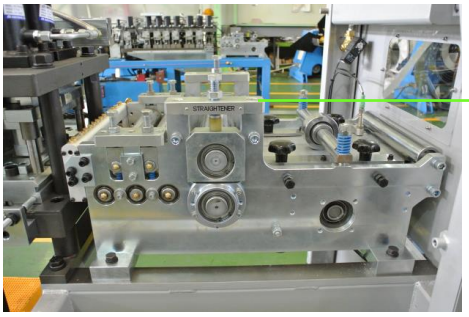
Once the in-feed guide has been checked, the steel strip can now be fed into the Straightener unit. Instructions on checking the Straightener unit follow.

Set the Straightener

Steel strip will often have a natural tendency to bend or curve once it is unravelled from off the coil. The Straightener unit at the in-feed end of the FRAMECAD TF500H is designed to “flatten” the steel strip so that it does not get caught or “hang-up” on the pre-punch tooling block or elsewhere in the machine as it is being threaded through. The procedure below explains how to set the Straightener unit up if required.

1. Continue to push the steel strip through the in-feed guide and into the Straightener unit. Once the steel strip has reached the Straightener unit, continue to while at the same time rotating the end cover Inch selector switch to the Forward position. This will allow the rollers to start spinning and take up the steel strip so that it can be fed through the without having to push the steel forward by hand.

Inch Selector Switch

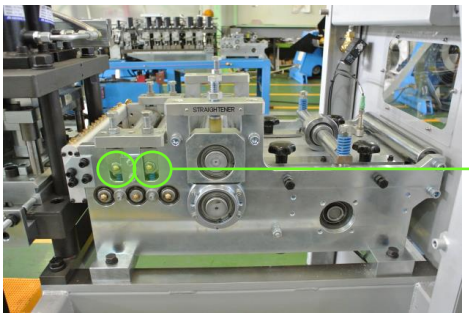


Straightener Assembly

2. Continue to feed the steel strip through until the end is just about to enter the Pre-punch tooling block. Check to make sure the steel strip is horizontally flat by viewing from the side. If it is then the steel strip can now be threaded all the way through using the Inch selector switch. Continue to feed until the steel strip has just exited the out-feed end of the machine.

   If the steel strip is not coming through the Straightener completely flat, continue with the following steps that explain how to adjust.

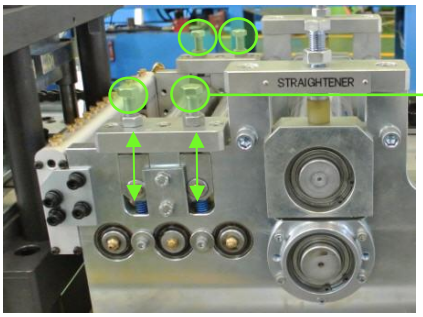
3. ***Reverse*** the steel strip out until the end has cleared the top rollers in the Straightener unit. To reverse the steel strip, rotate the end cover Inch selector switch to the Reverse position.



Top Rollers:
Reverse steel strip out until clear of the top rollers

4. Loosen the x4 lock nuts on the top roller adjustment bolts using an 18mm spanner. Wind the adjustment bolts either up or down to correct any curve in the steel strip (e.g. wind the bolts down if the steel strip is curving downwards. Wind the bolts up if the steel strip is curving in the upwards direction).

   Make adjustments in ¼ of turn *or less*. Adjust all 4 bolts by the same amount (i.e. they should all be at an even height):

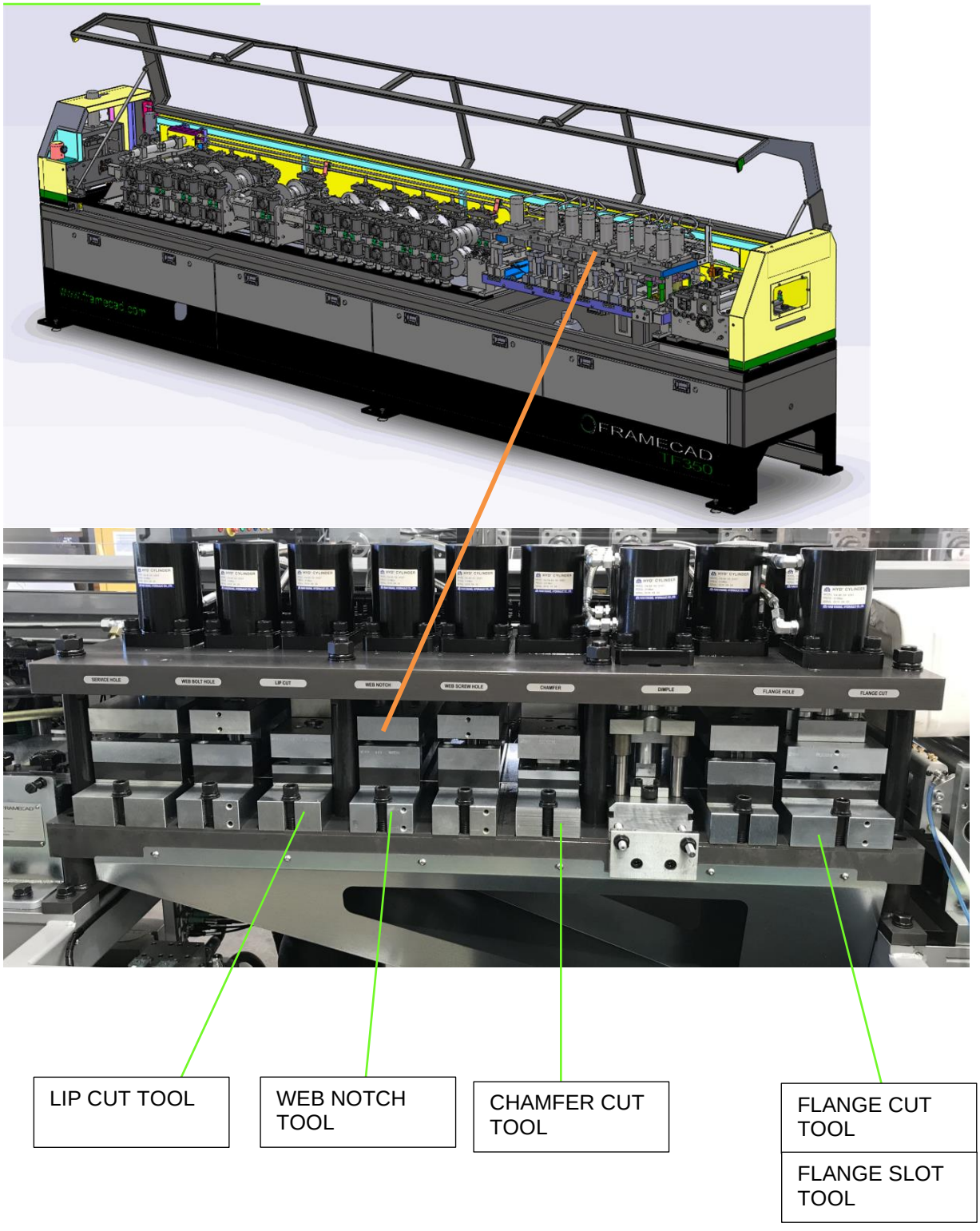


Top Roller Adjustment Bolts

	5. After each adjustment, repeat steps 2 to 4 above until the steel strip is entering the Pre-punch tool block completely flat. If it is then the steel strip can now be threaded all the way through using the Inch selector switch on the end cover. Continue to feed until the steel strip has just exited the out-feed end of the machine. NOTE! Also Check the Central Guide setup as the steel strip is threaded through the machine. See Section 8 – Centre Guide Setup **SAFETY!** **ALWAYS ENSURE THAT CUT-RESISTANT GLOVES ARE USED WHEN HANDLING STEEL.**
Check Central Guide Setup	As the steel strip is threaded through the machine check the central guide setup. The sides of the guide should hold the steel strip firm but should not be over-tight. See Section 8 – Initial Setup – Centre Guide Setup

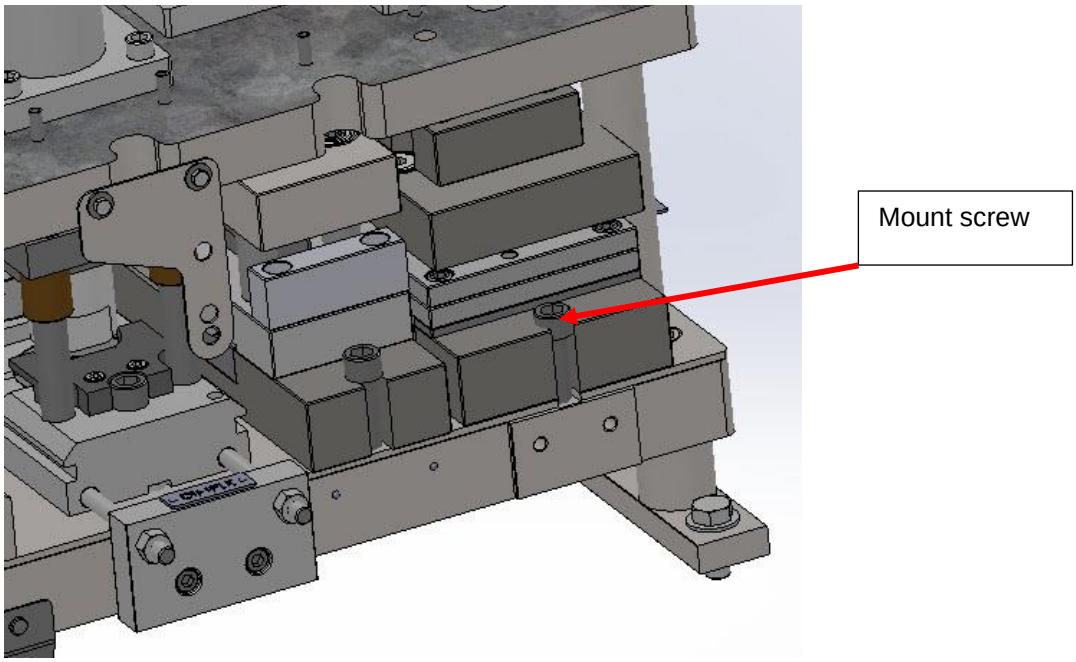
10.4 Installation of Swap Over Punch Tools

Flange Cut Tool, Chamfer Cut, Web Notch and Lip Cut Tool are swap over cartridges, to enable roll forming of F41mm and F51mm profiles.



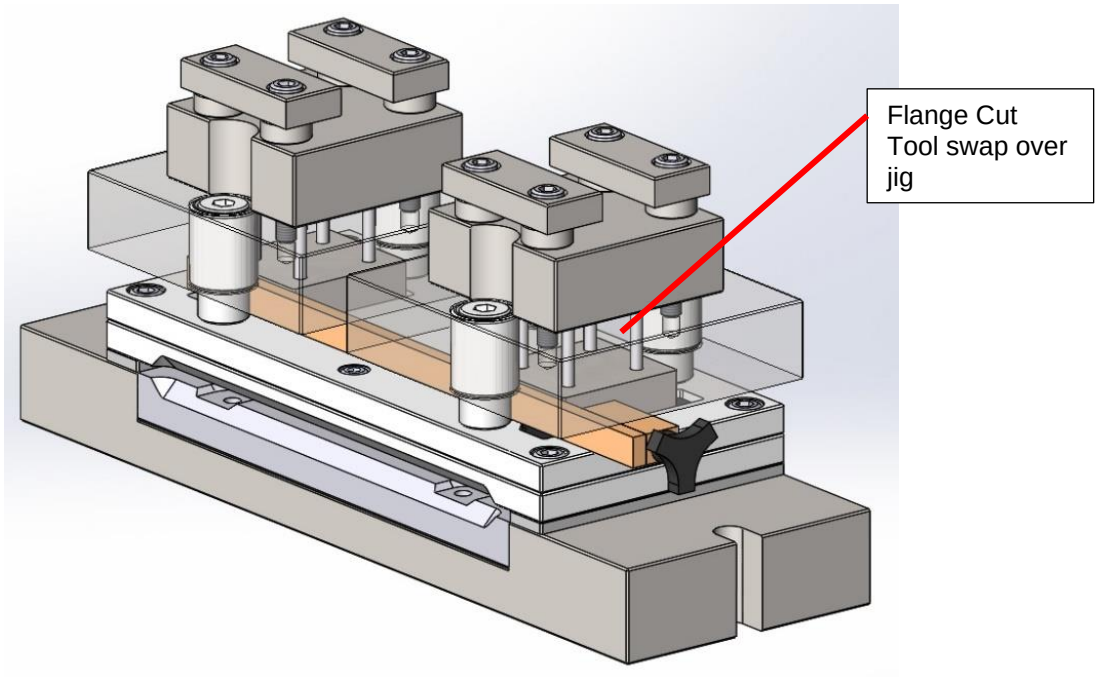
FLANGE F41 AND F51 TOOLS REPLACEMENT

1) Undo mount screws on both sides of the Flange Cut Tool



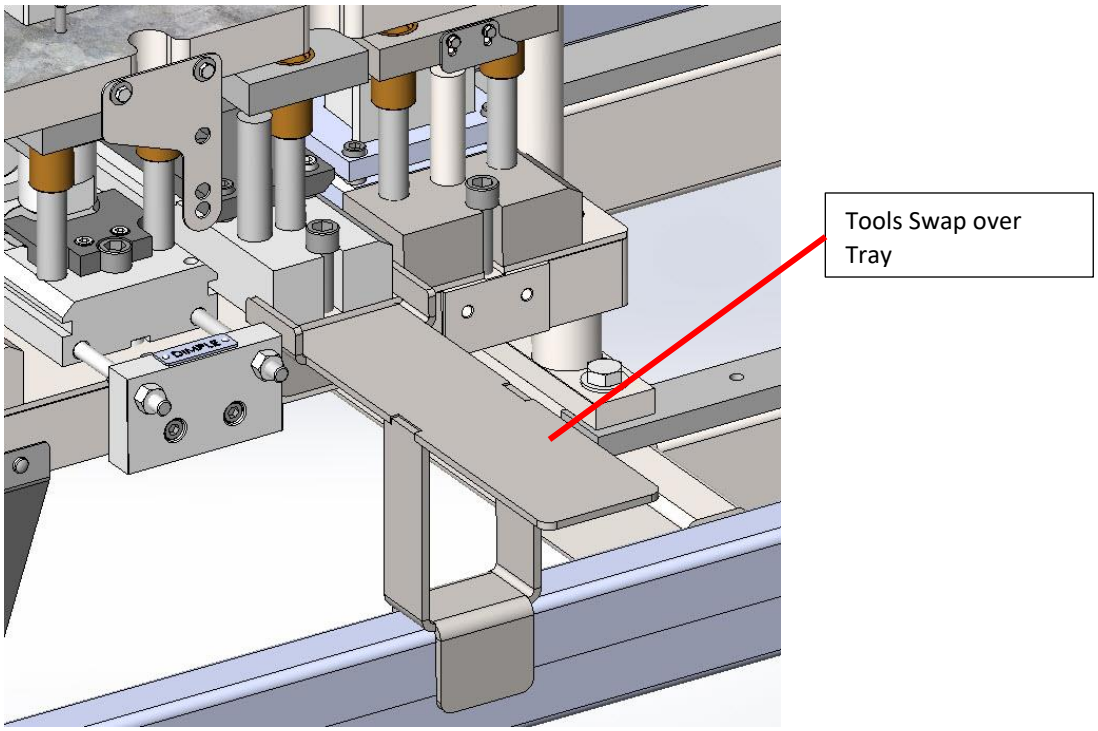
2) Jig is required to support upper punch when the tool is swapped over.

The jig is inserted between the top and bottom plates to keep the opposite side top plate in upper position to clear the cylinder adaptor.



The jig will be supplied with the 0.40” Flange Hole Tool.

3) Install the swap over tray.



4) Slide out the Flange Cut Tool and replace with Slot Tool. Ensure that spigot holders are both engaged with the cylinders.

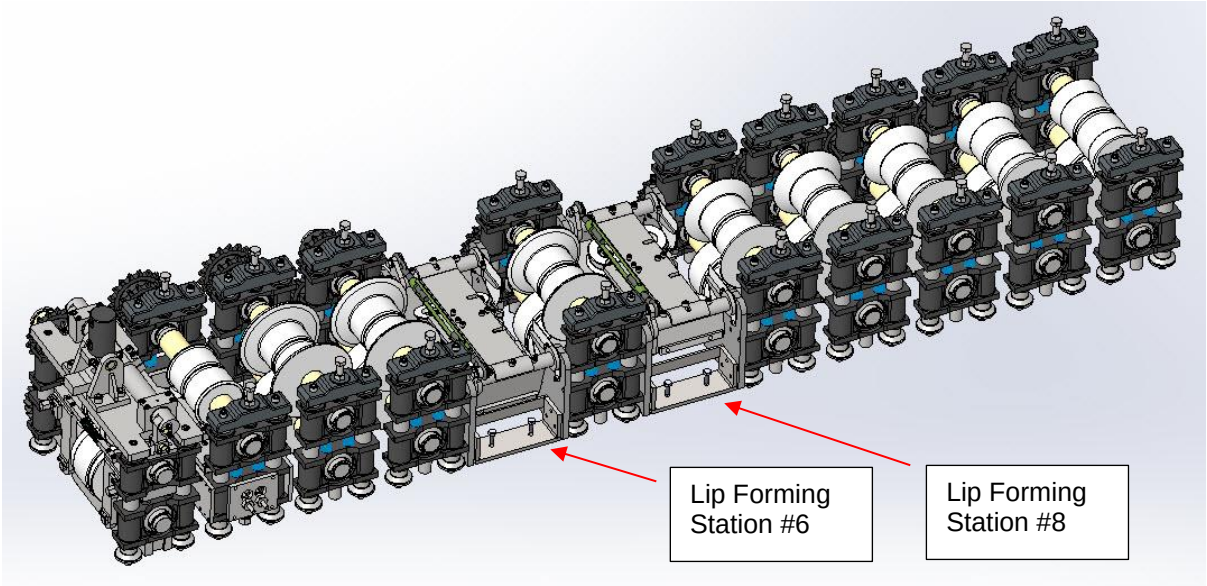
5) Tighten up the mounting screws.

SAFETY!

CAUTION: EACH TOOL WEIGHT IS ABOUT 40KG (90 LB).

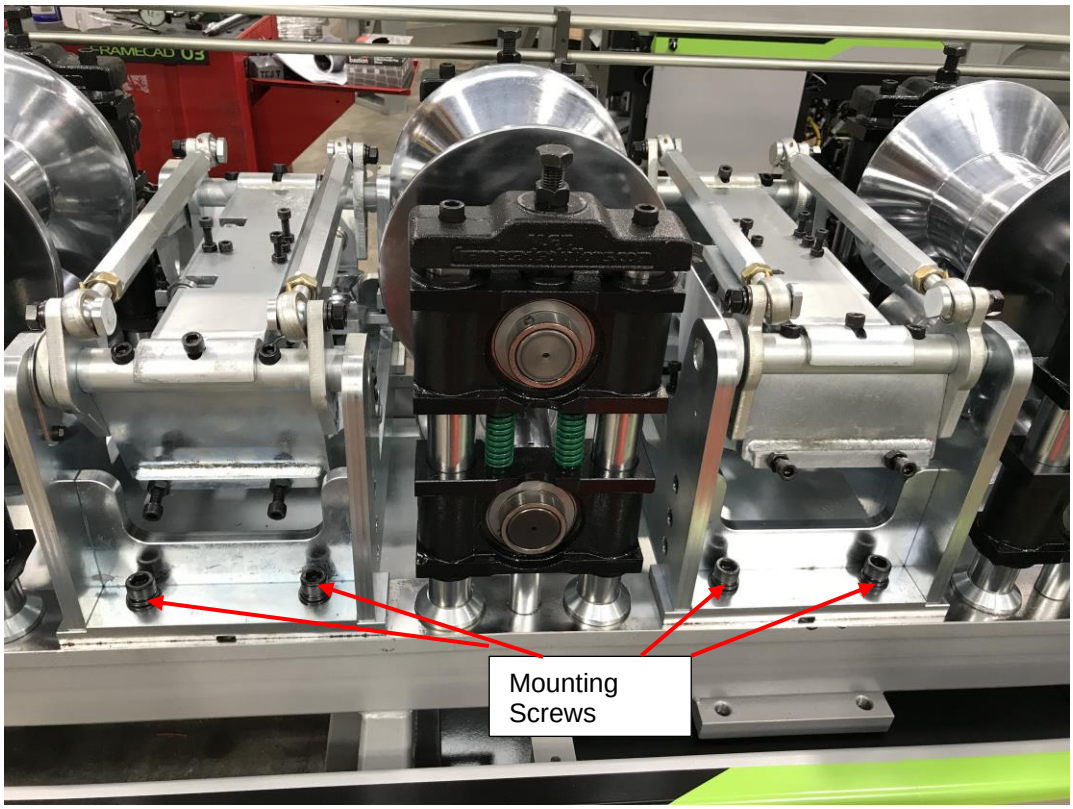
10.5 Lip Forming Station Change

Lip forming Stations are located at the positions 6 and 8 of the Rollergang assembly.
For the profile change execution between F=1.625” and F=2.0” the Lip forming Stations have to be replaced with relevant configuration.

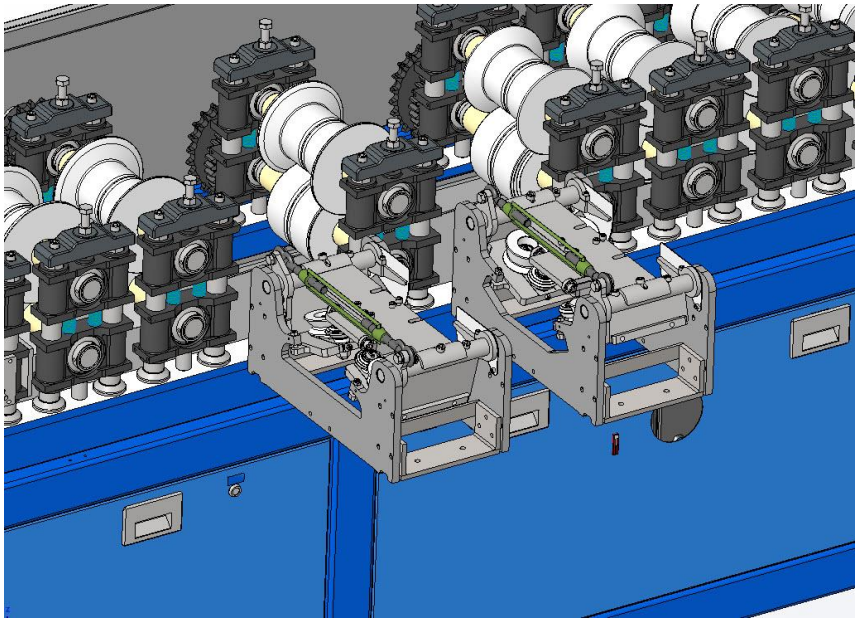


The Lip forming Stations are mounted on the chassis main rails and fixed by the x4 M10x30 cap screws.

The change procedure starts with undoing those 4 bolts for each Station.



After the bolts are removed, the Station is pulled out to the operator's side of the Rollergang.



SAFETY!

CAUTION: LIP STATION WEIGHT IS ABOUT 80KG (180 LB).

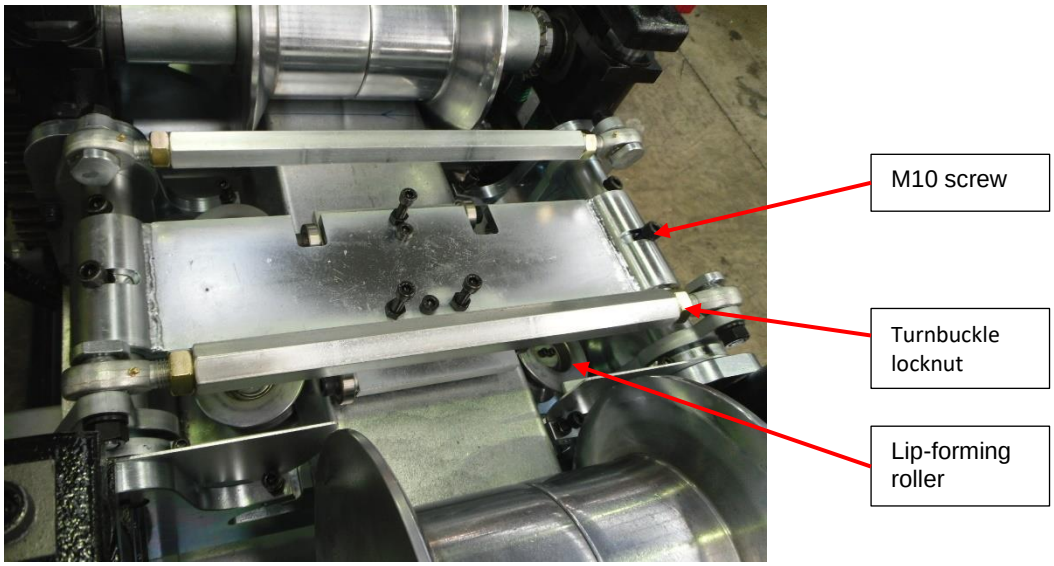
10.6 Lipped and Un-lipped (C and U section) Profile Change Procedure

To change the machine setup from lipped to un-lipped and back the Lip Box Stations 1 and 2 must be adjusted, and the Shear Side crimp dies changed.

10.6.1 Lip Box Station Adjustment

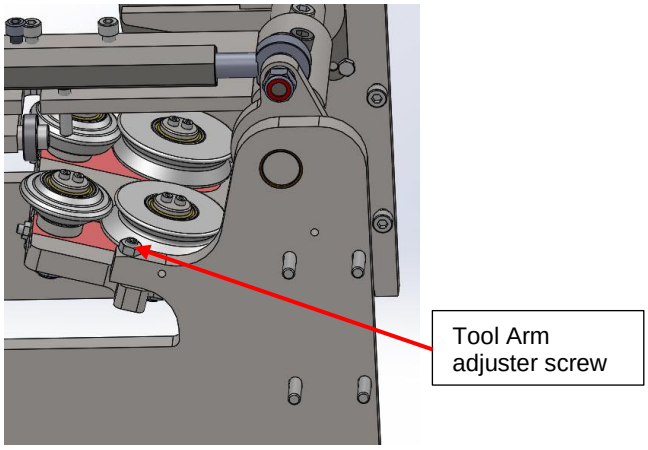
The first place of the machine to change the setup from lipped to the un-lipped and vice versa is the Lip box.
To change to the un-lipped U section, do the following:

1. Loosen M10 cap screws holding the Tool assembly
2. Undo the turnbuckle lock nuts and drive turnbuckles in move the lip forming rollers out of engagement with a profile.



3. Lock M10 screws
4. Lock the turnbuckle nuts

NOTE: Ensure that Adjustment screws position does not change

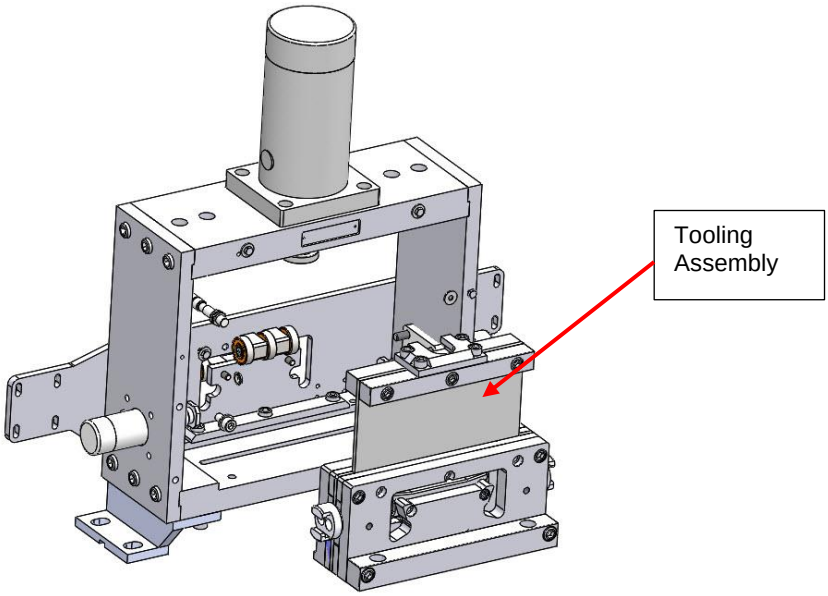


To return to Lipped / C-section setup do the steps 1-4 in reverse order.

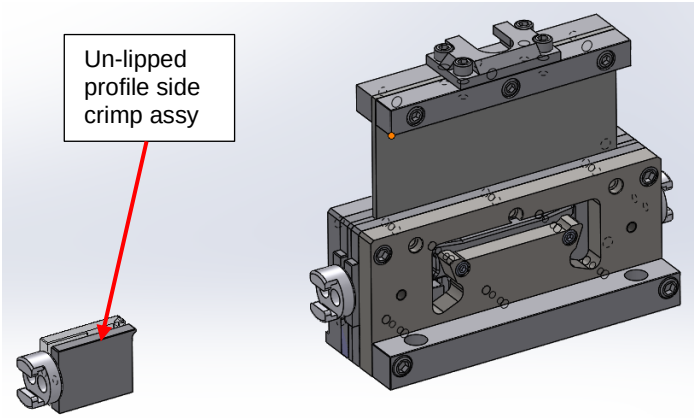
10.6.2 Shear Side Crimp Dies Change

To change the Shear setup to the un-lipped profile:

1. Undo four M12 screws holding the Tooling Assembly to the base plate.
2. Pull out the Tooling Assembly.



3. Pull out the Side Crimp assemblies on both sides



4. Replace the Lipped side crimp assemblies with Un-lipped ones.
5. Insert the Tooling assembly
6. Tighten the assembly by M12 screws

10.7 Purging the Ink Jet Printer System with Ink

Before commencing production, it is important to ensure the printer system is ***ready to print***. In order to achieve this, the printer control system must be ***purged*** with ink.

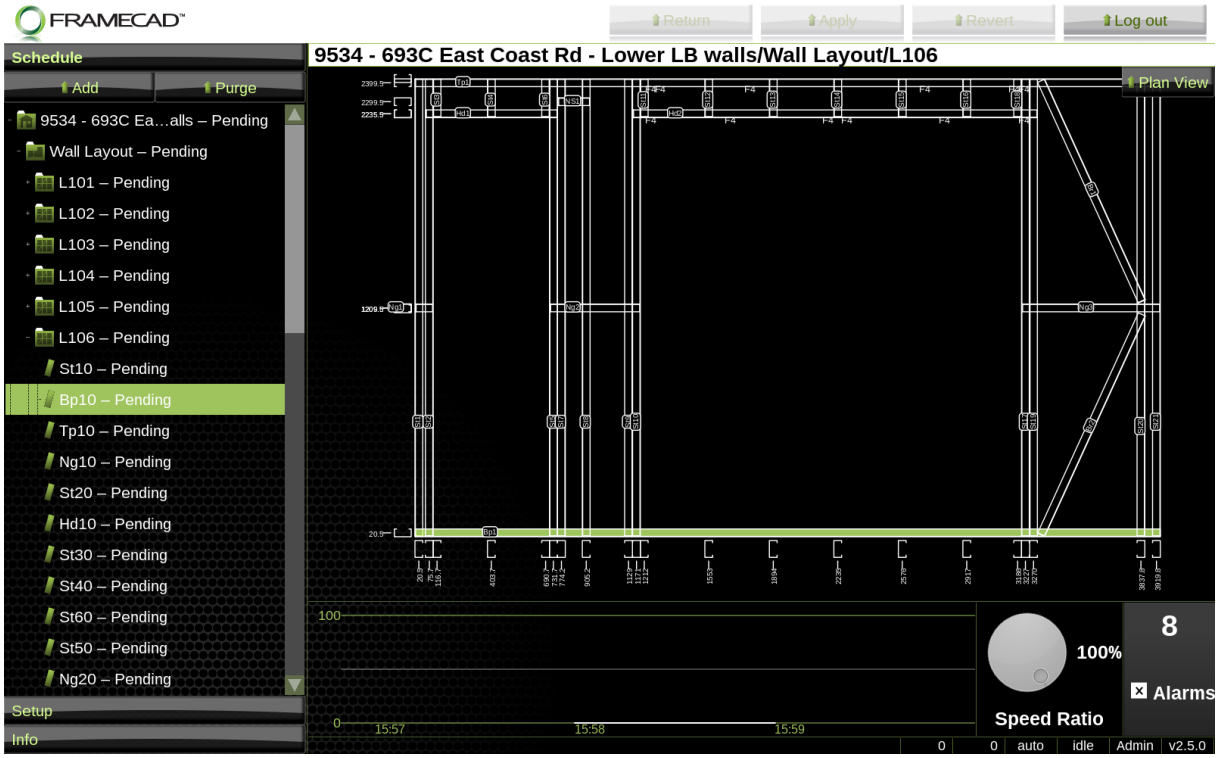
10.8 Switching to Automatic Control

In this control mode the FRAMECAD Factory 2 software will *automatically* process all items occurring in the job schedule. This will start with the first item in the job schedule and will create one frame at a time. At the end of a frame, the job schedule will be re-scanned from the top of the list to find any items which may have been added, moved, or remade. This way it keeps job lots together.

It will then begin the next job folder it finds with the Pending status.

The production rates are shown by the graph at the bottom of the screen, showing the amount of steel produced per hour over the last 8 hours.

See FRAMECAD Factory 2 software User Manual

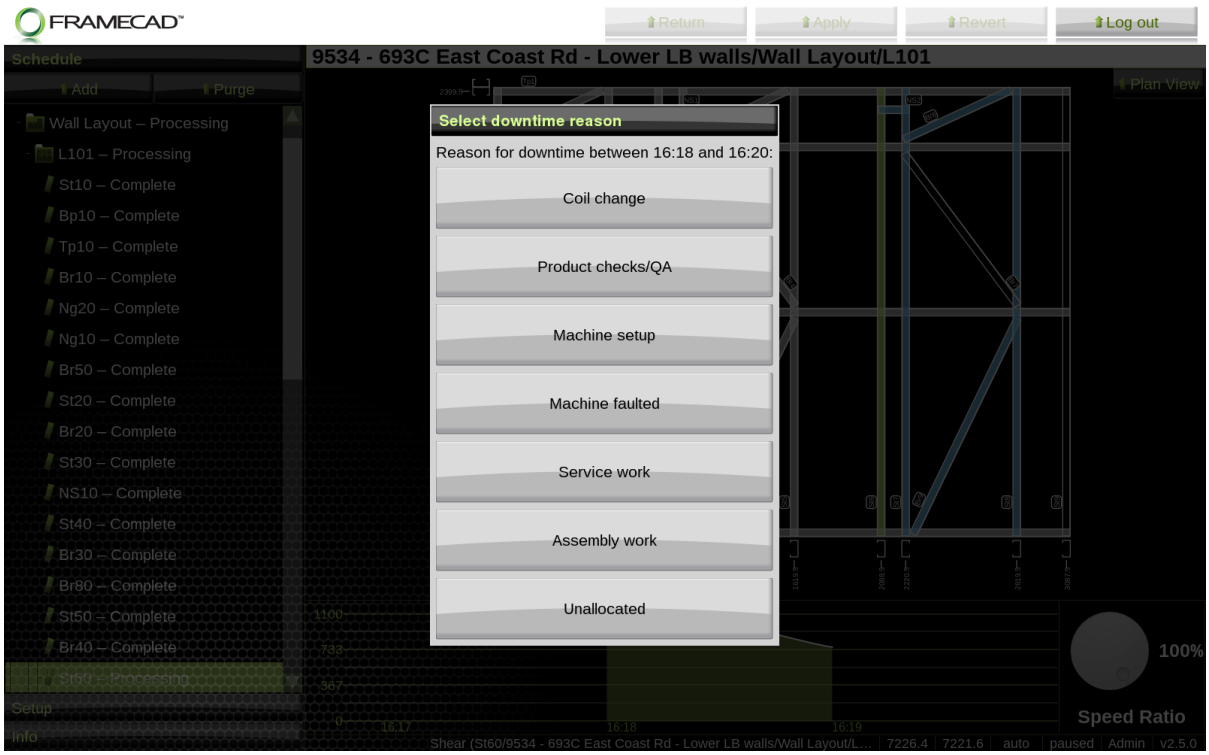


10.9 Downtime Reasons Message Prompt

FRAMECAD Factory 2 includes the option to log the reason why a machine was paused or stopped during automatic production. If an unexpected interruption to automatic production occurs for a period of at least 10seconds, the Operator will be prompted to select from a pop-up list the reason why the machine was stopped the moment the machine resumes automatic production.

These reasons are logged so that events that contribute to *down-time* or steel scrap on the machine can be reviewed.

The downtime logging is turned ON (See FRAMECAD Factory 2 software Supplementary Manual Section 3.6.7) the following message prompt will be displayed whenever automation production has been expectantly stopped for at least 10seconds. The Operator will need to select a reason from the list before the message prompt is removed.



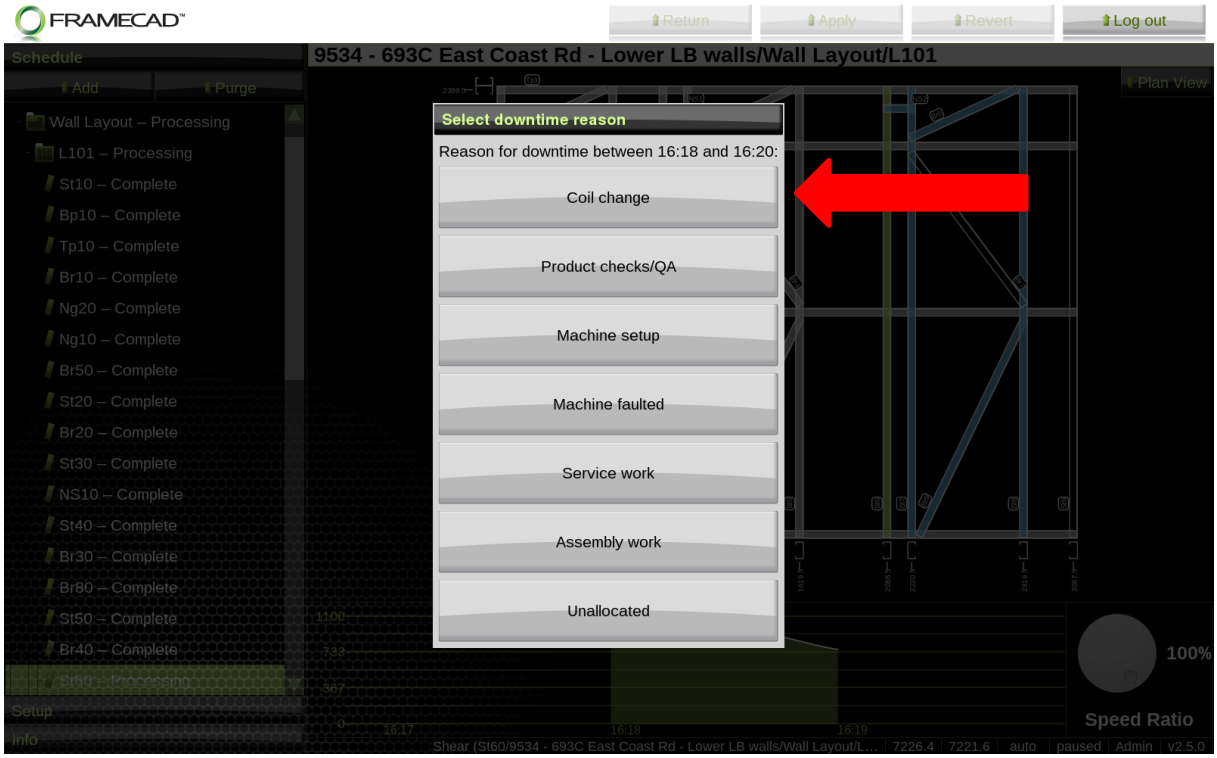
All downtime reasons will be logged so that summary data can be extracted using on-line tools available at my.framecad.com.

TIP!

THE DOWNTIME REASONS PROMPT AND BE TURNED ON OR OFF UNDER THE SETUP – MISCELLANEOUS SCREEN. SEE SECTION 3.6.7 SETUP – MISCELLANEOUS OF FRAMECAD FACTORY 2 SOFTWARE SUPPLEMENTARY MANUAL

10.10 Entering a Coil ID after a Coil Change

If the Operator selects **Coil change** as a downtime reason (Downtime Reasons Message Prompt FCF2 Software Manual) they will then be prompted to enter a coil identification number or description as shown below. This will be logged so that it can be used for production reporting using on-line tools available at https://my.framecad.com/.



10.11 Switching Between Metric and Imperial

FRAMECAD Factory 2 can switch between metric and imperial measurement units. Switching the unit format will change the way measurement data is both entered and displayed inside FRAMECAD Factory 2. This will also determine the type of profile options available when configuring the machine setting.

For more information on switching between metric and imperial dimensions, please see Setup – Miscellaneous.

For more information on configuring the machine setting, see Setup - Machine Setting Screen

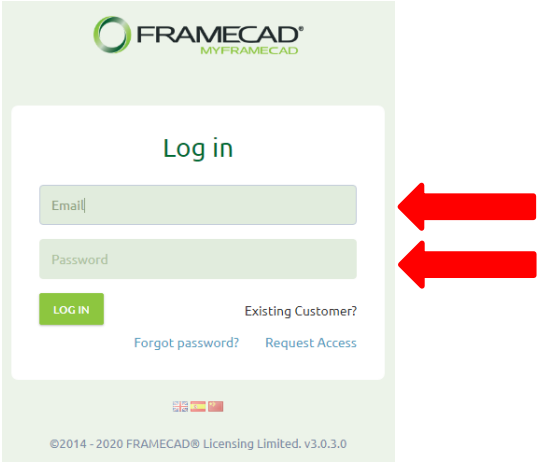
10.12 Accessing My Production – On-line Production Management

Once your machine is on-line and collecting data you will be able to access the My Production tools available at the MyFRAMECAD web-site (my.framecad.com). If you don't have a valid MyFRAMECAD login account, please contact a member of our Aftersales team.

To gain access to the My Production area of MyFRAMECAD, follow the steps provided below.

Step 1:

Go to the my.framecad.com website and login to MyFRAMECAD



Step 2:

Once you have logged in, select My Production

Step 3:

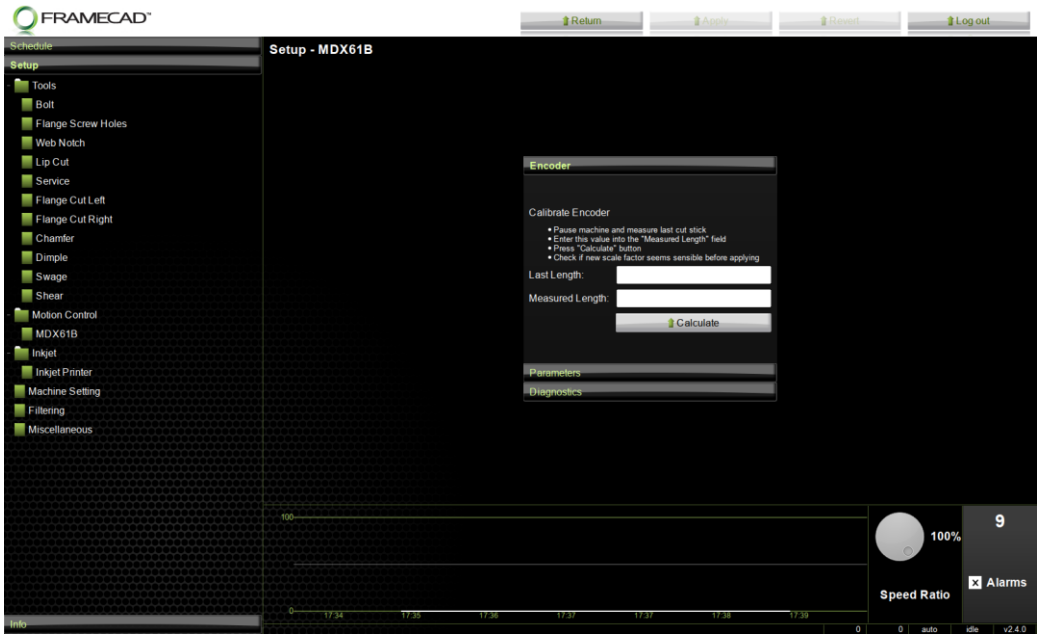
Provided your machine is on-line *and has* logged data, you will be able to access My Production. For more information on using My Production, please refer to the My Production User Guide (also available at the MyFRAMECAD website).

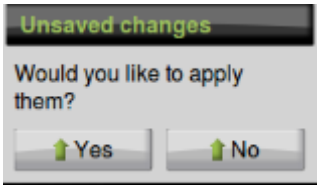
11 Machine Calibration

11.1 Scale-Factor (Strip Encoder) Calibration

The FRAMECAD TF550H machine and FRAMECAD Factory 2 software are designed to operate at a very high level of accuracy. However, to ensure positional accuracy is maintained, it is important to check the strip encoder calibration of the machine at least once a week.

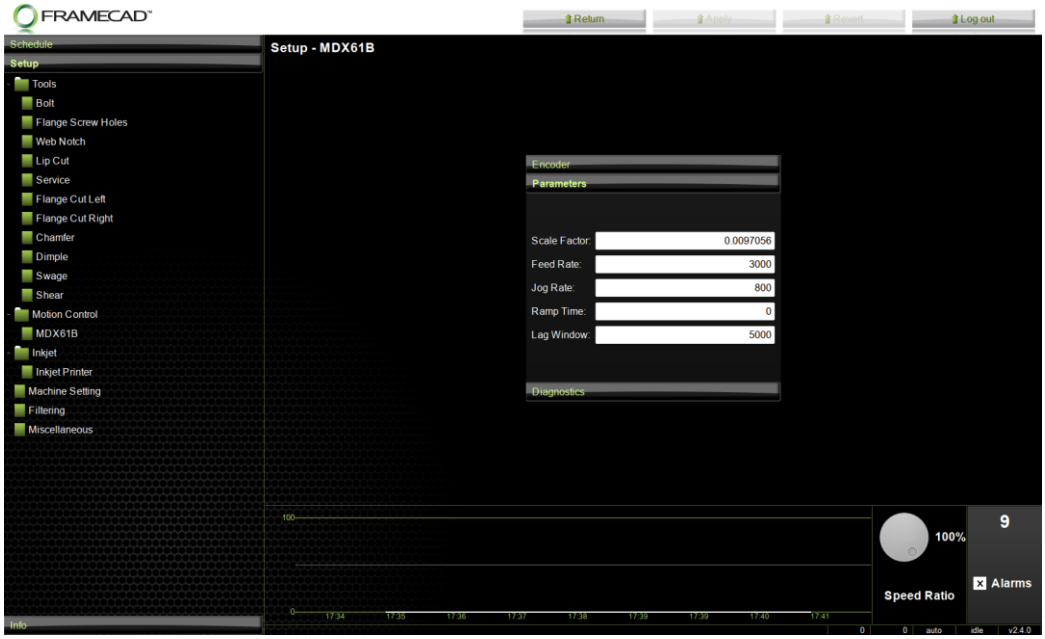
Tools Required	• Accurate Measuring Tape
Safety	• ALWAYS wear cut-resistant gloves during this procedure. • NEVER stand directly in front of the FRAMECAD TF550H Out-feed:
Check the Last Length Made	Select Setup from the menu tree. Now select Motion Control and the MDX61B screen.  To check the scale factor calibration, measure the last stick length made using an accurate tape measure. Compare this with the Last Length value shown in the MDX61B screen. **OR** Load a manual job (see Section 10 - Schedule Screen) and create a stick of at least **3000**mm in length. Run the Manual job in either Automatic OR Semi-Automatic control mode. Measure the actual length made with an accurate tape measure. Compare this with the Last Length value shown in the MDX61B screen. If there is >0.5mm error between the measured length and that displayed in the Last Length value text box, then scale-factor calibration may be required.

Check the In-feed Assembly	One of the most common causes for inaccurate encoder (scale factor) calibration is “slip” at the in-feed unit assembly of the machine. The term “slip” literally means that the strip encoder is “slipping” as the steel strip is progressed through the machine and thereby introducing measurement errors. Typical areas where slippage can occur are (see Section 8 – In-feed Guide Setup (Including the Steel Strip Sensor and Encoder): • The TF550H in-feed unit incorporates a belt-coupled strip encoder. If this belt is loose then it may slip under speed thereby causing inaccurate measurement – **solution**, **re-tension the belt**: • Slipping top guide wheel. If the top guide wheel slips on the steel strip as it is being progressed through the machine then measurement errors will be introduced – **solution**, **tighten down top guide wheel shaft**. **NOTE!** **FOR FULL INSTRUCTIONS AND INFORMATION ON SETTING UP THE IN-FEED UNIT, PLEASE REFER TO SECTION 8 – IN-FEED GUIDE SETUP (INCLUDING THE STEEL STRIP SENSOR AND ENCODER).**
Re-calibrating Scale-Factor	Once you have confirmed that there is **NO** slippage or looseness at the in-feed assembly that may be introducing measurement errors you can re-calculate the strip encoder scale factor by entering the *measured length* (this is the actual length of the last stick made as measured by an accurate tape measure or steel rule) into the **Measured Length** text box.  Once entered, press the Calculate [Calculate] button. This will automatically recalculate the scale-factor. **BEFORE** you exit the MDX61B screen **YOU MUST** press the Apply [Apply] button to save any changes, otherwise you will be presented with the following confirmation box.



Select Yes to save the changes or No to cancel.

You can review the new encoder scale-factor by selecting the Parameters tab.



Checking Scale Factor Calibration During Production

The encoder scale factor calibration can be checked at any time during normal Automatic production using the following method:

1. Suspend production by pressing the [Pause] button.
2. Select the Motion Control / MDX61B screen from under the Setup menu. Select the Encoder tab.
3. Measure the last stick made with an accurate tape measure and compare this with the value shown for Last Length. If the error is >0.5mm, enter the actual measured value in the **Measured Length** text box and press the Calculate [Calculate] button.

   IMPORTANT NOTE! The longer the measured stick length the more accurate any calculation of Scale Factor will be. If the last stick length made is <3000mm then create a manual job incorporating a 3000mm long stick, measure then enter into the Last Length text box to ensure the greatest accuracy of Scale Factor.
4. Press the Apply [Apply] button at the top of the screen to save any changes.
5. Press the Return [Return] button to go back to the job schedule screen.
6. Press the [Pause] button again to recommence Automatic production.

11.2 Tool Offset Calibration

As discussed previously, the centre of the Flange Cut is treated as the *Datum* or reference point for all the tool positions on the FRAMECAD TF550H, including the Shear tool at the out-feed end of the machine. If the *offset* position of any tool relative to the Flange Cut is configured wrong in FRAMECAD Factory 2 then the relative location of the tool will likewise be incorrect. An error in the tool offset values is repeatable and therefore discernible from other measurement errors such as strip encoder slippage (which tend to vary based on speed and or acceleration of the machine).

Tool Offset values are factory set prior to shipping and very rarely if ever, should require changing. If tool positioning is not accurate always check to make sure there is no other *movement* or *looseness* in the various tool assemblies AND confirm the accuracy of the steel strip measurements (i.e. In-feed unit/encoder setup and Scale Factor calibration) *BEFORE* commencing to make any changes to Tool Offset positions.

The following procedure illustrates how to check and/or how to make adjustments to the tool offsets ***if required***. The procedure uses a manual job to create a stick that includes Flange Cuts (as this is the *Datum* tool it is important to include).

Using a sample stick with Flange Cuts included allows you to check first and foremost the Shear tool offset so that once this is correct other tool offsets can be checked relative to the edges of the stick which is easier to do in most cases than to the centre of the Flange Cut.

IMPORTANT NOTE!

TOOL OFFSET VALUES ARE FACTORY SET PRIOR TO SHIPPING AND VERY RARELY IF EVER, SHOULD REQUIRE CHANGING. IF TOOL POSITIONING IS *NOT* ACCURATE ALWAYS CHECK TO MAKE SURE THERE IS NO OTHER MOVEMENT OR LOOSENESS IN THE VARIOUS TOOL ASSEMBLIES OR IN-FEED UNIT AND CONFIRM THE ACCURACY OF THE STEEL STRIP MEASUREMENTS (I.E. IN-FEED UNIT/ENCODER SETUP AND SCALE FACTOR CALIBRATION) *BEFORE* COMMENCING TO MAKE ANY CHANGES TO TOOL OFFSET POSITIONS.

WHEN CHECKING THE TOOL OFFSET VALUES, ALWAYS CHECK THE SHEAR OFFSET FIRST. ONCE THE SHEAR OFFSET IS ACCURATE, MEASUREMENTS BETWEEN THE STRIP EDGE AND OTHER TOOL CUTOUTS WILL BE PROPORTIONALLY THE SAME AS REFERENCE CHECKS TO THE FLANGE CUT DATUM USING THE METHOD DESCRIBED HEREIN.

<table>
<tr><th colspan="2">TOOL OFFSET CALIBRATION</th></tr>
<tr><td>Tools Required</td><td>• Accurate Measuring Tape
• Engineers Square (Optional)
• Steel Scribe (Optional)</td></tr>
<tr><td>Safety</td><td>• ALWAYS wear cut-resistant gloves during this procedure.
• NEVER stand directly in front of the FRAMECAD TF550H Out-feed:</td></tr>
<tr><td>Check Tool Offset Procedure</td><td>1. Load a Manual job that has the following properties (see Section 10 - Schedule Screen):
<table><tr><td>Stick Properties</td><td>Value</td></tr><tr><td>Stick Length</td><td>500mm</td></tr><tr><td># to Make</td><td>1</td></tr><tr><td>Flange Cut 1</td><td>100mm</td></tr></table></td></tr>
</table>

Flange Cut 2	400mm
Service Hole 1	50mm
Service Hole 2	450mm
Bolt Hole / Web Holes	250mm

2. Place the machine into Automatic control mode and manufacture the above stick. ***Mark the leading edge (i.e. the end of the stick that comes out of the machine first) so that you can determine the direction of any tooling offset errors if they exist.***

3. Check the Sick Length:

   Make sure the measured stick length (from end to end) is accurate. If not, then complete the following:

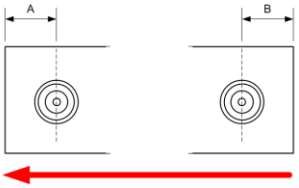
   a. Check In-feed unit setup (see Section 8 – In-feed Guide Setup (Including the Steel Strip Sensor and Encoder)):

   b. Re-check Scale Factor calibration (see above) before continuing with this procedure.

4. Check the Shear Offset:

   a. Measure the distance from the ***edge*** of ***each*** Flange Cut to the adjacent end of the stick (i.e. the end of the stick closest to each respective Flange Cut) and record these measurements as **A** and **B** respectively.

      If **A** and **B** measurements for the Flange Cut locations relative to their respective ends ***differ*** then this indicates that the offset value for the *Shear tool* position is wrong and will need to be adjusted. This is because the Flange Cut is the fixed Datum point for the machine, so all other tool operations, including the Shear are positioned relative to it.

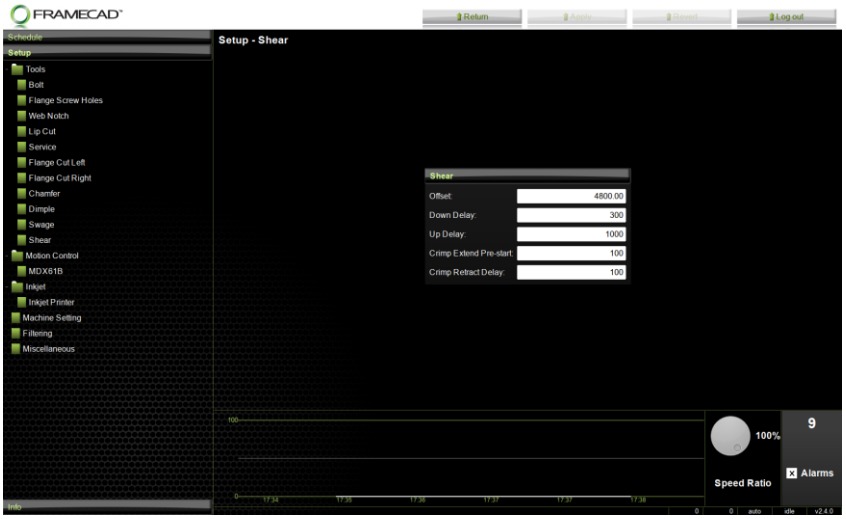


   b. Calculate the degree of offset error and in what direction (i.e. relative to the leading Flange Cut, does the Shear operation need to be brought *closer* or further away and if so, by how much?). Here's an example: suppose the leading Flange Cut is located further back from the stick leading edge by approximately 1.5mm. This would mean the trailing edge Flange Cut would therefore be *closer* to the stick trailing edge by 1.5mm. This means the Shear offset will need to be *increased* by 1.5mm.

      Select the Setup folder from the menu tree. Now select Tools followed by Shear. Enter the new value for the Shear Offset, then the 

[Apply] button.

To re-check that the adjustment made was correct you will need to press the  [Software Reset] button, then re-run the sample stick to confirm.



5. Check the Service Hole Tool Offset:

   NOTE: the procedure below can be completed to check the offset value of any tool once the *Shear offset value has been confirmed* (see above).

   a. Measure the distance from the ***edge*** of ***each*** Service Hole (use the edge of the inner screw hole) to the adjacent end of the stick (i.e. the end of the stick closest to each respective Service Hole) and record these measurements as **C** and **D** respectively.

   b. If **C** and **D** measurements for the Service Hole locations relative to their respective ends ***differ*** then this indicates that the offset value for the Service tool position is wrong and will need to be adjusted. As with Shear offset in 3 above, the position is always relative to the Flange Cut tool Datum – this is why the Shear offset must always be checked first so that measurements made to the stick edges are proportionally correct to the Flange Cut as well.

      Calculate the degree of offset error and in what direction (i.e. relative to the leading strip edge, does the Service Hole operation need to be brought *closer* or further away and if so, by how much?). Here is an example: suppose the leading Service Hole is located further back from the stick leading edge by approximately 1.5mm. This would mean the trailing edge Service hole would therefore be *closer* to the stick trailing edge by 1.5mm. This means the Service Hole offset will need to be *increased* by 1.5mm.

      Select the Setup folder from the menu tree. Now select Tools followed by Service Hole. Enter the new value for the Service Hole Offset, then the  [Apply] button.

      To re-check that the adjustment made was correct you will need to press the  [Software Reset] button, then re-run the sample stick to confirm.

DESCRIPTION	VARIABLE	MEASURED VALUE
Distance Leading Flange Cut to Leading Edge of Stick	**A**	
Distance Trailing Flange Cut to Trailing Edge of Stick	**B**	
Distance Leading Service Hole Centre to Leading Edge of Stick	**C**	
Distance Trailing Service Hole Centre to Trailing Edge of Stick	**D**	

If A <> B then Shear tool Offset value is incorrect.

If C <> D then Service Hole tool Offset value is incorrect

11.3 Setting Tool Cycle Times

The FRAMECAD Factory 2 software provides the ability to alter the cycle time (in milliseconds) of each hydraulic tool action. The tooling cycle time is the sum total of the time it takes for a tool to complete its downward stroke (including the cutting of the steel strip) AND the time it then takes to fully retract the tool back to its home position during the return upward stroke. This tool cycle timing is critical for three main reasons:

1. If the downwards stroke time is set **too short,** then the tool may not fully cut the steel strip. This may result in a partial or inefficient cut operation that can then lead to steel jam ups inside the machine.
2. If the upwards return stroke time is **too short,** then the tool may not have had enough time to fully retract before the FRAMECAD Factory 2 software instructs the VFC unit to progress the steel strip forward in the machine. This will typically result in the edges of the steel strip cut-out catching on the tooling as it retracts, resulting in a jam up inside the machine.
3. If either the downward or upward times are set **too long,** then this will unnecessarily slow down the FRAMECAD TF550H production rate.

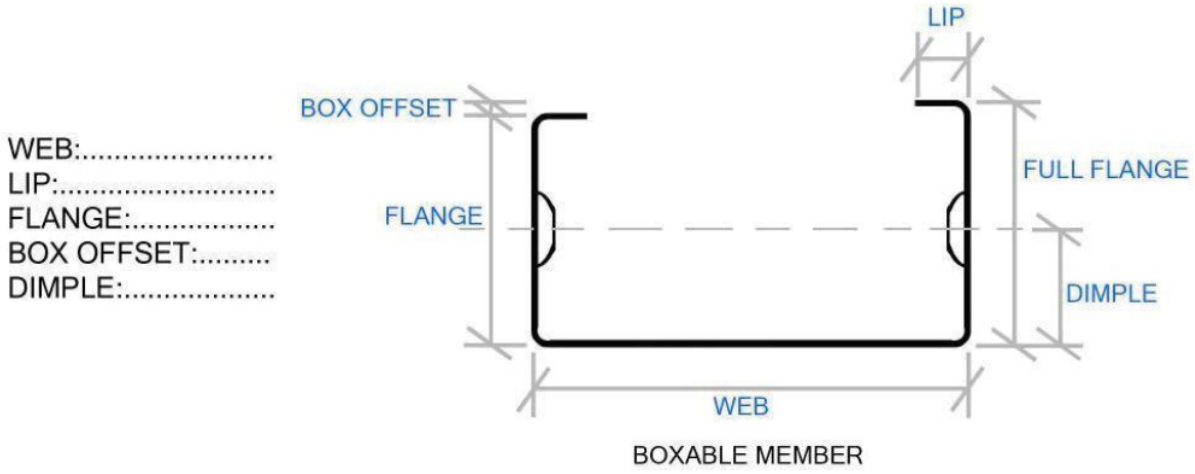
If any of the above issues are present the tool cycle times can be adjusted via the Setup menu (see Section 10 – Setting Tool Cycle Times).

TOOL OFFSET CALIBRATION	
Tools Required	• Nil
Safety	• ALWAYS wear cut-resistant gloves when handling steel during this procedure. • NEVER stand directly in front of the FRAMECAD TF550H Out-feed:
Change the Tool Up & Down Times	1. Select the Setup folder from the main directory. 2. Select Tools followed by the actual tool you wish to adjust the cycle time on. 3. Change the Up-Time value to alter the upward return stroke time of the tool. Change the Down Time value to alter the downward stroke and steel strip cutting time of the tool. The sum of these two values is the *Total tool cycle time*. **NOTE! The time values MUST BE entered in milliseconds** 4. Once you have entered the new values, press the [Apply] button to save any changes. 5. It is always good practice to test any new tool cycle times in Manual control mode *before* running in fully Automatic control mode. **WARNING!** **THE TOOL DELAY TIMES ARE FACTORY SET AND SHOULD ONLY BE ADJUSTED IF DIRECTED TO BY A FRAMECAD TECHNICIAN. INCORRECT ADJUSTMENT COULD CAUSE CATASTROPHIC DAMAGE TO THE MACHINE TOOLING.**

11.4 Setup and Calibration of the "C" Section Profile

Each FRAMECAD TF550H is designed to produce dimensionally, a dedicated "C" section profile (and the equivalent a "U" section profile). The dimensions of this profile will have been specified at order placement time to suit the time of framing assemblies required. This means that the roll forming section and all the available tooling will have been factory set to achieve this profile configuration.

It is good practice to retain the profile dimension information *inside this manual* for future reference and training needs. The following diagram and spacing is provided for this:



NOTES:

- You will have specified the type of "C" section profile to be produced at time of order and this cannot be altered without substantial changes to the machine.
- The Web and Flange dimensions are pre-set at the FRAMECAD factory. The flanges may be of equal length for a *Symmetrical* profile (i.e., where the Box Offset value above is 0), or of an uneven length for a *Boxable* profile (where two "C" section profiles can be fixed together to produce a stronger "boxed" section):
- The Lip length is a function of the steel strip width. FRAMECAD will have provided the *nominal* steel strip width to manufacture the requested "C" section profile. If you reduce this steel strip width, the Lip width will likewise reduce proportionally. If you run a steel strip width wider than recommended, the Lips will grow in proportion.

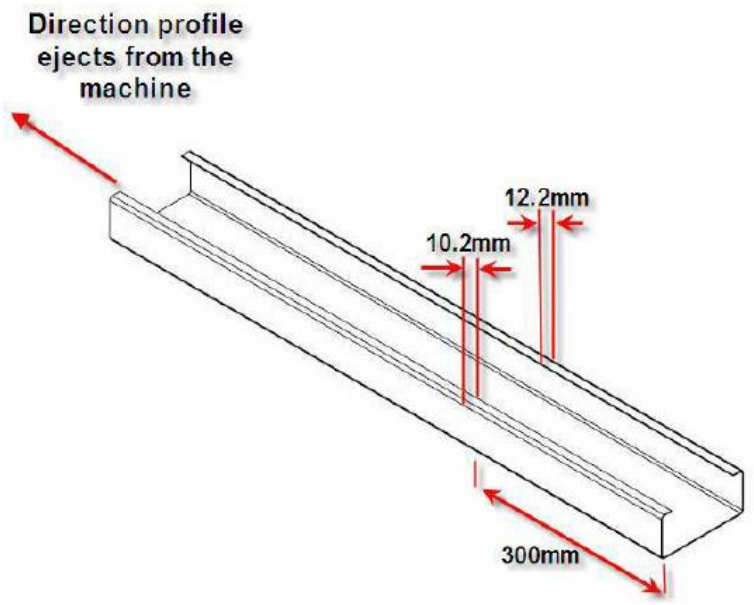
  CAUTION! If the Lip width is larger than the specification for your machine, the "C" section profile <u>WILL</u> jam inside the machine.

11.5 Product Quality

It is critical that Operators of the FRAMECAD TF550H routinely check the quality of the “C” section profile being manufactured. In addition to the accuracy of stick lengths and tool positioning, the following profile issues should be routinely checked for and adjustments made to correct if they occur.

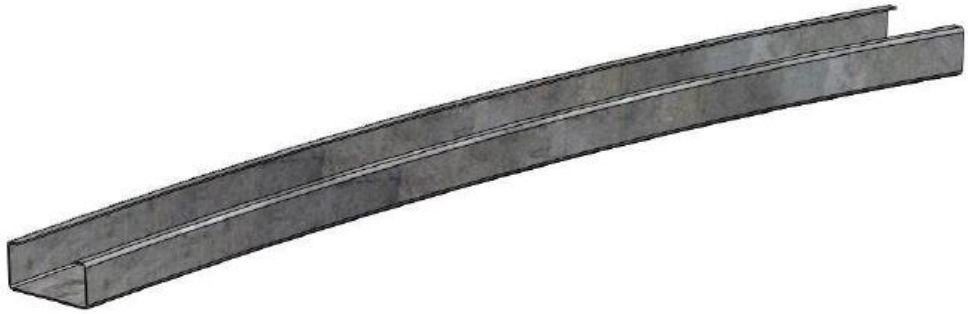
11.5.1 Variations in Lip width

This is when there is a >0.8mm difference in the lip width from one side of the profile versus the other. An example is shown below. Typically, this can be corrected by adjusting the in-feed or central guides:



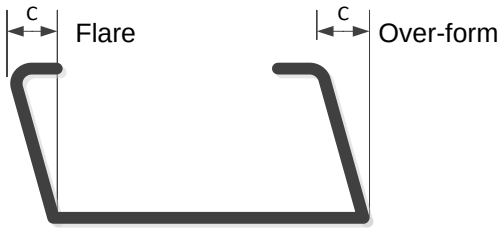
11.5.2 Bow (or straightness)

Bow is the amount of “bend” in the profile being produced in either an *uphill* or *downhill* direction as the product exists the machine. An example of *downhill* bow is shown below:



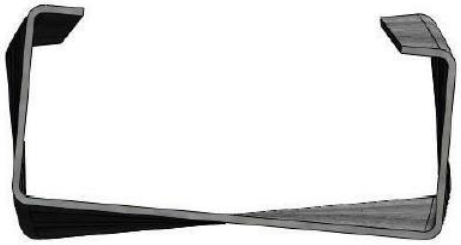
11.5.3 Flare or Over-form

Flare or Over-form is when the Flanges are no longer 90degress relative to the Web. Flare is when the Flange is bent outwards from the Web: Over-form is when the Flange is bent in towards the Web.



11.5.4 Twist

Twist is the difference in angle between each end of the “C” section profile. It can be either “clockwise” or “counter-clockwise” in direction. Twist is most commonly formed by an *uneven pressure* being applied to one side of the profile versus the other in the roll-forming section. An example is shown below:



11.5.5 Incorrect Flange Height

The FRAMECAD TF550H incorporates two *Lip forming* sections that progressively roll the lips into the profile. The formation and size of the lips also has a direct impact on the *height* of the profile side flanges. In a standard boxable profile configuration (see Section 6 – Introduction to the ‘C’ Section Profile) one flange (Operator Side) is deliberately made shorter than the other (typically a 41/39mm flange configuration).

If the flange heights do not match the required specification for the machine, the Lip forming section(s) will need adjustment. To assist with this, all FRAMECAD TF550H machines are supplied with a set of standard profile templates that are designed to slide over the back of the “C” section profile to determine if acceptable: each Lip forming station will have a unique profile template associated with it. Using these templates, a quick assessment can be made as to whether or not adjustment of a particular Lip forming station is required.

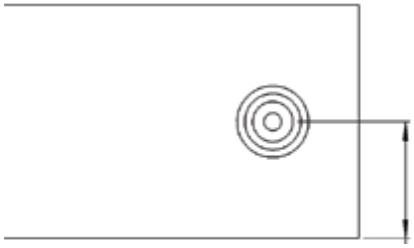
An Example of Incorrect Flange Height

IMPORTANT!

THE STANDARD PROFILE TEMPLATES ARE CRITICAL FOR SETTING THE LIP SECTION UNITS. KEEP THESE IN A SAFE PLACE FOR FUTURE USE.

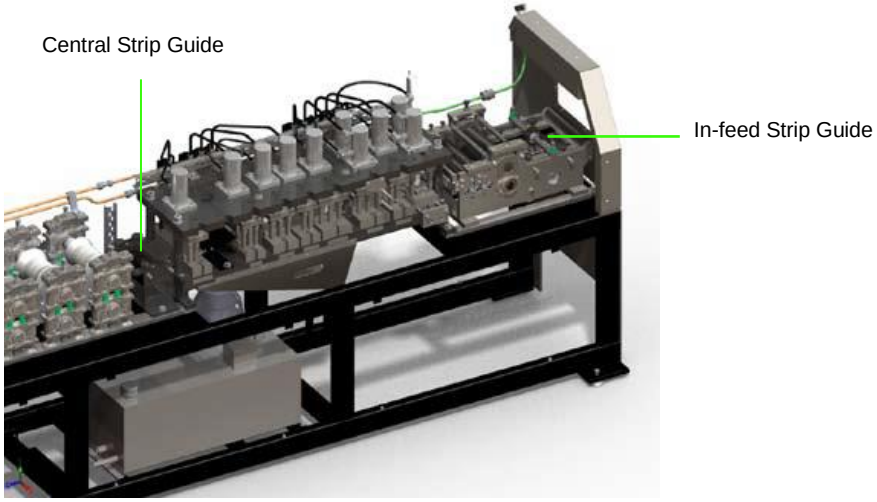
11.5.6 Incorrect Dimple Height

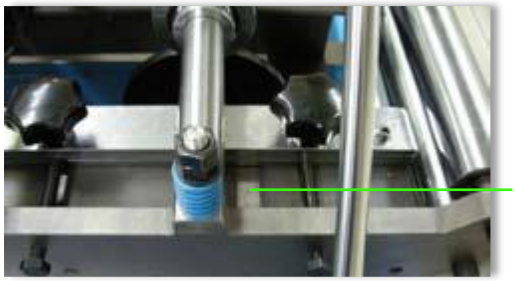
The Dimple heights on a FRAMECAD TF550H determine the connection point of one frame component to another. It is therefore critical that the height of the dimple relative to the web is the same on both sides (within +/-0.2mm) otherwise frame assemblies will have twist in them. The FRAMECAD TF550H dimple to web height should be 21mm:



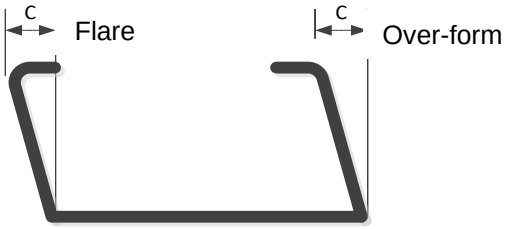
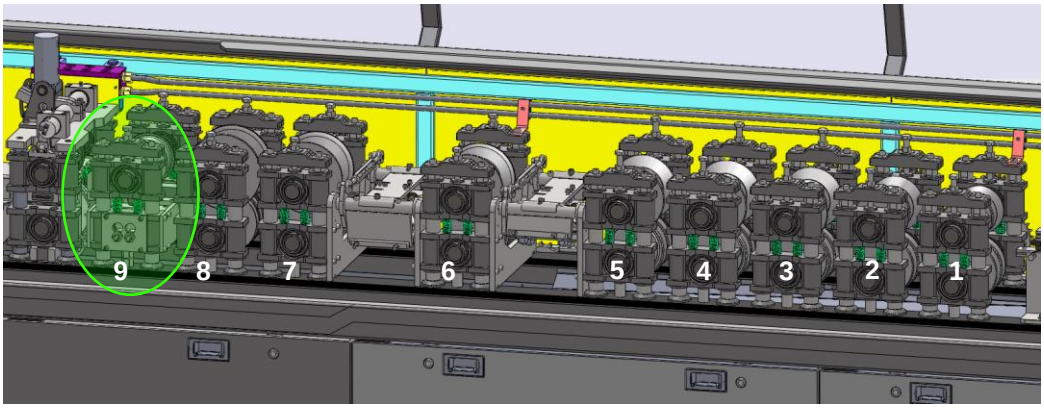
Dimple to Web Dimension = 21mm (+/-0.2mm)

11.6 Correcting Lip Width Variation

Tools Required	• High accuracy Vernier Caliper
Safety	• ALWAYS wear cut-resistant gloves when handling steel during this procedure:
Purpose of In-feed /Central Guides	The in-feed and central guides are designed to align the steel strip as it is fed into the FRAMECAD TF550H. This is to ensure the steel strip is evenly distributed across both sides of the machine as it is progressed through. 
When to Adjust	The in-feed unit guides should always be checked and adjusted if required in the following situations: 1. After a change in the steel coil (i.e., as it is being fed into the in-feed unit of the FRAMECAD TF550H).

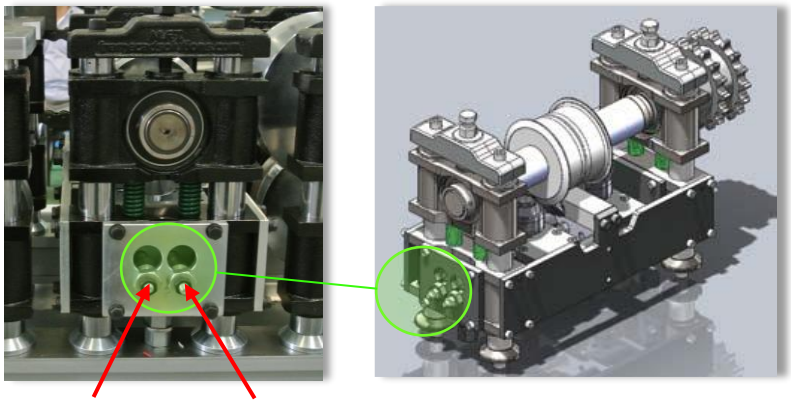
Continued	2. Whenever there is a variation in the measurement of Lip width from one side of the machine to the other (this can be due to the guides being loose on the strip width OR the sideways Lip adjustment is not correct). 3. Whenever the steel strip does not track evenly through the machine, often resulting in jam ups at the Lip Box unit (typically due to loose in-feed guides on the steel strip): 4. If the in-feed guides themselves are showings signs of wear (due to the guides being either over-tightened or not correctly set for the steel strip width).
Side to Side Lip Adjustment	The Lip width on either side of the profile should be approximately the same. If there is significant variation (>0.8mm) from one side to the other, use the Side to Side Lip Adjustment. The first step is to measure the size of the variance and the direction. For example, the steel strip width is sized to give 11mm Lips on either side, but there is side difference of 2mm. This means that to properly centralise the steel strip tracking in the machine, the steel strip needs to be moved to the ***left*** by the guides (relative to the direction of travel in the machine) by 1.0mm. This is because there is a 2.0mm difference between the two Lip widths, so that moving 1.0mm to the left will allow 11mm symmetry on both Lip widths. To adjust the guides, follow the procedure below: 1. Back off the ***Central*** guide so that neither side is touching the steel strip: 2. Remove the steel strip from the machine. This is the easiest way to adjust the side to side positioning of the guides. 3. Adjust the side to side position of the in-feed guide using the reference scale provided (see Section 8 – In-feed Guide Setup (Including the Steel Strip Sensor and Encoder) for more information).  In-feed Strip Guide Reference Scale 4. Manually run 8-10m of steel through the machine – this is to allow the strip to settle into its new position. 5. Measure the lip widths and repeat steps 2 to 4 above if necessary. 6. Once the lip widths are equal, bring the Central guide sides in to within +0.5mm on each side of the steel strip and tighten adjustment bolts (see Section 8 – Centre Guide Setup).

11.7 Over-from Adjustment

Tools Required	• Engineers Square • 16mm Spanner • 26mm Spanner
Safety	• **ALWAYS** wear cut-resistant gloves when handling steel during this procedure. • **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection. • **REMOVE** Steel from the FRAMECAD TF550H before making any adjustments
Purpose of the Over-form Rollers	The over form rollers allow you to adjust the angle of the web to flange bend. This should be 90^0.  The rolling section will roll the steel strip to 90^0 during roll forming, but because the steel strip is typically having high tensile strength there is a tendency for the steel flanges to want to spring back. The over form rollers compensate for this by allowing some additional forming past the rolling section: this is known as over-forming. The FRAMECAD TF550H allows for up to an additional 8 degrees of over-form to ensure the profile Flanges are at 90^0 to the Web.
When to Adjust	The over-form rollers will need adjustment when there is either too much *flare* (i.e. not enough over-form) or too much *over-form* (i.e. the machine is over-forming the profile at the over-form rollers). Typically, if you change steel stock to a different tensile strength or even thickness, you will need to adjust the degree of over-form:
Location of the Over-form Roller Adjustment	A set of over-form rollers are located at the base of the roller station assembly just prior to the Swage tool assembly towards the out-feed end of the machine (the 9th driven roller station).  **Roller Station 9 (the 9th Driven Roller Station)** Each side of the profile will have an over-form roller that can slide horizontally either in or out to configure the degree of over-form required.

Over-form Roller

Each side can be independently adjusted via an adjustment screw.



Drive Chain Side Flange Adjustor

Operator Side Flange Adjustor

The left-hand adjustment screw will adjust the *Drive Chain Side* flange over-form
The right-hand adjustment screw will adjust the *Operator Side* flange over-form

Over-form Adjustment

1. Using an Engineers Square, check the *squareness* (how close the angle is to 90^0) of the Flanges.

   ALWAYS check squareness of the Flanges relative to the Web at least 300mm from the end of a stick – the reason for this is that the Shear action will always introduce a degree of flare (opening up) of the Flanges where the Shear cut takes place.

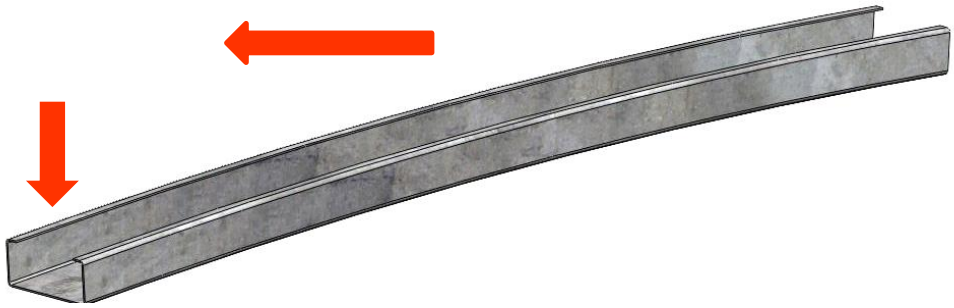
2. Adjusting Over-form:
   Remove steel from the machine BEFORE attempting this procedure.

   Drive Chain Side Flange Over-Form Adjustment
   On the Drive Chain Side flange adjustment screw, loosen the outer lock nut using the 16mm spanner. Rotate the adjustor screw nut using the 26mm spanner either clockwise (to *increase* the amount of over-form bend) or counter clockwise (to *decrease* the amount of over-form bend). Once set, retighten the lock nut.

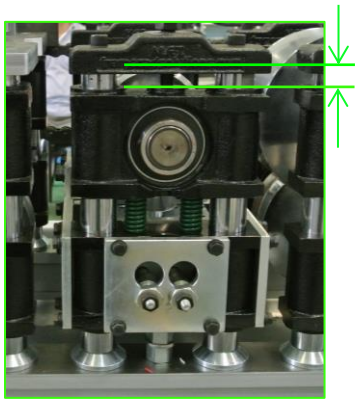
   Clockwise to Increase the amount of over-form on the Drive Chain Side flange
   Counter-clockwise to Decrease the amount of over-form on the Drive Chain Side Flange

	Operator Side Flange Over-Form Adjustment On the Operator Side flange adjustment screw, loosen the outer lock nut using the 16mm spanner. Rotate the adjustor screw nut using the 26mm spanner either clockwise (to *decrease* the amount of over-form) or counter clockwise (to *increase* the amount of over-form). Once set, retighten the lock nut. **Clockwise to Decrease the amount of over-form on the Operator Side flange** **Counter-clockwise to Increase the amount of over-form on the Operator Side Flange** 3. Close all the cover and reset the safety control system. Run out another test stick and re-check Flange squareness. If required re-adjust.

11.8 Correcting Bow

Tools Required	• High accuracy Vernier Caliper • 29mm Spanner
Safety	• **ALWAYS** wear cut-resistant gloves when handling steel during this procedure. • **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection. • **REMOVE** Steel from the FRAMECAD TF550H before making any adjustments
Bow Overview	Bow is the amount of bend in a product. It is either an "up-hill" or "down-hill" bend: typically, most bow will tend to be in the down-hill direction. The targeted maximum bow is ± 1.6mm per 2.4m of length (this measurement is carried out on uniform section steel, i.e., with no tooling operation cut-outs in the profile). To check for bow, place two equal stick lengths back-to-back (i.e. Web to Web). If there is a gap between the centres of the sticks, this is ***down-hill bow***. To counteract Bow in the profile, a selection of *shim* spacers are supplied with the machine which can be used to provide a specific step change in height of the bottom roller at the 9th driven roller station (which is the same roller station where the over-form is adjusted). An increase in height will counteract a *down-hill* bow. Removing shim spacer(s) to lower the height will tend to counteract an *up-hill* bow.  **Example of Down-hill Bow**
When to Adjust - Testing for Bow	1. Run off two sticks of length 3000mm. There must be no tool operations other than the Shear to cut the length. This is because some tools cause inherently distorts the “C” section profile: 2. Place the two lengths back-to-back on a smooth level surface and clamp the two ends lightly together. 3. Using a calibrated Vernier Caliper measure for a gap between the two webs at the mid 1500mm point. 4. Divide the measured value by two and the resultant figure will be the total bow in each length. 5. Typically, the maximum amount of bow in a 3000mm length should be no more than **2-3mm**.
Correcting Bow	1. Shutdown and isolate the machine from the electrical power supply to prevent injury when working on or near the rolling stations.

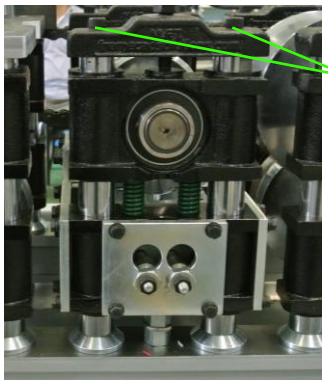
2. Before commencing with any adjustments, use a Vernier Caliper to accurately measure the distance between the top pedestal cap and top bearing housing on both sides of the 9th driven roller station as shown below. Record these measurements for future use:



Measure between top cap and top bearing on both sides of the 9th Driven Roller Station – record these values

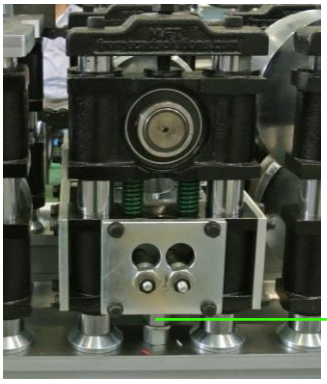
Operator Side Cap to Bearing Distance (mm)	
Drive Chain Side Cap to Bearing Distance (mm)	

3. Loosen the cap screws on the top cap for both sides of the 9th driven roller station as shown below so that the cap is free to slide up or down:



Loosen the top cap screws on both sides of the 9th Driven Roller Station

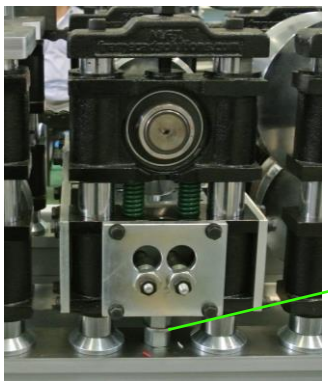
4. Loosen the lock nut on the Raise/Lower adjustor at the base of Roller Station 9 for ***both sides***:



Loosen the Raise/Lower Adjustor lock nut on both sides of the 9th Driven Roller Station

5. A selection of calibrated shim spacers are supplied with the machine. Measure the thickness of the shim spacer to determine the right thickness needed to counteract any Bow in the profile using a Vernier Caliper: record this measurement.

6. Loosen the lock nut off until the required shim thickness can be inserted between the lock nut and the bottom adjustment nut:



Loosen the lock nut off until the required shim spacer can be inserted between the lock nut and bottom adjustment nut

REMEMBER!
Adding a shim spacer will tend to bend the profile in an up-hill direction: Removing or reducing the shim spacer thickness will tend to bend the profile in a down-hill direction.

7. Re-tighten the lock nut down onto the shim spacer and bottom adjustment nut.

8. If the height of the bottom roller has altered, the top roller will also need to be adjusted ***in the same direction by the same amount***. Rotate the adjustment bolt on the top cap either in or out by the same amount as the change in height made to the bottom roller. Measure the distance between the top cap and top bearing housing as per step 2 above and rotate the adjustment bolt to retain the same distance as previously measured. This will ensure the gap between the rollers is the same.

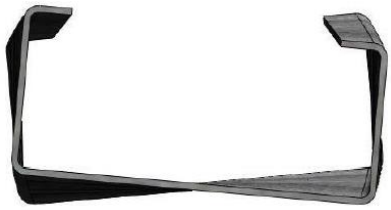
   For example, if the bottom roller was raised with a thicker shim spacer then the top cap adjustment bolt will need to be loosened off by the same amount as the thickness of the shim spacer.

9. Retighten the top cap screws.

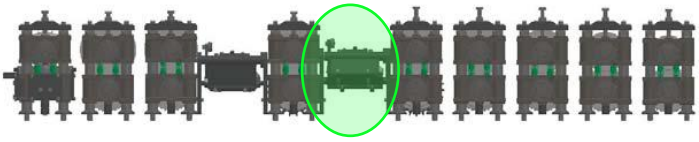
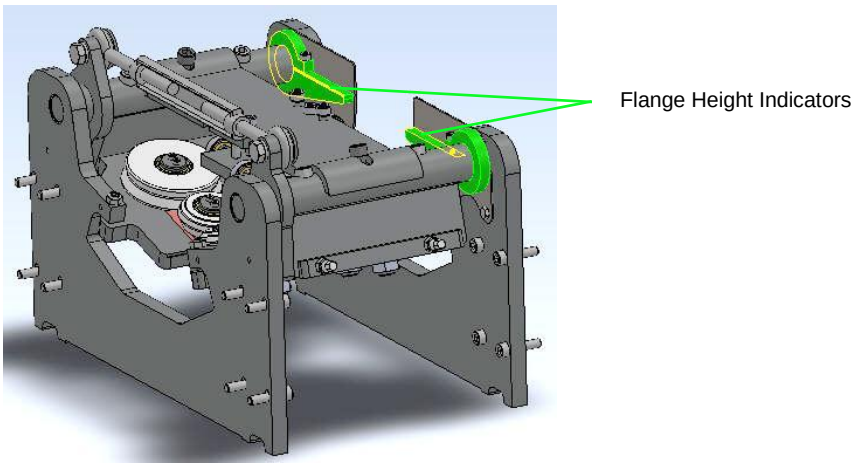
10. The next step is to check that the stick profile can still clear the Shear tool at the exit of the machine.

11. Re-power the machine and run two more 3000mm length sticks and re-measure. If still out of limits, repeat this procedure using alternate shim spacers.

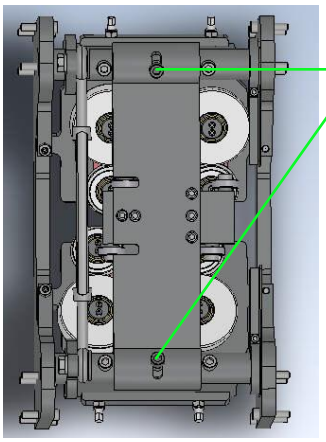
11.9 Correcting Twist

Tools Required	• 150mm long, 0.05mm to 2.0mm metric feeler gauge set (or an imperial equivalent for non-metric sheet steel) • 18mm Spanner • 6mm Hex-key
Safety	• **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection. • **DO NOT** have steel sheet loaded into the machine:
Twist Overview	Twist is the difference in angle between each end of the stick. Twist can be in either clockwise or anticlockwise direction. Twist is caused by one side of the "C" section being stretched more than the other. This is often caused by uneven rolling pressure being applied to either side. 
When to Adjust	Place the stick web down on a flat surface. Twist at either end should not exceed more than **2-3mm** per **1000mm** of the stick length relative to the flat surface. If it is greater than this, then adjustments will be required to the roller-station clearances in order to counteract.
Setting the Roller Clearances	Refer to the procedure detailed in Section 8 – Initial Setup – Check Roller Clearances. **WARNING!** **TAKE YOUR TIME! IT IS IMPORTANT THAT BOTH SIDES OF THE TOP ROLLER IN EACH STATION ARE SET THE SAME. IF ONE SIDE IS MORE LOADED THAN THE OTHER IT WILL CAUSE THE TRACKING OF THE STEEL STRIP THROUGH THE MACHINE TO VEER (BE PULLED) TO ONE SIDE AND/OR TWIST IN THE PROFILE.** **SET ALL ROLLFORMING STATIONS TO SAME TOP AND BOTTOM ROLLER CLEARANCE (BMT – 0.05MM)** **IF THE ROLLER CLEARANCE IS SET TOO TIGHT FOR THE BMT OF THE STEEL STRIP BEING USED, THIS MAY CAUSE THE MACHINE TO FAULT, PRODUCE OUT OF SPECIFICATION PRODUCT, REDUCE PRODUCTION PERFORMANCE AND/OR IN SEVERE CASES, CAUSE DAMAGE TO THE MACHINE.** **IF THE ROLLER CLEARANCE IS TOO LOOSE FOR THE BMT OF THE STEEL STRIP BEING USED, THIS WILL CAUSE THE STEEL TO SLIP INSIDE THE ROLLFORMING SECTION AND MAY CAUSE THE MACHINE TO FAULT.**

11.10 Correcting Flange Height

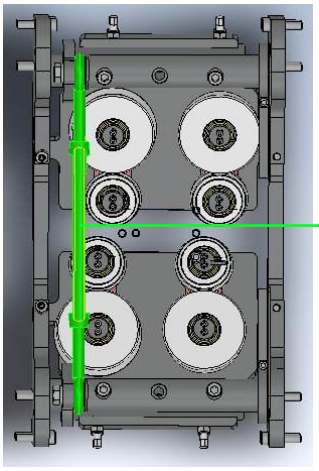
FLANGE HEIGHT ADJUSTMENT PROCEDURE	
Tools Required	• High accuracy Vernier Caliper • 13mm Spanner • 8mm Hex-key • 4mm Hex-key • Lip Standard Profile Templates
Safety	• **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection.
Flange Height Adjustment	The height of the FRAMECAD TF550H flanges can be adjusted via the lip forming stations.
When to Adjust	If the flange heights do not match the profile specification. Use the supplied Standard Profile Templates to determine if the profile being made is correct.
Adjusting Flange Height	1. Manually feed steel strip through the machine until the end of the strip has just cleared the **first** Lip section (i.e. between the 5th and 6th driven roller stations). Using the Standard Profile Template for the first Lip section check the profile is correct. If not complete Steps 2 to x below. If the profile exiting the first Lip section is correct, proceed to Step x+1 below:  2. Remove the steel strip from the machine. 3. Note the Flange Height Indicator setting(s) on the first Lip section. These are highlighted below. Record these settings:  Flange Height Indicators **Flange Height Indicators**

4. Using an 8mm hex key, remove the Top Guide Plate – leave this off until the very last step in this procedure:



Remove top guide cap screws (x2) so that the Top Guide Plate can be removed: leave off until the very last step in this procedure

5. Loosen the Turnbuckle:

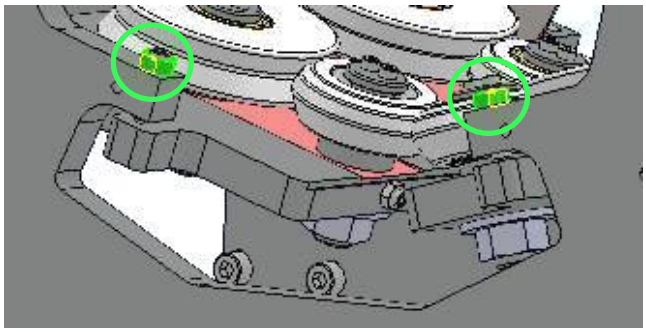


Loosen the Turnbuckle

6. On the Flange side that is not correct, loosen the lock nut (using a 13mm Spanner) on the height adjustment screw. Rotate the adjustment screw using a 4mm Hex Key in either clockwise (to *increase* the Flange height) OR counter-clockwise (to *decrease* the Flange Height).

   As adjustments are made, check the Flange Height Indicator to confirm the amount of adjustment being made.

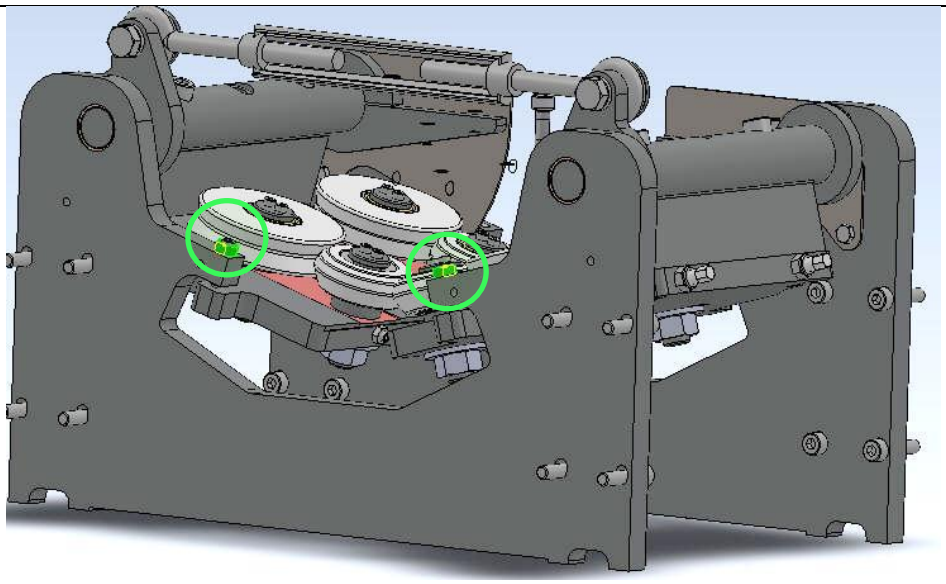
   Tighten the lock nut when complete:



Loosen the lock nut on the adjustment screw for the side to be modified:

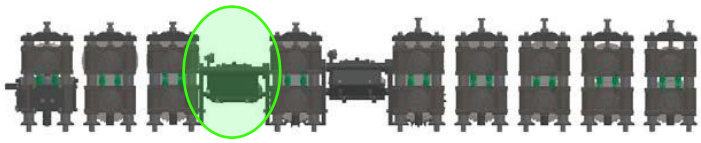
1. Rotate Adjustment Screw *clockwise* to *increase* Flange height:
2. Rotate Adjustment Screw *counter clockwise* to *decrease* Flange height:

Check Flange Height Indicator as adjustments



7. Retighten the Turnbuckle (see also Step 5 above).
8. We now need to check the adjustment(s) made in Step 6 above. Insert steel strip into the machine and manually run the steel through ***until*** the leading edge has **just** exited the first Lip forming section. Carefully position the steel strip so that the profile can be checked using the ***first*** Lip forming section *Profile Template* (this will have been supplied with the machine).

   If necessary, remove the steel strip out of the machine and readjust as per steps 5 to 8 until the profile is correct.
9. Once the first Lip forming section profile has been correctly set, continue to manually roll the steel strip through the machine until it has *just cleared* the ***second*** Lip forming section:



10. Using the ***second*** Lip forming section *Profile Template* (this will have been supplied with the machine) check the profile is correct.

    If adjustment(s) are required **repeat** the same procedure used on the first Lip forming section but on the ***second*** lip forming section:

    - Remove steel strip from the machine.
    - Record the current Flange Height Indication points for both sides of the second Lip forming section.
    - Remove the Top Guide Plate on the second Lip forming section.
    - Loosen the Turnbuckle on the second Lip forming section.
    - Loosen the lock nut on the side that needs adjustment and rotate the adjustment screw in the required direction (***clockwise*** to ***increase*** the Flange height, ***counter clockwise*** to ***decrease*** the Flange height). Confirm the amount of adjustment by reviewing the Flange Height Indicator. Retighten the lock nut(s) once complete.
    - Retighten the Turnbuckle.

	• Check adjustment(s) by manually running new steel strip through machine until leading edge has just exited the ***second*** Lip forming section. Check the profile with the ***second*** Lip forming section *Profile Template*. • If further adjustment is required remove steel strip from machine and repeat adjustment procedure until profile is correct. 11. Reattach the Top Guide Plate on ***both*** Lip forming sections. 12. Manually produce at least 10m of steel product and then re-check Flange heights.

11.11 Correcting Dimple Height

<table>
<tr><td>Tools Required</td><td>

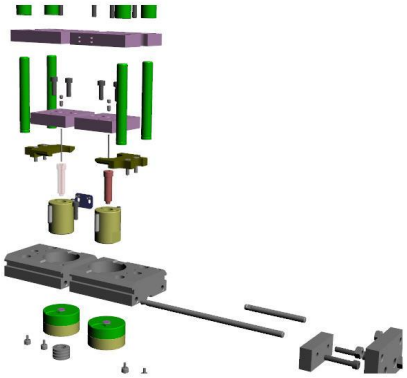
High accuracy Vernier Caliper
18mm Spanner
14mm Hex-key

</td></tr>
<tr><td>Safety</td><td>

ISOLATE electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection:

</td></tr>
<tr><td>TF350/550/ 550H Dimple Tool</td><td>
The FRAMECAD TF550H Dimple tool is the third tool in the Pre-punch block. Like all the tools in the Pre-punch block, they are positioned prior to the roll-forming section of the machine and therefore operate on the flat sheet steel.

Each side of the Dimple tool is independently adjustable. It is therefore critical that the Dimple height on each side is the same otherwise twist can be introduced into frame assemblies once screwed together.


TF550H Dimple Tool – Exploded View (Right)
</td></tr>
<tr><td>When to Adjust</td><td>

When the Dimple height(s) relative to the Web are not 21mm (+/-0.2mm)
When there is a difference between the Dimple height on one side of the profile versus the other – the Dimple heights must be the same

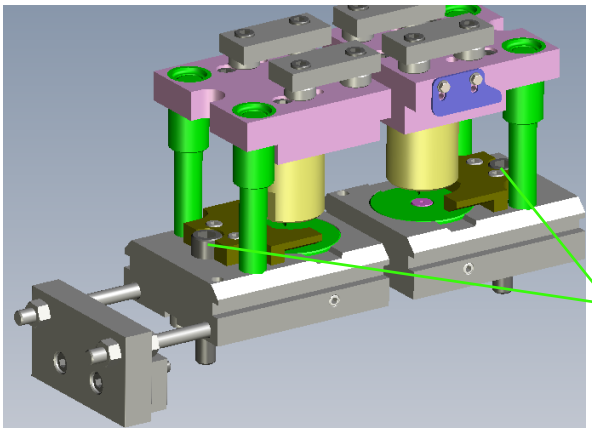
</td></tr>
<tr><td>Dimple Height Adjustment</td><td>
1. Using a Vernier Caliper, measure the Dimple height on both sides of the profile. Record the results. Also record the tool reference scale position.

<table>
<tr><td>MEASUREMENT</td><td>ACTUAL</td><td>VARIANCE</td></tr>
<tr><td>Operator Side Dimple to Web Distance (mm)</td><td></td><td></td></tr>
<tr><td>Drive Chain Side Dimple to Web Distance (mm)</td><td></td><td></td></tr>
</table>
If there is a variance of > +/-0.2mm OR there is a variance in measurement from one side to the other the Dimple height(s) must be adjusted.

2. At the base of the Dimple tool a reference scale is provided on the bottom plate of the Pre-punch tool block. This is provided as a datum reference point for any adjustments. Accurately record the current value as indicated.

<table>
<tr><td>Dimple Tool Scale Reference Mark</td><td></td></tr>
</table>
</td></tr>
</table>

3. Loosen the *clamping bolt* on the Dimple side requiring adjustment:



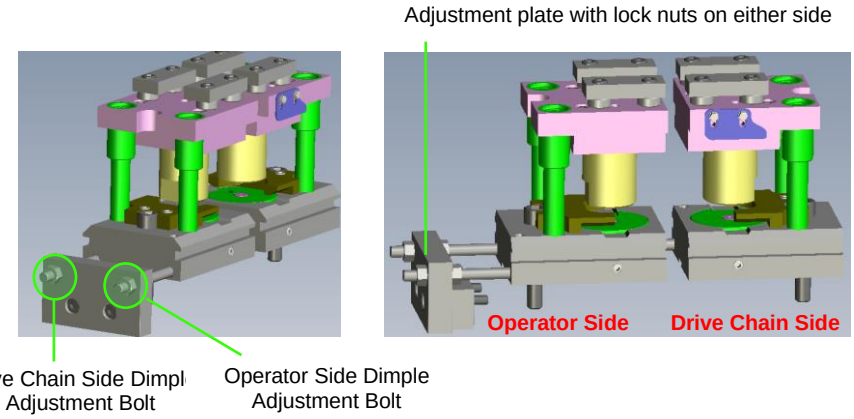
4. Each side of the tool has an adjustment bolt associated with it. This allows either side to be adjusted independent of the other.

   For each adjustment bolt there are ***two*** lock nuts, one on either side of the adjustment plate. Depending on the direction of adjustment, loosen one lock nut and use the other to adjust.

   Choose the right lock nut to loosen and/or adjust based on the following:

   a. The Dimple side that is to be adjusted

   b. The required adjustment direction



5. Retighten the tool clamping bolt(s) and the adjustment bolt lock nut.

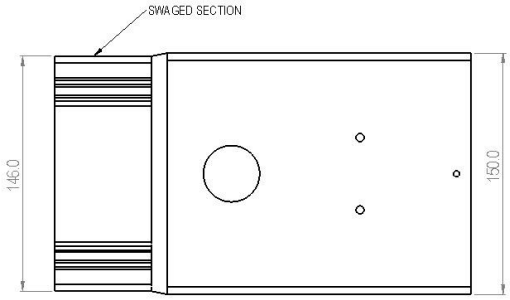
6. Insert steel sheet into the machine and in Manual control, perform a Dimple operation. Roll the steel strip out of the machine and re-measure the Dimple heights. Repeat the above procedure if required until the Dimple heights on both sides are correct and at exactly the same position.

11.12 Swage Adjustment

Tools	• 32mm spanner • 40mm spanner
Safety	**ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection:

TH550H

The Swage operation must be setup depending on steel gauge and mechanical properties.

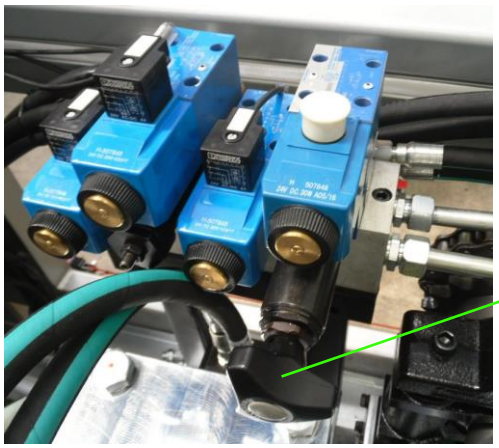


Swaged profile width can be adjusted by three methods:

1. Adjustment by hydraulic pressure change in the Swage top cylinder circuit.

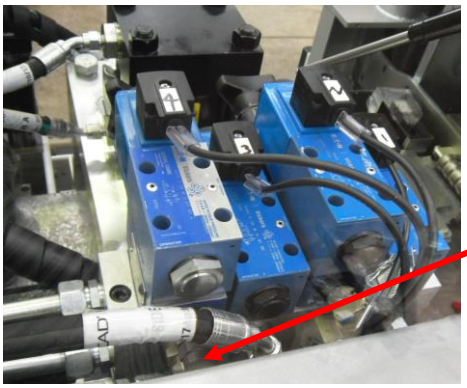
The change is achieved by rotating a knob of the pressure regulator.

Turn the knob clockwise to increase the top cylinder pressure. Turn the knob counter clockwise to reduce the top cylinder pressure. See Figure below:



The top swage cylinder pressure settings for various steel gauges are shown in the table 11.12.1

The pressure is measured by connecting the pressure gauge to the port located on the back side of the pressure reducer:



2. Tools Down time change

1. Change *Down Delay* and *Crimp Retract Delay* setting in the Factory 2 Software, Setup / Tools Screen / Setup / Swage / Parameters.

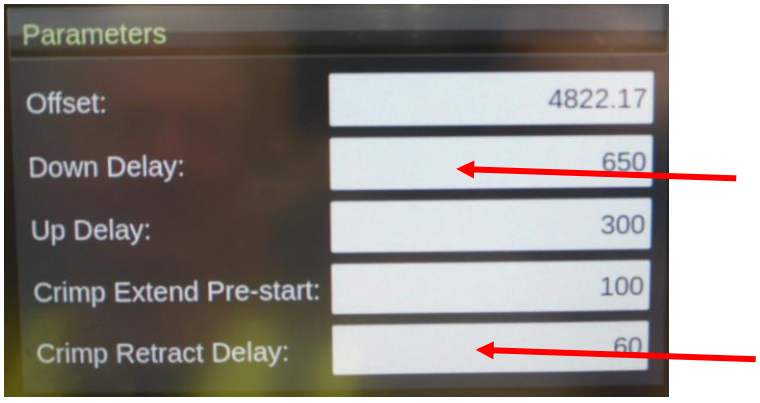


Table 11.12.1 Hydraulic Pressure and Tools delays recommended settings

Steel Gauge / PARAMETER	1.2 mm	1.6 mm	2.0 mm
Top cylinder pressure, Bar	40-50	80-90	120-130
Down Delay	100	500-600	500-600
Up Delay	300	300	300
Crimp Extend Pre-start	100	100	100
Crimp Retract Delay	60	100	100

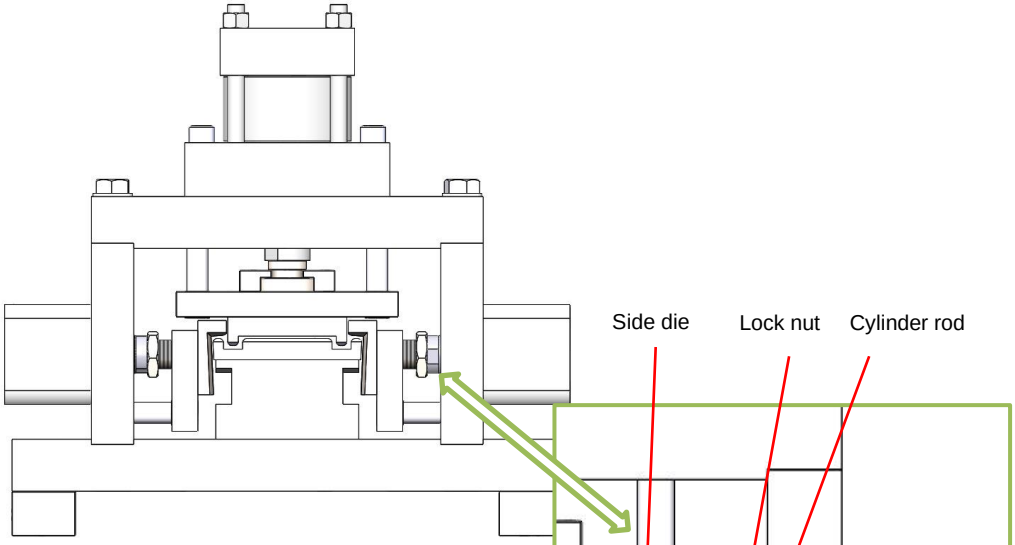
WARNING!

THE TOOL CONFIGURATION VALUES ARE FACTORY SET AND SHOULD ONLY BE ADJUSTED IF DIRECTED TO BY A FRAMECAD TECHNICIAN. INCORRECT ADJUSTMENT CAN SIGNIFICANTLY ALTER THE PERFORMANCE AND/OR QUALITY OF THE PRODUCT BEING MADE. EXTREME CAUTION IS ADVISED.

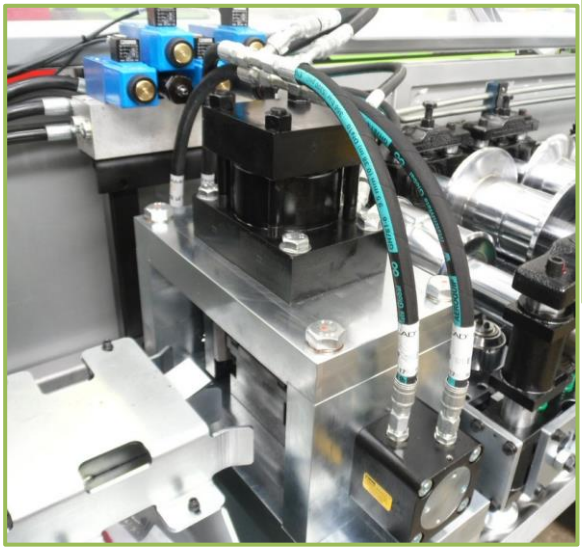
3. Side crimp die adjustment

In the case if additional adjustment is needed, the side die extension should be changed.

3.1 Loosen M20 lock nut. Use 40mm spanner
3.2 Rotate the cylinder rod to change the extension of the side die. Use 32mm spanner.
3.3 Lock the rod by the M20 nut



SWAGE UNIT

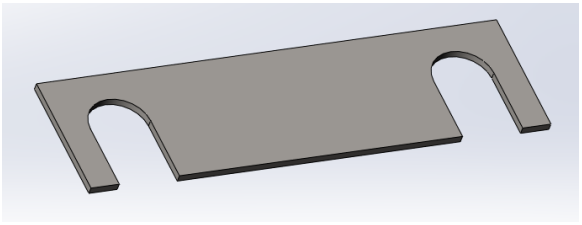


Factory setup for dimension A is 20.5mm

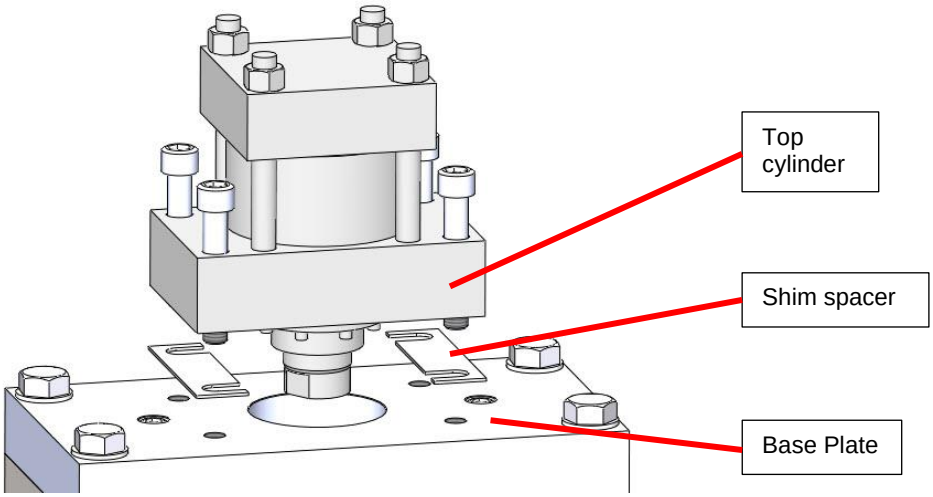
To increase degree of swaging, move the side crimp die IN.

4. Add shim to the top hydraulic cylinder

Add shims between the top cylinder and the base plate reducers degree of swaging. The swage is supplied with two sets of shim spacers 0.04” mm and 0.08” thick.



Top Cylinder Shim Spacer



In general, for 30-50 mil steel 80 mil shim is recommended

For the steel thicker than 50 mil 40 mil shim or none are recommended.

11.13 Tuning the Decoiler

The following section describes how to fine-tune the Decoiler performance. This can be achieved by altering the parameters inside the VFC (Variable Frequency Controller) that manages the speed and responsiveness of the Decoiler to changes in the Dancer Arm height (see Section 6 - The Decoiler).

Decoilers are normally tuned for high performance and smooth operation when leaving the factory. However, in some circumstances some adjustment may be required (for unusual coil sizes, different dancer arm lengths, or different roll formers).
V7 decoilers (identified by using an IFM inclinometer instead of a potentiometer to sense the dancer arm angle) have slightly different parameters to tune performance compared to previous iterations. Before trying to tune the decoiler, make sure basic calibration has been achieved by following the “V7 Decoiler Calibration" document.

11.13.1 Identification

V7 decoilers with inclinometers and IPOS can be identified by checking the following three items: • Black cube-shaped inclinometer sensor screwed to dancer arm (see Fig. 1) •

Figure 1. Inclinometer installed on dancer arm

WARNING!

ALTERING THE PARAMETERS INSIDE THE DECOILER VFC CAN CHANGE THE PERFORMANCE CHARACTERISTIC OF THE DECOILER. INCORRECT SETTINGS CAN PRODUCE DANGEROUS RESULTS AND/OR DAMAGE THE MACHINE. EXTREME CARE MUST BE TAKEN.

TIP!

ALWAYS CHECK AND RE-CALIBRATE THE DECOILER POTENTIOMETER IF NECESSARY BEFORE ADJUSTING OTHER VFC PARAMETERS. SEE SECTION 9 - CHECK CALIBRATION OF DECOILER DANCER ARM

11.13.2 Navigating the Decoiler VFC Keypad

Access the parameters inside the VFC is achieved via the keypad plugged into the front of the VFC. The following describes the keypad button functions.

UP/DOWN

Use the UP/DOWN buttons to navigate through the menu structure of the VFC. These buttons are also used to change parameter values.

OUT/ENTER

Use the OUT/ENTER buttons to step into or out of a particular menu/parameter

RUN

Use the RUN button to start the VFC

STOP/RESET

Use the STOP/RESET button to reset any local VFC errors and stop the VFC from running. This button takes priority over all other signals to the VFC. If the VFC is stopped using this button, it can only be re-started using the **RUN** button.

SPEED CONTROL KNOB

Use SPEED CONTROL KNOB to adjust speed level during basic calibration and to set up zero-point offset.

11.13.3 Common Tuning Parameters

Parameter Number	Description	Default Value	New Value
P-117	Output Speed % with dancer arm at max height	100	
P-118	Expected analogue input % at lowest arm	95	
P-161	Jogging Speed in Manual mode	150	
P-251	Higher values increase speed for same height	6.5	
P-252	Smoothing of speed in reaction to dancer arm	5.0	
P-450	Dancer arm trip height	34.0	

Zero-point Calibration

Zero-point calibration (ensuring the decoiler stops when the dancer arm is fully lowered) is usually performed just by adjusting the white speed control knob on the keypad. It may also require modification of **P118.**

Decoiler direction

If the decoiler is rotating the wrong way when the dancer arm is lifted, this can be reversed in the drive settings. However, if the decoiler is fitted with auto/manual and jog forward/reverse switches (see Fig. 4 below), first confirm that it is also jogging the wrong way.

1. Place the decoiler in manual operation by setting the auto/manual switch to manual
2. Jog the decoiler by using the jog switch
3. The top of the mandrel should move in the same direction as the top of the jog switch

If the decoiler is spinning the wrong way, then the decoiler motor phases may need to be reversed. This should be performed by a registered electrician.

If the decoiler does spin the correct way when jogged, but is spinning the wrong way in automatic operation, this can be adjusted with **P117**:

- **P117** is normally set to 100% for standard orientation decoilers (loading side on left).
- **P117** should be set to either 100% or -100% to achieve correct rotation direction
- Do not set this to any other value than 100% or -100%: setting the correct speed is done with **P251**

- The E-Stop must be pressed before the VSD will allow this parameter to be modified
  Changing **P117** will not affect direction in manual operation mode.

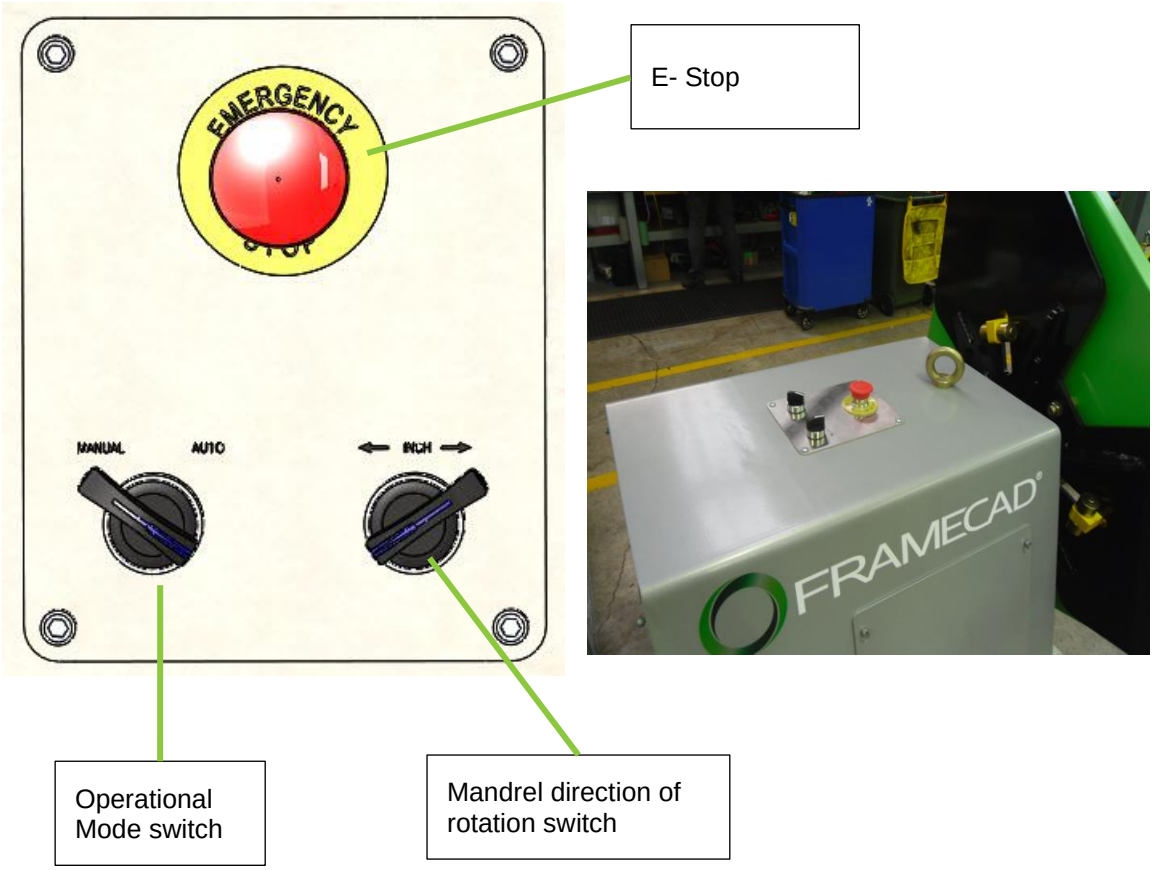


Fig.4. Decoiler control pad

Manual jog speed

If the machine is fitted with auto/manual and jog switches as shown in Fig. 4 above, the decoiler can be manually jogged. This speed can be set by adjusting **P161**.

The default is 150rpm, which gives a safe speed for rewinding or manual payoff. The E-Stop must be pressed before the VSD will allow this parameter to be modified

Maximum automatic rotation speed

The decoilers are normally set up to achieve a maximum speed of 1850rpm when the dancer arm end is at its maximum operation height.
The maximum operation height is normally assumed to be 900mm (3'). This lines up well with the infeed of most FRAMECAD roll former's infeed guide. If the maximum height needs to be adjusted.

To change the maximum rotation speed, first use a tape measure to raise the dancer arm to 900mm (3') and use the decoiler VSD keypad to check the current RPM. If necessary, press the ← (out) button until the main display is shown, then use the ↑/↓ arrow buttons until the current RPM is shown.

To change the speed, make small adjustments (0.1-0.5 at a time) to **P251**.

Smoothing decoiler reactions

FRAMECAD roll formers can accelerate and decelerate rapidly. The decoiler must respond to coil demands very quickly to avoid tripping out over-height.

However, if large coils are used, or the machine is always set on a low speed and/or accelerates gently, the smoothness of the decoiler can be improved by adjusting **P252**.

The default value of 5.0 gives acceptable smoothness while still reacting rapidly. Increasing this value by 1-2 at a time will make the decoiler slower to react to changes in dancer arm height.

Decreasing the value below 5.0 should not be necessary: if it's set too small, the decoiler may react unnecessary to small vibrations felt at the inclinometer.

If the value is increased too high, calibration may need to be repeated to ensure the decoiler stops rotating when the arm is lowered.

Trip height

The decoiler VSD programme has an important safety function, causing the decoiler to trip out the safety relays of the roll former when the dancer arm exceeds a certain height. This height should never be reached during normal operation. However, it must be close to or below the infeed height of the machine, to ensure it does trip if the machine pulls the steel tight.

Decoilers are normally set up to trip when the dancer arm end reaches a height of 1m (3'-3"). The trip height can be decreased by lowering **P450**.

Likewise, increase **P450** to raise the tripping height. After setting this, check the speed at 100mm (4") lower than the trip height by referring to section Maximum Rotation Automatic Speed.

11.13.4 Basic Calibration Procedure

1. Place the end of the dancer arm fully on the ground
2. Remove the service panel to gain access to the VSD inside the decoiler
3. Locate the VSD's keypad, and the white speed control knob on its face (see Fig. 2)
4. If the decoiler is switched off, power up the decoiler by turning the isolator switch to the on position
5. Make sure the E-Stops are not pressed, and ensure the safety circuit of the machine is reset (no Safety circuit tripped alarm)
6. If present, ensure the decoiler auto/manual switch is set to the auto position (see Fig. 2)
7. If decoiler is rotating on its own, the speed control knob should be turned anti-clockwise until it stops
8. Slowly lift the dancer arm. The decoiler should start rotating once the arm is lifted more than 50mm (2"):
    - Turn the knob clockwise to start the decoiler rotating earlier (when the arm is lower)
    - Turn the knob anti-clockwise to start the decoiler rotating later (when the arm is higher)

If you cannot completely calibrate the decoiler by adjusting the speed control knob, first check the following:

- Check that the rotation/orientation of the inclinometer matches Fig. 1 with respect to the dancer arm
- Check the inclinometer is securely screwed to the dancer arm, and that the bottom screw is aligned with the middle of the slotted mounting hole
- Check that the dancer arm is securely mounted to the decoiler, and not bent or twisted

If after checking these items calibration still cannot be achieved, adjustment of the VSD parameters is required. This is covered in the Section 11.13.5.

11.13.5 Advanced Calibration Procedure

The VSD uses several parameters to scale and process the inclinometer's voltage feedback.
These can be used to compensate for an inclinometer or dancer arm that is out of the expected range of adjustment.
In the following procedures, ensure the decoiler E-Stop is pressed.

To access the Decoiler VFC parameters and review the values/settings stored within them, use the keypad button sequence.

Check resting voltage

The default parameters expect a resting voltage around 9.5V. When the resting voltage is close to this, adjustment of the speed control knob is enough to compensate for small differences.

To check the resting voltage:

1. Make sure the decoiler is E-Stopped, but powered
2. Ensure the dancer arm is fully on the ground
1. Locate the VSD keypad (see Fig. 2 on the preceding page)
2. Press either the ↑ or ↓ arrow buttons until **Par** is selected, and **P** is displayed on the screen
3. Press the → (Enter) button
4. Press the ↑ or ↓ arrow buttons until the display shows **P-20** (this is parameter 20)

5. Press the → (Enter) button
6. The value displayed is the feedback voltage from the inclinometer (see Fig. 3 on the next page).

Take note of this value.

Modify P118

If the resting voltage is too far away from 9.5V, then parameter 118 will need to be adjusted to compensate. To do this:

1. Make sure the decoiler is E-Stopped, but powered

2. If the VSD keypad is still displaying the **P20** value, then use the ← (out) button to exit

3. Now use the ↑ or ↓ arrow buttons to navigate to **P118**, and press → (Enter)

4. The current value of **P118** will be displayed. The default parameters will display 95 here, meaning 95%.

5. Take the resting voltage value from section 6.1 on the previous page, and multiply it by 10 to give a percentage (e.g. if the resting voltage was 8.84, this should be 88.4%)

6. Use the ↑ or ↓ arrow buttons to modify the **P118** value to the new percentage you calculated

7. Press the → (Enter) button to apply the new **P118** percentage

Now repeat the basic calibration procedure in Section 11.7.4. The speed control knob should easily allow compensating for any small differences.

IMPORTANT: IF P118 WAS ADJUSTED, PROCEED TO NEXT SECTION TO ENSURE SAFE OPERATION.

Fig. 3 P20 (voltage feedback) display showing 9.4V from inclinometer

Trip Height

The decoiler has an important safety function built in. If the dancer arm exceeds a certain height, it causes both the roll-former and the decoiler to be safely E-Stopped, to avoid pulling the steel tight. If modification of any parameters has taken place, it is necessary to re-check the decoiler still trips at the correct height.

The machine should not reach the trip height during normal operation. To align with most FRAMECAD roll-former, the trip height is normally expected to be 1m (3'-3").

1. Ensure the decoiler is powered-up, not E-stopped, and ready for automatic operation, with no steel
2. Slowly lift the dancer arm, using a tape measure to check the end of the dancer arm's height above the floor
3. The decoiler should increase its speed as the dancer arm is raised. When the dancer arm reaches 1m (3'-3"), the decoiler should stop immediately and cause the safety circuit to trip

If the dancer arm does not trip at 1m (3'-3"), **P450** will need to be adjusted in the VSD:

a. Locate the VSD keypad

b. If necessary, use the ← (out) button to step out of another parameter if one was entered in a previous step

c. If necessary, use the ↑ or ↓ arrow buttons until **Par** is selected and **P** is displayed on the screen

d. Press the →(Enter) button

e. Press the ↑ or ↓ arrow buttons until the display shows P-450 (this is parameter 450)

f. Press the → (Enter) button

g. The current value of **P450** will be displayed: its default is 34 (meaning 34%).

To adjust:

• If the dancer arm needs to be raised too high before it trips (or it does not trip at all), reduce the **P450** value.
• If the dancer arm is tripping too early, *increase* the **P450** value.

h. Press → (Enter) to confirm the changes, and repeat the test

Only small (increments of 1-2 at a time) changes will be necessary for **P450**.

Decoiler Speed

The decoiler is set up to run at its maximum speed (1850rpm) when the arm is slightly below the trip height. This is normally assumed to be 900mm (3'). If changes to VSD parameters have taken place, the maximum speed should be re-checked.

1. Ensure the decoiler is powered-up, not E-stopped, and ready for automatic operation, with no steel

2. Ensure the dancer arm is fully on the ground. The decoiler should not be rotating.

3. Locate the VSD keypad

4. If necessary, use the ← (out) button to step out of any parameters and menus

5. If necessary, use the ↑ or ↓ arrow buttons until the current RPM is displayed on-screen: this should be 0.

6. To confirm the RPM display is shown, have an assistant lift up the dancer arm slightly. The RPM value should increase (a gentle rotation speed might be around 100-200rpm).

7. Have the assistant slowly lift the dancer arm, using a tape measure to check the end of the dancer arm's height above the floor

8. When the dancer arm is at 900mm (3') off the floor, the RPM should be approximately 1850rpm

If the RPM at 900mm (3') is not approximately 1850 rpm, VSD parameter P251 will need to be adjusted:

a. Use the ↑ or ↓ arrow buttons until Par is selected, and P is displayed on the screen

b. Press the → (Enter) button

c. Press the ↑ or ↓ arrow buttons until the display shows P-251 (this is parameter 251)

d. Press the → (Enter) button

e. The current value of **P251** will be displayed: its default is 6.5. To adjust:

   - If the speed is too fast, *reduce* the **P251** value
   - If the speed is too slow, *increase* the **P251** value

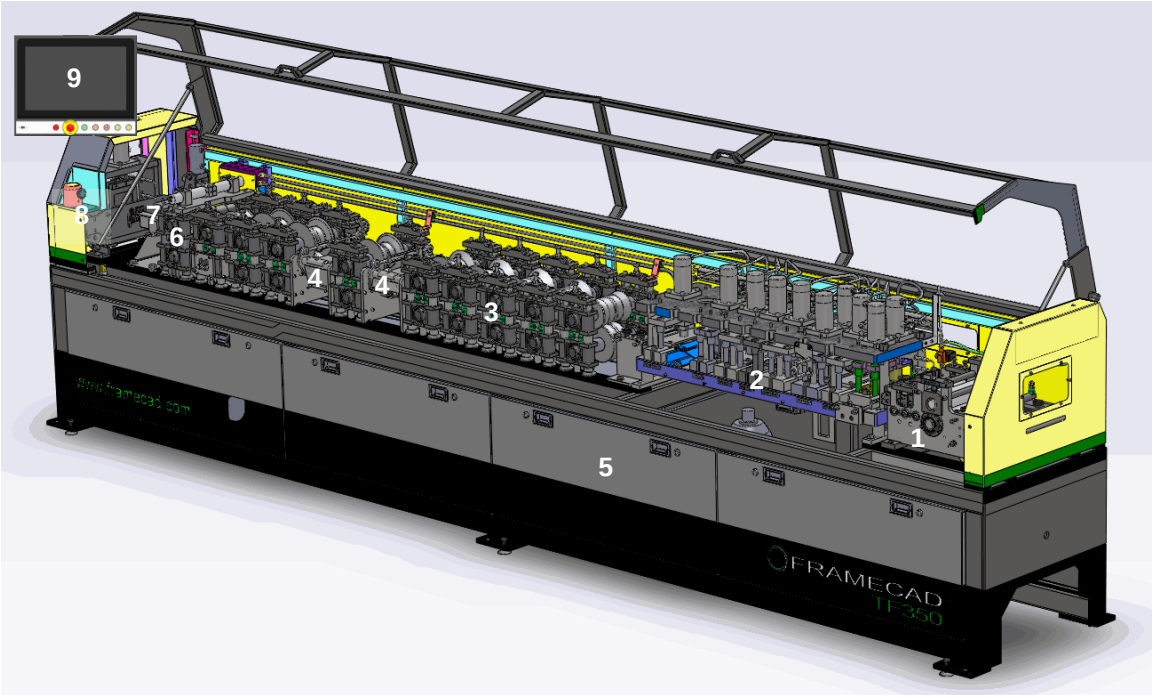
f. Press → (Enter) to confirm the changes, and repeat the test

This is a sensitive parameter: only small adjustments will need to be made (around 0.1-0.5 at a time).

12 FRAMECAD TF550H Maintenance

Like any high-performance machine, the FRAMECAD TF550H needs to be checked and maintained on a regular basis. This section details the type and frequency of maintenance checks required. Machine maintenance should always be completed by qualified and competent technical

NOTE: Failure to follow the Maintenance job schedule may null and void the FRAMECAD Warranty



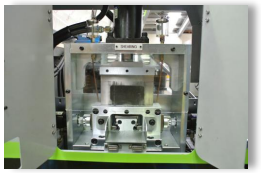
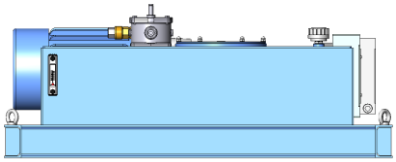
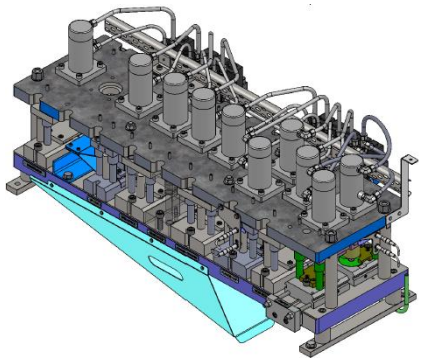
The TF550H Machine

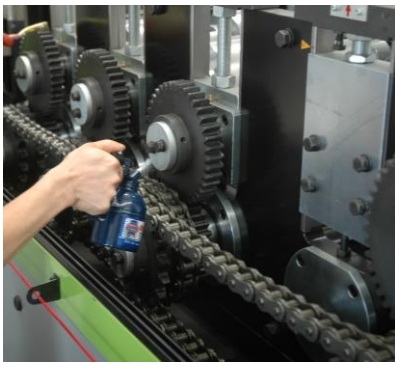
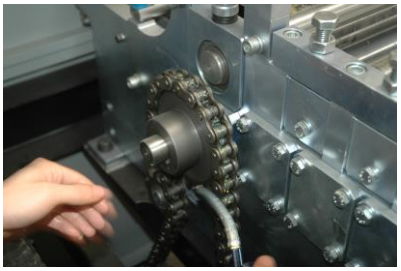
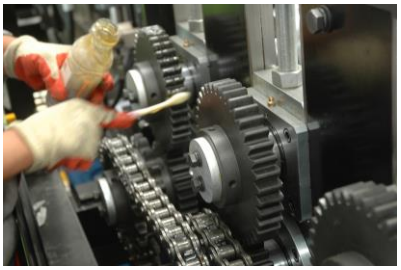
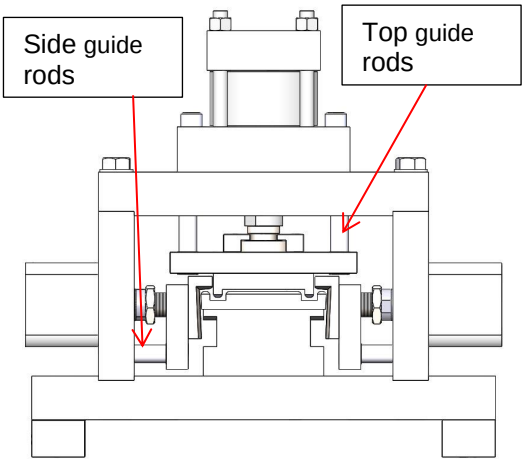
Item	Description
1	In-feed Guide, Straightener and Lubricator Unit
2	Pre-Punch Tool Block Assembly
3	Roll-forming Stations (Sections)
4	Lip Forming Sections (x2)
5	AC Electrical Control Cabinet
6	Over-form Section
7	Swage Unit
8	Shear Tool
9	Operator Screen and Controls

IMPORTANT NOTE!

IT IS A CONDITION OF WARRANTY THAT THE PRESCRIBED MAINTENANCE ROUTINES DESCRIBED HEREIN ARE COMPLETED AT THE REQUIRED PERIOD/FREQUENCY. FAILURE TO DO SO WILL RESULT IN REDUCED PERFORMANCE AND QUALITY, PREMATURE COMPONENT WEAR AND SUBSEQUENT FAILURE. DAMAGE RESULTING FROM INSUFFICIENT AND/OR INCORRECT SERVICE/MAINTENANCE WILL VOID FRAMECAD'S WARRANTY TERMS AND CONDITIONS.

12.1 Lubrication Schedule

ACTION	FREQUENCY	LUBRICANT TYPE
Check Shear Blade Oiler units are functioning, and the Shear Blade is adequately lubricated – Manually lubricate if necessary.  See also Section 8 – Shear Blade Lubrication	Every Day before Production and 4 times a day during production	Lightweight Machine Oil
Check Steel Strip Lubricant Level & Top Up as Required  See also Section 8 – Check Lubrication Level & Lubricator Adjustment	Every Day before Production	30:1 Emulsion Oil Mix (e.g. Hocut 757)
Check Hydraulic Oil Level  See also Section 7 - Checking Hydraulic Reservoir Level	Fortnightly	High Grade Hydraulic Oil – ISO46
Lightly Lubricate all moving and sliding parts in each tooling assembly 	Fortnightly	Lightweight Machine Oil, Spray-on Type (Aerosol) DO NOT over lubricate. Excess lubrication can attract dirt and other contaminants.

Check Chain Tension & Lightly Lubricate   See also Section 8 – Check Chain Tension	Fortnightly	Chain Lubricant, Spray-on Type (Aerosol) DO NOT over lubricate. Excess lubrication can attract dirt and other contaminants.
Lightly Lubricate Roller Station Gears/Sprockets 	Fortnightly	Light Grease, Spray-on Type (Aerosol) DO NOT over lubricate. Excess lubrication can attract dirt and other contaminants.
	Fortnightly	Light Grease

12.2 Recommended Maintenance Schedule

The following is the recommended maintenance regimen for the FRAMECAD TF550H machine. For any assistance or advice on the below, please contact your local FRAMECAD regional office or visit our support web-site at https://care.framecad.com

LUBRICATOR ASSEMBLY CHECKS	FREQUENCY
Check Lubricator rolls for build-up of impregnated dirt and contaminants – replace if necessary	160km / 400hrs
Lubricator pipes for hardening/kinking – replace/repair as required	160km / 400hrs
Lubrication oil for serviceability – refill/replace as required with new	160km / 400hrs

IN-FEED/STRAIGHTENER ASSEMBLY	FREQUENCY
In-feed guide wheels for tightness (check grub screws and top roll)	160km / 400hrs
Check steel strip sensor for height and damage – adjust height and/or replace sensor as required	160km / 400hrs
Encoder mounting and connections – make sure there are no loose screws/bolts – tighten as required	160km / 400hrs
Check in-feed assembly mounting and squareness	160km / 400hrs
Check in-feed guides for cleanliness and material build-up – clean/replace as required, adjust to ensure steel strip is central	160km / 400hrs
Check Straightener gears (Drive Chain Side of machine) for wear – clean/replace as required - lubricate	160km / 400hrs
Check Straightener Assembly – make sure there are no loose screws/bolts – tighten as required	160km / 400hrs
Lightly apply grease at available grease nipple points (Operator + Drive Chain Side)	480km / 1200hrs

PRE-PUNCH TOOL BLOCK	FREQUENCY
Check hydraulic tool actuator cylinders for leakage – replace seals as required	480km / 1200hrs
Check mounting bolts for security – tighten as required	480km / 1200hrs
Check and tighten all attachment bolts and hydraulic tool actuator bolts	480km / 1200hrs
Lightly lubricate all sliding and moving parts	26km / 64hrs
Check punch tools – check for damage/wear, replace as required	480km / 1200hrs

ROLL-FORMING SECTION	FREQUENCY
Check chain tension and adjust as necessary, lubricate	160km / 400hrs
Check condition of all sprockets + gears (meshing), lubricate	160km / 400hrs
Check and tighten roll-former sprocket/gear mounting bolts	160km / 400hrs
Check lip rollers for rotation – replace bearings as required	320km / 800hrs

SWAGE ASSEMBLY	FREQUENCY
Check all swage bolts for security – tighten as required	320km / 800hrs
Check condition of all sprockets + gears (meshing), lightly lubricate	320km / 800hrs
Check and tighten roll-former sprocket/gear mounting bolts	320km / 800hrs

SHEAR ASSEMBLY	FREQUENCY
Check all shear assembly bolts for tightness (including mounting bolts) - tighten as required	320km / 800hrs
Check condition of shear blade (remove front plate for access) – replace as required	320km / 800hrs

HYDRAULICS	FREQUENCY
Check for leaks on all fittings – tighten as required	320km / 800hrs
Check for fretting or cuts along hydraulic hose paths – replace as required	320km / 800hrs
Check security of hydraulic tool actuators– tighten as required	320km / 800hrs
Check all hydraulic clamps are tight and maintain hose separation	320km / 800hrs
Check pressures on main system (Accumulator and main Pump Pressure)	320km / 800hrs

Check hydraulic tank level and condition of oil (replace oil every 12months)	320km / 800hrs
Listen to hydraulic motor running for cavitation or aeration	320km / 800hrs
Check heat exchanger for leakage and debris	320km / 800hrs

PRINTER INK JET SYSTEM	FREQUENCY
Check condition of printer heads, orientation and spacing – clean replace as required	160km / 400hrs

PRODUCT INSPECTION	FREQUENCY
Calibration on profile length	Daily
Check tool offsets by running a sample	Daily
Check lip width	Daily
Check Flange Straightness (over-form)	Daily
Check product for bow, twist and camber	Daily
Check product for scores nicks and deformity	Daily

ELECTRICAL	FREQUENCY
Check supply circuit protection is appropriate and of correct type and capacity	480km / 1200hrs
Check supply cable is of correct type and current carrying capacity	480km / 1200hrs
Check machine is adequately earthed	480km / 1200hrs
Check supply cable and Decoiler supply cables are mechanically protected	160km / 400hrs
Check circuit breaker settings are correct	160km / 400hrs
Check Machine and Decoiler isolators, push buttons and switches for secure mounting and check for any damage	160km / 400hrs
Check integrity and functionality of Emergency Stop buttons and Guard switches	Daily
Check operation of push buttons and switches	Daily
Check visually for any damaged cables, cable glands and cable ducting	480km / 1200hrs
Clean electrical cabinet fan filters	480km / 1200hrs
Check operation of AC electrical cabinet fan	160km / 400hrs
Ensure electrical cabinets are clean and dust free	160km / 400hrs

SOFTWARE	FREQUENCY
Check software version	As required
Functionally check all punch and printer operations	As required
Record all machine data including punch counts, material run, tool offsets, calibration etc and download onto USB stick	As required

GENERAL SERVICE	FREQUENCY
Level the machine	Every 12months
Replace hydraulic filter	Every 12months
Replace shear blade	Every 12months
Replace hydraulic fluid	Every 12months

DECOILER	FREQUENCY
Check chain tension - lubricate and adjust as necessary	160km / 400hrs
Check dancer arm calibration (potentiometer) - adjust as necessary	160km / 400hrs
Check motor mounts are secure - adjust as necessary	160km / 400hrs
Check expanding mandrel for tightness/security - adjust as necessary	160km / 400hrs
Check coil guards for functionality - adjust as necessary	160km / 400hrs
Check Decoiler feet for security - adjust as necessary	160km / 400hrs
Check Decoiler alignment with machine - adjust as necessary	160km / 400hrs
Check for hydraulic leaks – rectify as required	160km / 400hrs
Check operation of Emergency Stop	Daily

12.3 Hydraulic Oil/Filter Replacement

Tools Required

- New Mineral Hydraulic oil as per spec on page 15 (min 100ltrs)
- Suction Pump to Remove Oil
- New Hydraulic Oil (minimum 60ltrs)
- 10mm Spanner
- Suitably sized container or drum for capturing old oil

Safety

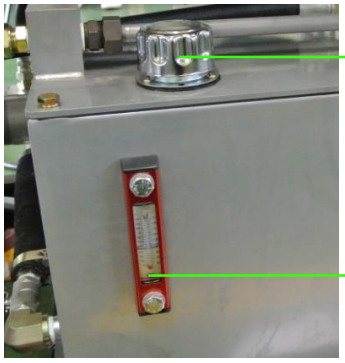
- ISOLATE electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection.
- Ensure suitably sized container or drum for capturing old oil:

When

Change oil every 12months

Replace Oil

1. Unscrew Filler Cap and remove.



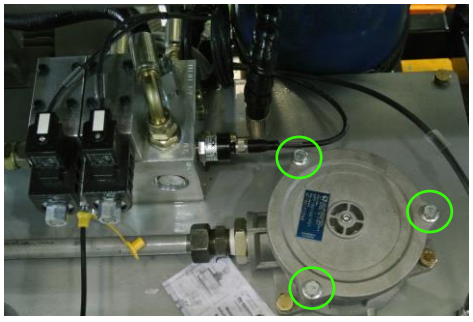
2. Use suction pump to remove old oil into suitably sized container or drum.
3. Re-fill with new oil until level at top of sight-glass (approximately 80ltrs). BE CAREFUL not to contaminate the oil with dirt or other loose material.
4. Replace Filler Cap.

WARNING!

Under any circumstances DO NOT MIX SYNTHETIC/SEMISYNTHETIC OIL WITH THE RECOMMENDED MINERAL HYDRAULIC OIL. Failure to follow that recommendation will result in hydraulic pump damage.

Replace Oil Filter

1. Use 10mm Spanner to remove In-line Filter Cap bolts.

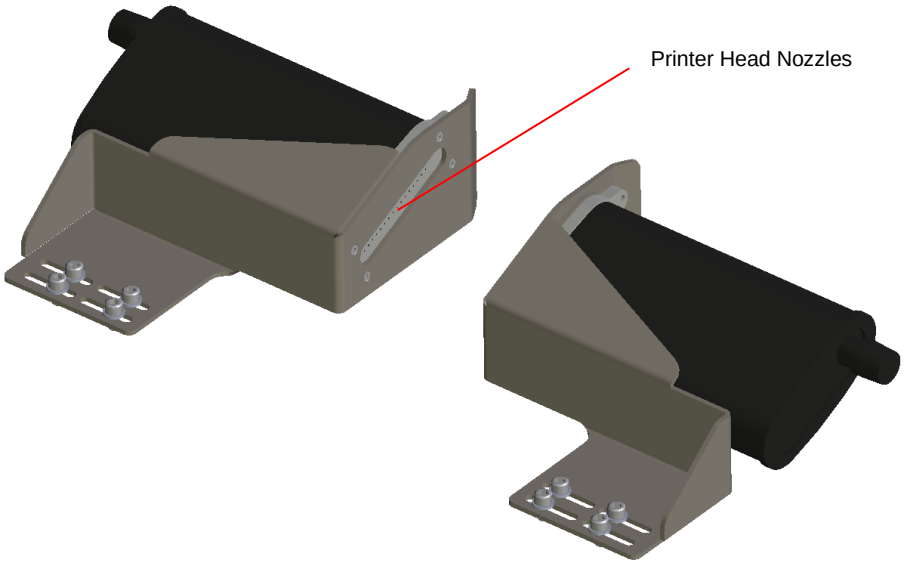


2. Remove In-line Filter and replace with new. BE CAREFUL not to drop any items into the open tank.
3. Replace Filter Cap and tighten bolts.

12.4 Cleaning the SX32I Printer Head

1. Activate an Emergency Stop state by pressing one of the Emergency Stop pushbuttons.
2. Remove Steel from the machine and Activate an Emergency Stop state by pressing one of the Emergency stop switches.

   NOTE! The print system air Compressor is turned OFF when any of the FRAMECAD TF550H safety circuits are tripped (i.e., an Emergency Stop activation OR sliding cover is opened). This is important to allow the print system to de-pressurise.
3. Clean the nozzle-end of the print heads with a brush dipped in cleaner every 4 hours of operation using rags to remove any dry or contaminated ink.



12.5 Short-term Shut-down Procedure

It is important to always make sure that the Printer Heads are properly purged with cleaner fluid at the end of each Production Day. This is to prevent the ink from drying out overnight and causing blockages

Use safety glasses and appropriate personal protective equipment including Nitrile rubber gloves whenever handling ink or cleaner

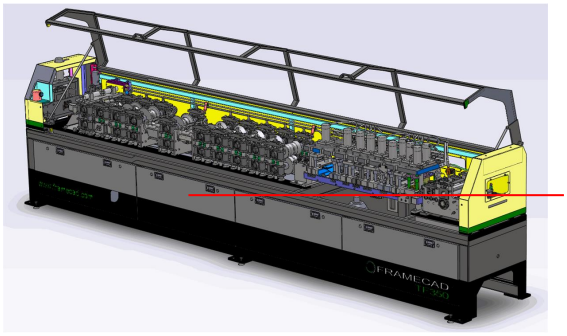
WARNING!

THE SPECIFIED INK AND CLEANER ARE CHEMICAL BASED PRODUCTS. THESE PRODUCTS ARE HIGHLY FLAMMABLE AND REQUIRE SPECIAL SAFETY PRECAUTIONS WHEN HANDLING. ALWAYS CONSULT THE MATERIAL SAFETY DATA SHEET BEFORE USE.

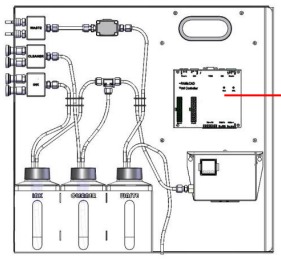
THE INK AND CLEANER DELIVERY SYSTEM IS PRESSURISED. ALWAYS USE SAFETY GLASSES AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING ON OR NEAR THE INK AND CLEANER SYSTEM. SEE SECTION 5 - SAFETY FOR MORE INFORMATION.

12.6 Perform Short-term Shut-down Procedure at the end of every Production Day

1. Pause/Stop machine – **DO NOT** activate an Emergency Stop OR Open the sliding guards.
2. Ensure printer Air Compressor pressure is at approximately 10psi. This can be checked by viewing the compressor digital display beneath the Operator Side end cover.



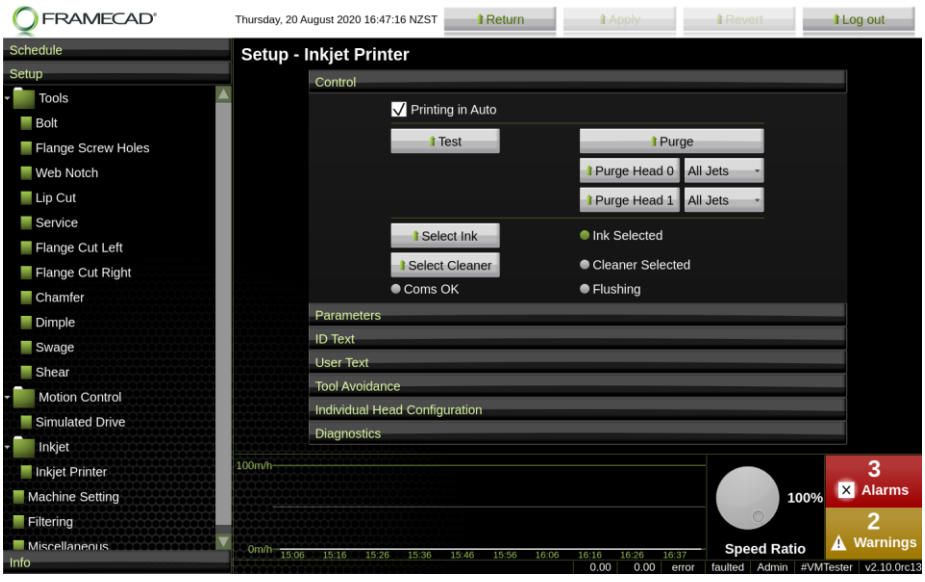
Printer Air Compressor located beneath Operator Side End Cover



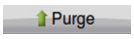
Print Compressor Unit

Print Compressor Unit

3. Go to the Setup / Inkjet Printer Screen and press the Control tab.
4. Press the Select Cleaner [Select Cleaner] button – this will do two things.
    a. Switch the print control system over to use cleaner fluid instead of ink.
    b. Flush the tubes going up to the printer heads and back down to the Waste bottle for a period of 0.5 seconds. This is to remove any residual ink from the lines.



5. In this next step cleaner fluid will be sent up into the printer head and through the nozzles to flush any residual ink out of the printer head itself. If there is no steel in the machine, it is a good idea to insert a piece of cardboard in the space between the two printer heads to prevent Cleaner fluid from one printer head being sprayed onto the other.

   Press the 

   [Purge] button. This will momentarily send cleaner fluid up into the printer heads and eject through the nozzles. Repeat this until the cleaner fluid is a clear colour and free of any noticeable ink contamination.

   Once complete the FRAMECAD TF550H can be shut down.

6. Check the Ink and Cleaner bottles to make sure there is sufficient quantity for the next day's production requirements. Re-fill as required.

   Check the Waste bottle. If this is full, consult your company's *hazardous materials handling policy* on how to safely dispose of CHEMICAL based inks and solvents.

7. When production resumes, the Operator will need to purge the printer system with ink once more by completing the Printer Ink Purge procedure (see Section 13 - Purging the Ink Jet Printer System with Ink

12.7 Extended Shutdown Procedure

It is important to always make sure that the Printer Heads are properly purged with cleaner fluid at the end of each Production Day. If however, production has ceased for a period of ***more than 3days*** then it is important to also flush ink from all the printer system delivery tubes. This is to prevent the ink from drying out in these tubes and causing blockages.

- A second cleaner bottle (full)
- Use safety glasses and appropriate personal protective equipment including ***Nitrile*** rubber gloves whenever handling ink or cleaner

WARNING!

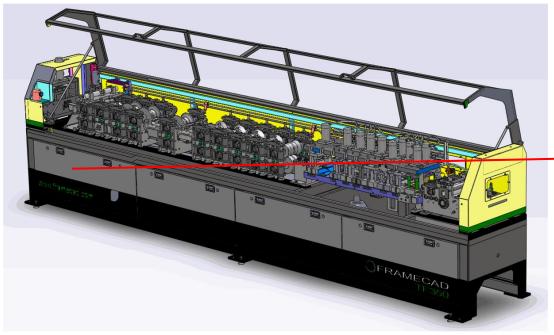
THE SPECIFIED INK AND CLEANER ARE CHEMICAL BASED PRODUCTS. THESE PRODUCTS ARE HIGHLY FLAMMABLE AND REQUIRE SPECIAL SAFETY PRECAUTIONS WHEN HANDLING. ALWAYS CONSULT THE MATERIAL SAFETY DATA SHEET BEFORE USE.

The ink and cleaner delivery system is pressurised. always use safety glasses and appropriate personal protective equipment when working on or near the ink and cleaner system. see Section 5 - Safety for more information

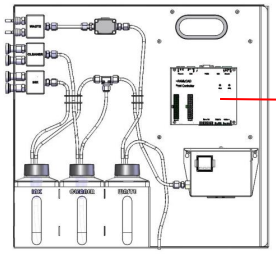
Perform Extended Shut-down Procedure when machine is to be left idle (i.e., no Production) for periods >3days

1. Activate an Emergency Stop state by pressing any Emergency stop switch on the machine. This will remove power to the printer Air Compressor.
2. Slowly unscrew the black filter cap on the Ink bottle to gently relieve pressure in the system. Remove the cap and filter from the ink bottle and insert it into the second cleaner bottle which must be full of cleaner fluid. Make sure the cap is retightened to prevent air leaks.

3. Reset the safety control system (i.e., release any Emergency stop switches, close all sliding covers, and reset the safety control system. See Section 5 - Emergency Stop Buttons & Reset Procedure)
4. Ensure printer Air Compressor pressure is at approximately 10psi. This can be checked by viewing the compressor digital display inside the printer control cabinet



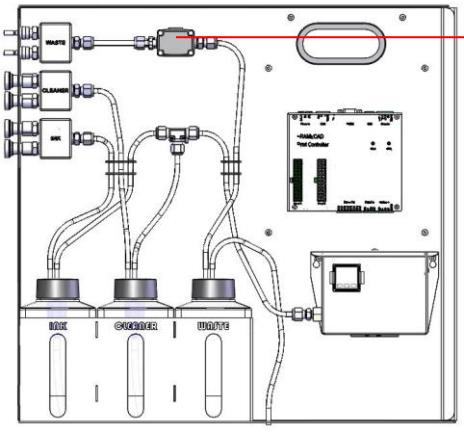
Printer Air Compressor located beneath Operator Side End Cover



Print Compressor Unit

Print Compressor Unit

5. In the printer cabinet, locate the Waste solenoid valve and press the manual over-ride button on the side of it. This will open the Waste valve and allow cleaner fluid from the second Cleaner bottle (now sitting in the ink position) to flush through the ink tubes and back down into the Waste bottle. Continue to do this until tube going into the Waste bottle is no longer dark with ink. Release the override button



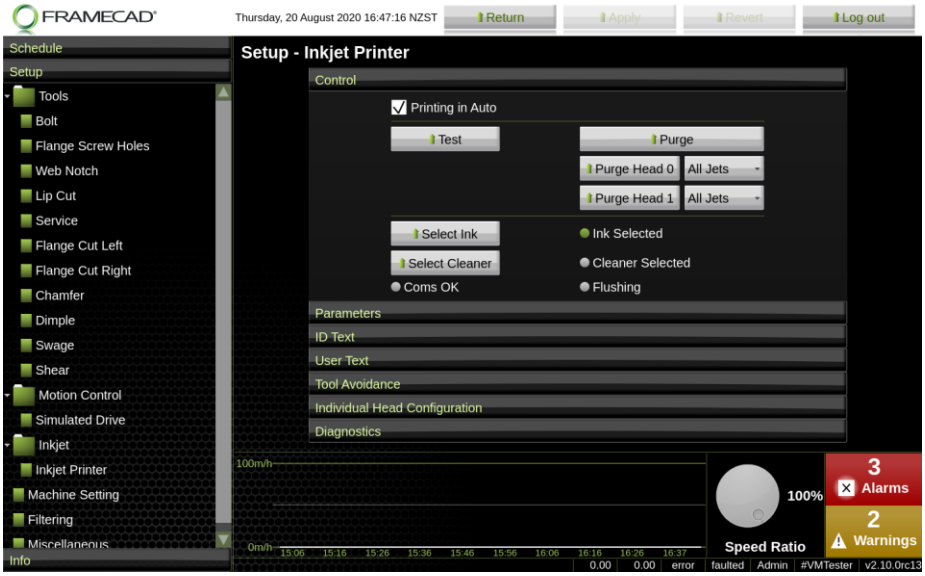
Printer Waste Valve

NOTE! The tube going into the Waste bottle will never be completely clear and some discolouration is inevitable.

1. In this next step cleaner fluid will be sent up into the printer head and through the nozzles to flush any residual ink out of the printer head itself. If there is no steel in the machine, it is a good idea to insert a piece of cardboard in the

space between the two printer heads to prevent cleaner fluid from one printer head being sprayed onto the other.

Go to the Setup / Inkjet Printer Screen and select the Control tab:



2. Press the Purge [Purge] button. This will momentarily send cleaner fluid up into the printer heads and eject through the nozzles. Repeat this until the cleaner fluid is a clear colour and free of any noticeable ink contamination.

   Once complete the FRAMECAD TF550H can be shut down.

3. Check the Ink and Cleaner bottles to make sure there is sufficient quantity for when production will resume. Re-fill as required.

   Check the Waste bottle. If this is full, consult your company's *hazardous materials handling policy* on how to safely dispose of CHEMICAL based inks and solvents.

4. When production resumes, the Operator will need to purge the printer system with ink once more by completing the Printer Ink Purge procedure (see Section 13 - Purge the Ink Jet Printer System with Ink).

   - Replacement ink filter
   - Use safety glasses and appropriate personal protective equipment including ***Nitrile*** rubber gloves

⚠ WARNING!

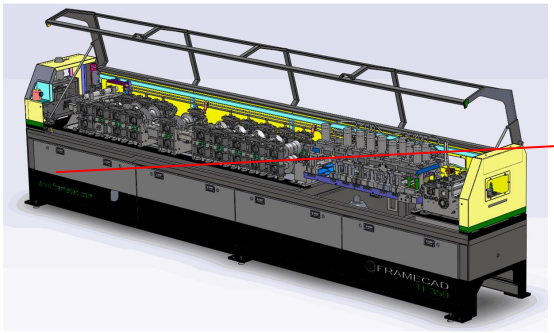
THE SPECIFIED INK AND CLEANER ARE CHEMICAL BASED PRODUCTS. THESE PRODUCTS ARE HIGHLY FLAMMABLE AND REQUIRE SPECIAL SAFETY PRECAUTIONS WHEN HANDLING. ALWAYS CONSULT THE MATERIAL SAFETY DATA SHEET BEFORE USE.

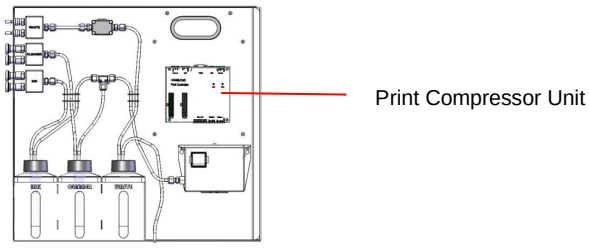
THE INK AND CLEANER DELIVERY SYSTEM IS PRESSURIZED. ALWAYS USE SAFETY GLASSES AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING ON OR NEAR THE INK AND CLEANER SYSTEM

Replace the ink filter after every 60ltrs of ink usage OR when the printed text begins to fade

1. Activate an Emergency Stop state by pressing any Emergency stop switch on the machine. This will remove power to the printer Air Compressor.
2. Slowly unscrew the black filter cap on the Ink bottle to gently relieve pressure in the system. Remove the cap and filter from the ink bottle.

3. Remove old filter and replace with new.
4. Insert cap and ink filter assembly back into ink bottle. Take care to make sure the ink bottle cap is tightened to enable a good seal.
5. Reset the safety control system (i.e. release any Emergency stop switches, close all sliding covers, and reset the safety control system. See Section 5 Ink and Cleaner).
6. Ensure printer Air Compressor pressure is at approximately 4 psi. This can be checked by viewing the compressor digital display inside the printer control cabinet





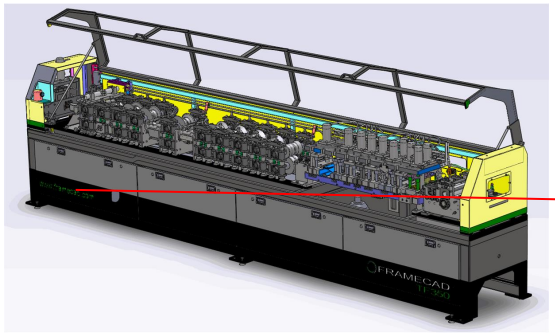
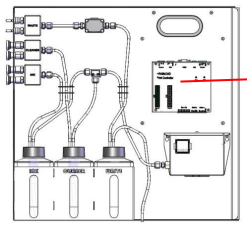
7. Check the Ink and Cleaner bottles to make sure there is sufficient quantity for when production will resume. Re-fill as required.

   Check the Waste bottle. If this is full, consult your company's *hazardous materials handling policy* on how to safely dispose of CHEMICAL based inks and solvents.

	8. When production resumes, the Operator will need to purge the printer system with ink once more by completing the Printer Ink Purge procedure

12.8 Purging the Ink Jet Printer System with Ink

Before commencing production, it is important to ensure the printer system is ***ready to print***. To achieve this, the printer control system must be ***purged*** with ink. The following procedure defines this.

Tools Required	• A4-size white paper or cardboard
Safety	• Use safety glasses and appropriate personal protective equipment including ***Nitrile*** rubber gloves whenever handling ink or cleaner **⚠ WARNING!** **THE SPECIFIED INK AND CLEANER ARE CHEMICAL BASED PRODUCTS. THESE PRODUCTS ARE HIGHLY FLAMMABLE AND REQUIRE SPECIAL SAFETY PRECAUTIONS WHEN HANDLING. ALWAYS CONSULT THE MATERIAL SAFETY DATA SHEET BEFORE USE.** **THE INK AND CLEANER DELIVERY SYSTEM IS PRESSURISED. ALWAYS USE SAFETY GLASSES AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING ON OR NEAR THE INK AND CLEANER SYSTEM.**
When	At the start of Production. This procedure will purge the printer system with Ink allowing printed text to be applied during production.
Clean Printer Heads	1. Start the machine and reset the safety control system (i.e. release any Emergency stop switches, close all sliding covers, and reset the safety control system. See Section 5 - Emergency Stop Buttons & Reset Procedure): 2. Ensure printer Air Compressor pressure is at approximately 10psi. This can be checked by viewing the compressor digital display inside the printer control cabinet.  Printer Air Compressor located beneath Operator Side End Cover  Print Compressor Unit **Print Compressor Unit**

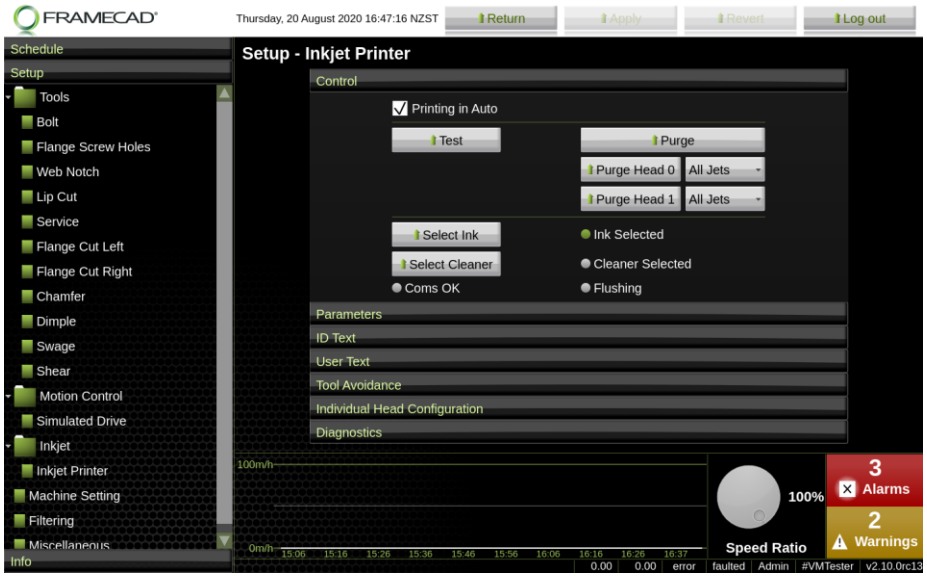
3. Check the Ink and Cleaner bottles to make sure there is sufficient quantity for the production requirements. Re-fill as required.

   Check the Waste bottle. If this is full, consult your company's *hazardous materials handling policy* on how to safely dispose of CHEMICAL based inks and solvents.

4. Go to the Setup / Inkjet Printer Screen, select the **Control** tab and press the Select Ink [Select Ink] button – this will do two things:

   a. Switch the print control system over to use Ink fluid instead of Cleaner.

   b. Flush the tubes going up to the printer heads and back down to the Waste bottle for a period of 0.5 seconds. This is to remove any residual Cleaner from the lines.

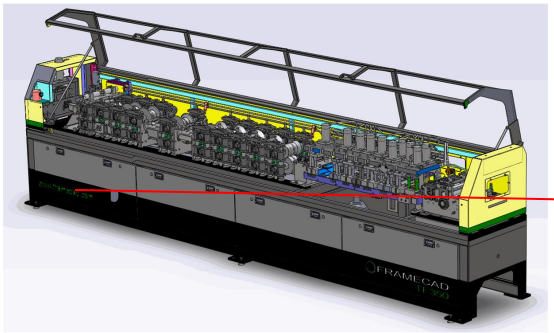


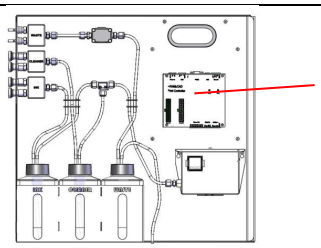
5. In this next step Ink will be sent up into the printer head and through the nozzles to flush any residual Cleaner/air out of the printer head itself. If there is no steel in the machine, it is a good idea to insert a piece of cardboard in the space between the two printer heads to prevent Ink from one printer head being sprayed onto the other.

   Press the Purge [Purge] button. This will momentarily send Ink up into the printer heads and eject through the nozzles. Repeat this until there is a consistent spray of Ink from the printer head whenever the Purge [Purge] button is pressed.

6. Once steel strip has been threaded through the machine it is a good idea to test the printer control system before commencing full production. Refer to the Printer System Test procedure below for instructions on this.

12.9 Printer System Test

Tools Required	• Nil
Safety	• Use safety glasses and appropriate personal protective equipment including ***Nitrile*** rubber gloves whenever handling ink or cleaner **⚠ WARNING!** **THE SPECIFIED INK AND CLEANER ARE CHEMICAL BASED PRODUCTS. THESE PRODUCTS ARE HIGHLY FLAMMABLE AND REQUIRE SPECIAL SAFETY PRECAUTIONS WHEN HANDLING. ALWAYS CONSULT THE MATERIAL SAFETY DATA SHEET BEFORE USE.** **THE INK AND CLEANER DELIVERY SYSTEM IS PRESSURISED. ALWAYS USE SAFETY GLASSES AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING ON OR NEAR THE INK AND CLEANER SYSTEM.**
When	• At the start of Production • At the completion of any purge or cleaning procedure
Clean Printer Heads	1. Start the machine and reset the safety control system (i.e. release any Emergency stop switches, close all sliding covers, and reset the safety control system. See Section 5 – Emergency Stop Buttons & Reset Procedure for more information): 2. Make sure the machine is in Manual control mode (see Section 10 – Manual, Semi-auto and Automatic Control Modes): 3. Make sure steel strip has been fully threaded through the machine to the Shear tool: 4. Ensure printer Air Compressor pressure is at approximately 10psi. This can be checked by viewing the compressor digital display inside the printer control cabinet.  Printer Air Compressor located beneath Operator Side End Cover

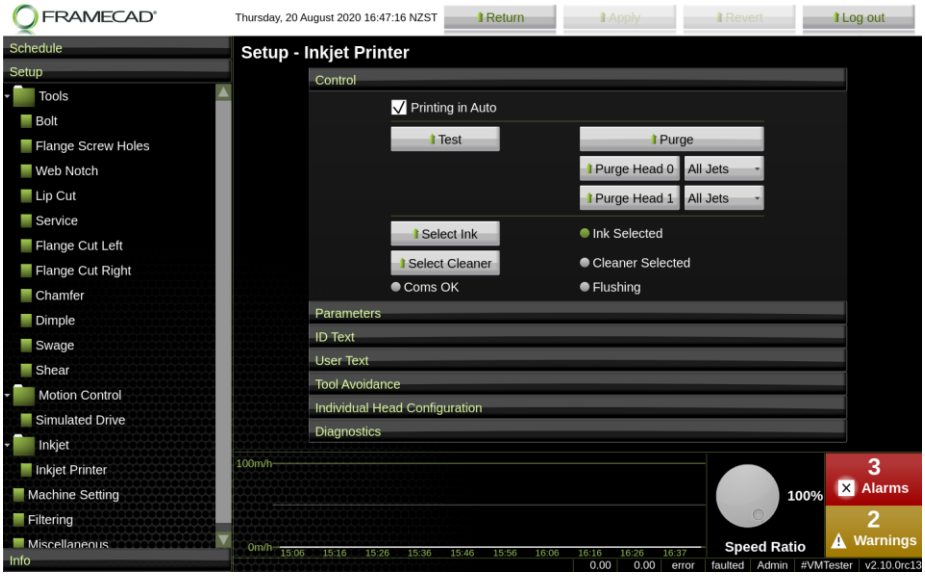


Print Compressor Unit

5. Check the Ink and Cleaner bottles to make sure there is sufficient quantity for the production requirements. Re-fill as required.

   Check the Waste bottle. If this is full, consult your company's *hazardous materials handling policy* on how to safely dispose of CHEMICAL based inks and solvents.

6. Go to the Setup / Inkjet Printer Screen. Select the **Control** tab. Make sure ink is selected:



7. Press the Test [Test] button then using the Inch FORWARD push button on the side of the machine, drive the steel strip forward. The printer control system will print text onto the strip while the FORWARD push-button is being pressed (typically this will be printer head identification: i.e. Head 0 and Head 1).

8. The printed text should be clearly legible. If the text is too light, not present or illegible complete the following checks.

   a. Purge the Printer Heads as discussed in Section 13 - Purge the Ink Jet Printer System with Ink:

   b. Check the amount of ink in the bottle located in the printer cabinet – refill as required:

   c. Make sure both the Ink and Cleaner bottle caps are tightly sealed, checking the Ink filter for blockages – tighten and clean as required.

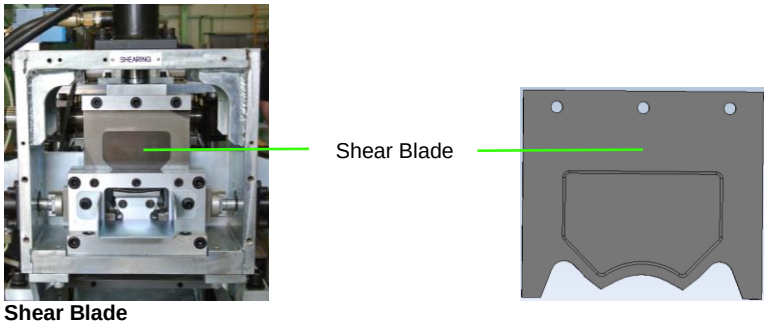
   d. Check the Air Compressor pressure is approximately 10psi.

   e. Check for any kinks or loose connections on the tubing both inside the printer cabinet and going up to the printer heads.

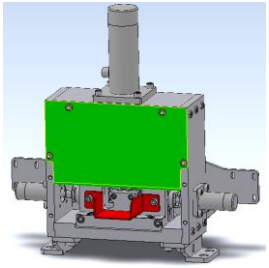
	f. Clean and purge the printer heads with Cleaner (see Section 13 – Cleaning the Ink Jet Printer Heads): g. Contact your nearest FRAMECAD® office for further support if the above does not resolve the printing issue.

12.10 Shear Blade Replacement

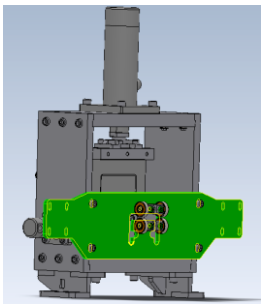
The Shear tool is actuated twice on every stick. The shearing action and forces involved are high, for this reason the Shear blade will require frequent lubrication and replacement when worn.



Shear Blade

SHEAR BLADE REPLACEMENT PROCEDURE	
Tools Required	• Metric Hex-key set
Safety	• **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection. • Remove steel strip from the machine • **TAKE EXTREME CAUTION** when lifting the Shear tool – this assembly is heavy (approximately 40Kgs) and will require two people to lift. **WARNING!** **THIS PROCEDURE MUST BE COMPLETED WITH ELECTRICAL POWER ISOLATED TO THE MACHINE AND WITHOUT STEEL STRIP INSERTED.** **SEE SECTION 5 - ELECTRICAL ISOLATION SWITCH FOR MORE INFORMATION.** **THE SHEAR TOOL IS HEAVY, TAKE EXTREME CAUTION WHEN LIFTING. IT IS RECOMMENDED THAT TWO PEOPLE COMPLETE THIS TASK.**
When	When Shear blade shows signs of wear and/or damage
Change Shear Blade	1. Remove the Perspex cover from the out-feed end of the Shear tool. 

2. Gently remove the Shear tool in-feed guide and Printer Head mounting bracket.

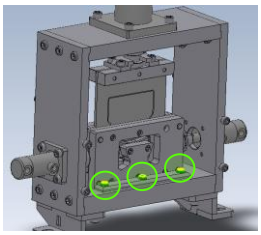


Remove in-feed guide and printer head mounting bracket

NOTE!
Take care not to damage the Printer Heads

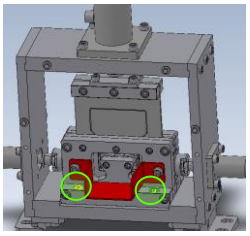
3. Loosen the Shear mounting clamp cap screws (x3) at the in-feed to the Shear tool.

   NOTE – you do not need to remove the clamp, just loosen the cap screws.



Loosen the in-feed mounting clamp cap screws

4. Remove the Shear hold down bolts (x2) from the out-feed side of the tool.



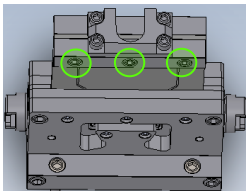
Remove Shear tool hold down bolts from the out-feed side of the tool

5. Slide the Shear tool out of the housing.

WARNING!

THE SHEAR TOOL IS HEAVY, TAKE EXTREME CAUTION WHEN LIFTING. IT IS RECOMMENDED THAT TWO PEOPLE COMPLETE THIS TASK.

6. Remove the three cap screws holding the shear blade to the top spigot coupling.



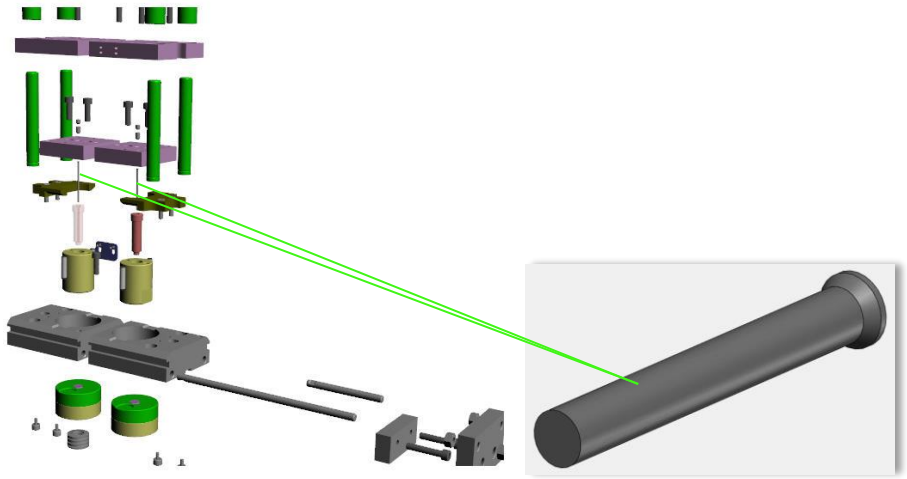
Remove the three cap screws holding the shear blade to the top spigot coupling

7. Replace the Shear blade – making sure that the replacement blade is the same size and shape as the one being removed!

	8. Repeat the above procedure in reverse to re-assemble the Shear tooling and locate assembly back into the Shear tool housing: a. Slid Shear tool back into the Shear tool housing – make spigot couplers for the top and side mounted hydraulic actuators are fully engaged. b. Insert and tighten the Shear hold-down bolts (x2) on the tool out-feed. c. Re-tighten the Shear mounting clamp cap screws at the in-feed to the Shear tool. d. Reattach the Shear in-feed guide and printer head mounting bracket. e. Reattach Perspex cover to the out-feed end of the Shear tool. 9. Manually apply lubricant (light machine oil) to the Shear blade. 10. Test the Shear operation before inserting steel strip back into the machine AND again after steel strip has been inserted. 11. Make sure you re-order a spare Shear blade for future use. Shear blades are a consumable item and it is highly recommended that at least one spare is carried in stock.

12.11 Dimple Punch Replacement

Inside each half of the Dimple tool assembly is the punch that will create the screw hole in the centre of the dimple pan.

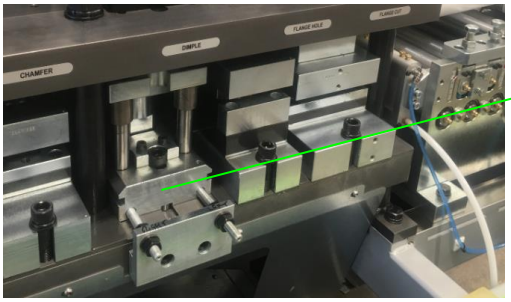


Dimple Punch

Given the frequency of operation (generally most sticks will incorporate multiple Dimple operations), the size of the Dimple punch (typically only 3.5mm up to 5.1mm) and the tool location (the first tool in the pre-punch assembly) the Dimple punch will require replacing more-often than most other tools: like the Shear blade it is a consumable item. The most frequent need for replacement is when the punch is snapped off the end.

Tools Required	• Metric Hex-key set • Replacement Dimple Punch
Safety	• **ISOLATE** electrical power to the FRAMECAD TF550H and implement measures to prevent accidental re-connection. • Remove steel strip from the machine **⚠ WARNING!** **THIS PROCEDURE MUST BE COMPLETED WITH ELECTRICAL POWER ISOLATED TO THE MACHINE AND WITHOUT STEEL STRIP INSERTED.** **SEE SECTION 5 - ELECTRICAL ISOLATION SWITCH FOR MORE INFORMATION.**
When	• When the Dimple punch is damaged or broken (i.e. the Dimple screw hole is not punched in the steel strip OR is semi / malformed).

Dimple Tool Location

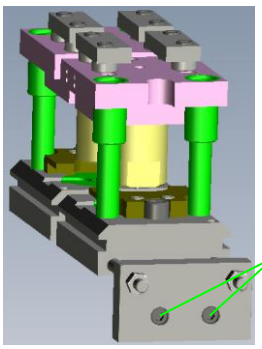


The Dimple tool is the third tool in this TF550H Pre-punch tool block

Change Dimple Punch

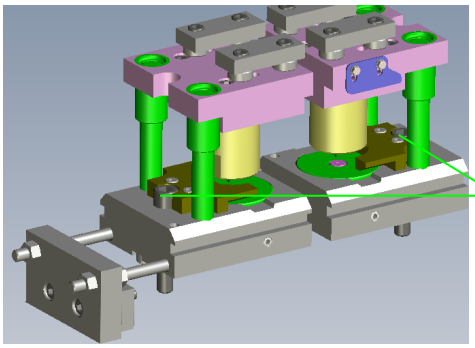
The procedure for changing the Dimple punch on a TF550H machine is detailed below.

1. Remove the side adjustment plate mounting bolts (Operator Side of machine).



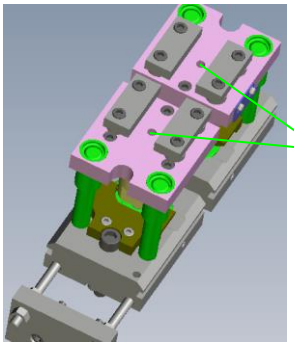
Remove the side adjustment plate mounting bolts (x2)

2. Remove the mounting bolts (x2) holding the Dimple tool inside the Pre-punch block.



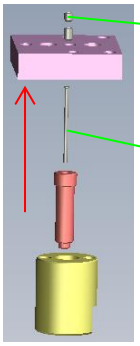
Remove the two mounting bolts holding the Dimple tool inside the Pre-punch block

3. Carefully slide the Dimple tool out of the Pre-punch block and place onto flat bench-top.
4. At the top of each half of the Dimple tool you will find an access hold hole for the grub screw that holds the locator for Dimple punch in place. Remove this grub screw for the side you wish to replace the Dimple punch on



Remove the top grub screw for the side you wish to replace the Dimple punch on

5. Carefully tip the tool over on its side and tilt upside down to allow the Dimple punch to drop out AND/OR use a small hex-key to push back through from the bottom side so that the punch can be pushed upwards and removed:



Remove the top grub screw for the side you wish to replace the Dimple punch on:

Push the Dimple punch back up through the top

6. Insert new Dimple punch. Reassemble the Dimple tool by following the above procedure in reverse:
    a. Insert the top locator and grub screw and tighten,
    b. Insert tool back into the pre-punch block – tighten mounting bolts.
    c. Insert from adjustment plate bolts and re-tighten.

7. Check Dimple heights (see Section 12 – Correcting Dimple Height) before commencing full production.

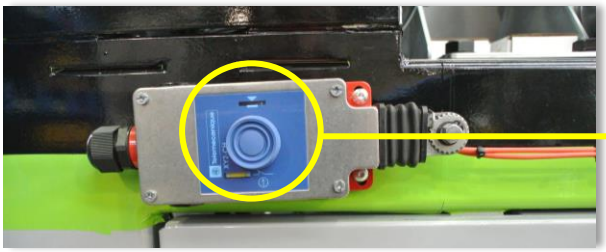
8. Make sure you re-order spare Dimple punches for future use. Dimple punches are a consumable item and it is highly recommended that at least a set of four is carried in stock.

12.12 Tensioning the Pull-switch Safety Cord

The FRAMECAD TF550H incorporates two Emergency Stop safety pull-cord switches that run down either side of the machine (see Section 5 - Emergency Stop Buttons & Reset Procedure).

Depending on time and use, the safety pull cord will need to be re-tensioned occasionally. This is a very straight-forward procedure.

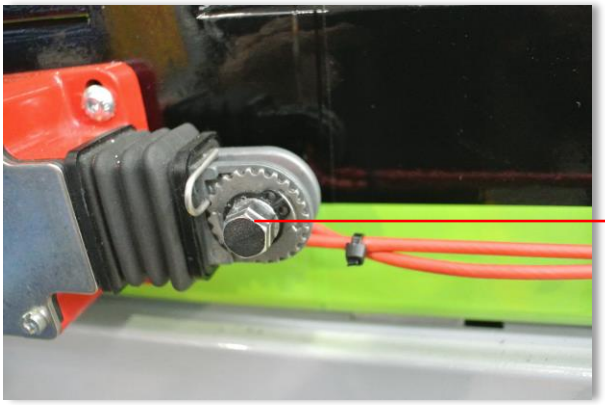
Typically, the need to re-tension the safety pull-cord will indicated by an inability to reset the safety pull-cord switch – see below:



Reset push-button for Safety Pull-cord Switch

If switch cannot be reset re-tension pull-cord

To re-tension the pull-cord, simply rotate the tension adjustment nut until the cable is taut and the switch can be reset.



Tension adjustment

CAUTION!

AVOID OVER-TENSIONING THE PULL-CORD AS THIS COULD DAMAGE THE SWITCH AND/OR PULL-CORD.

13 TROUBLESHOOTING

13.1 Managing Problems

The FRAMECAD TF550H is a highly advanced and powerful machine. It incorporates electrical, computer, hydraulic and mechanical sub-systems that will require maintenance and troubleshooting from time to time. Most issues can be effectively managed, or even avoided altogether by ensuring the following programmes/plans are in place:

1. **Operator Training**: the more effort put into developing employees utilising this equipment, the better the workplace environment will be and the more reliable and effective your production. Complete familiarity with this Operating Manual is an absolute prerequisite to using the FRAMECAD TF550H machine.
2. **Effective Maintenance/Service Plans**: do not wait for an issue to occur. Keep the machine well maintained and serviced to maximise productivity and reduce down-time.
3. **Resource Planning**: how many Operators/Frame Assemblers will you need? Design and Detailers? If you do not have on-site expertise in electrical, hydraulic, or mechanical disciplines, how will you manage these types of issues if/when they arise? Work out who, how and where you will need to contact and draw resource from when the need arises. This exercise is a simple and fundamental management strategy that should always be in place for any manufacturing environment.
4. **Spare Parts**: the FRAMECAD TF550H is shipped with a basic assortment of spare parts. These should be deemed the *minimum* requirement. Depending on location and availability of parts in your region, developing a smart spare part strategy that is specific to your needs and location is a sensible and highly recommended option. The types of things that need to be considered when formulating a spare parts plan are:
    a. Electrical power supply integrity: is the supply is prone to frequent dips or surges?
    b. Ambient temperature: extreme ambient temperatures (< 0^{o}C - >40^{o}C) in non-climate-controlled environments will add addition stress to machinery and equipment, resulting in higher wear and tear rates.
    c. Atmospheric dust/contaminate airborne or surface contaminates that can get inside the machine will result in a higher degree of wear and tear.
    d. Staff competency and training.
    e. Location and general infrastructure: this will have a direct impact on part availability and delivery times, particularly in remote or rural areas.

FRAMECAD has the knowledge and know-how to be able to advise and recommend options on all of the above. From specialised training through to the development of specific spare part packages and customised *Service Level* agreements, FRAMECAD can assist in developing the right strategy for your needs. For more information on FRAMECAD support services please contact you regional FRAMECAD office or visit our web-site www.framecad.com

13.2 Identifying Root Cause

The following guidelines are supplied to assist in problem diagnosis/solving when using the FRAMECAD TF550H machine.

- What has changed? Look for any changes that may have occurred just prior to the problem commencing. Common examples are:
    - Changes in steel (quality, tensile strength, strip width etc):
    - Change in steel thickness – has the roll-forming section been setup to accommodate the new material thickness?
    - Where there any changes to the set-up and configuration of the machine?
    - Have there been any changes to the FRAMECAD Factory 2 software?
    - If there are problems with tool cut-outs in the final frame assembly, check the job design. Many issues can be resolved by rethinking the layout and configuration of the job file.
- Review maintenance records – check to see if there were any adjustments made that may be impacting machine performance.
- Check to make sure that routine maintenance checks are up to date and were completed properly: a poor maintenance regimen typically means poor performance and product.
- Check the basics first:
    - Check consumable elements on the machine to make sure that they have not simply run out (i.e. does the machine require a new ink, is there sufficient lubricant being supplied to the steel strip?)
    - Use the built-in information screens of FRAMECAD Factory 2 (under the Info menu). These are useful for checking the basic state of the digital inputs and outputs, the Variable Frequency Controller and Print System configuration.
    - Look for loose nuts/bolts/screws in or around the problem area and tighten as required.
    - Review the Operating Manual for the correct procedures on setup, calibration and adjustment (this includes the Decoiler):
    - Does the issue occur after a particular tooling operation? For example, is the steel strip catching on a particular tool?
- Peculiar or intermittent faults resulting in unexpected machine shut-down, Emergency Stop trips, failure to start the hydraulics etc are often the result of poor electrical supply. Be aware of this and if you suspect a supply related issue, have a registered Electrician investigate.
- ALWAYS make sure that all material and services comply with the specifications outlined in this Operation Manual and in accordance with the original specification requested for the machine.
- For direct access to our on-line support web-site, go to http://care.framecad.com

13.3 Basic Trouble-shooting Chart

ISSUE	CAUSE	RESOLUTION
Display Fault Message – "MDX61 Fault Code 06" The FRAMECAD TF550H or Decoiler shut-down intermittently	One of the 3-phases supplying the machine has failed.	Have a registered Electrician check the incoming supply to the machine. Confirm voltages and frequency.
Display Fault Message – "MDX61 Fault Code 08"	The rolling motor failed to reach its target top speed in the required time frame. The most likely cause will be due to a mechanical hindrance in the machine, either as a result of incorrect setup (i.e. a misalignment or the roller clearances) or the steel fouling on a tool or guide as it is processed inside the machine.	Test the machine in Manual control to investigate the following possible causes: • Check to make sure there is sufficient lubricant being applied to the steel strip. If the steel strip is too dry this will increase the rolling effort required and may result in this error (see Section 8 - Check Lubrication Level & Lubricator Adjustment). • Check to make sure that the roller station clearances have been properly set for the steel thickness being run. Typically the roller clearances should be set to 0.05mm below the base metal thickness of the steel being run (e.g. if BMT = 0.75mm, roller clearance should be set at 0.70mm). See Section 8 - Roll-forming Section Setup • Check for mechanical obstructions that may be preventing the steel from moving forward (e.g. misalignment or a physical jam-up of the steel). • Check to make sure that no punching tools are stuck down or interfering with the steel movement. *Increase* the UP and DOWN time settings for the suspect tool in the Setup/Tools screen. See Section 10 - Setting Tool Cycle Times • Check that no scrap metal is being caught up in the bottom scrap exit points of the tooling pre-punch block/module. • Increase the Ramp time shown in the Setup/MDX61B screen. This will slow the acceleration of the rolling motor down to accommodate for any increase in mechanical loading in the machine. See Section - Setup - [Motion Control] MDX61B Screen
Display Fault Message – "MDX61 Fault Code 14"	The VFC has detected a failure with the rolling motor encoder (or resolver).	• Check all plug connections to the Encoder on the motor and to the VFC inside the AC Electrical Cabinet – make sure all plugs are firmly connected. • Look for a broken or damaged encoder cable and replace if necessary. • If all connections have been checked and there is no damage to the cable, replace the encoder.

Display Fault Message – “MDX61 Fault Code 28”	Communications with the master Computer has failed. NOTE: It is not uncommon to receive this fault just after a machine reset or on power-up as both these conditions reset the VFC and may interrupt the communication link with the Computer.	• If the RESET button was just pressed or the machine was just powered up, press the acknowledge button and ignore. • Check the Ethernet plug connections between the Computer and the VFC in the • AC Electrical Cabinet.
Display Fault Message – “MDX61 Fault Code 31”	The motor is too hot.	• Allow motor to cool. • If excessive production or ambient temperature, additional cooling may be required. • Have a registered Electrician check the state of the motor.
Display Fault Message – “MDX61 Fault Code 42”	The VFC detected too large a difference between the motor encoder signal and the steel strip encoder signal. This fault will often follow or be associated with a fault 08 code. These two faults are typically caused by similar events. The one that is displayed depends on which occurs first. The 08 fault will most likely occur during acceleration while the 42 fault will occur a little latter after the motor has got to speed.	• The guide wheel(s) at the in-feed of the machine is slipping on the steel strip OR the encoder belt pulley is loose (if applicable) OR the Encoder shaft coupling is loose. Check and re-tighten if necessary (see Section 8 - In-feed Guide Setup (Including the Steel Strip Sensor and Encoder). • Check to make sure there is sufficient lubricant being applied to the steel strip. If the steel strip is too dry this will increase the rolling effort required and may result in this error (see Section 8 - Check Lubrication Level & Lubricator Adjustment). • Check to make sure that the roller station clearances have been properly set for the steel thickness being run. Typically the roller clearances should be set to 0.05mm below the base metal thickness of the steel being run (e.g. if BMT = 0.75mm, roller clearance should be set at 0.70mm). See Section 8 - Roll-forming Section Setup • Check for mechanical obstructions that may be preventing the steel from moving forward (e.g. misalignment or a physical jam-up of the steel). • Check to make sure that no punching tools are stuck down or interfering with the steel movement. *Increase* the UP and DOWN time settings for the suspect tool in the Setup/Tools screen. See Section 10 - Setting Tool Cycle Times • Check that no scrap metal is being caught up in the bottom scrap exit points of the tooling pre-punch block/module. • Increase the Ramp time shown in the Setup/MDX61B screen. This will slow the acceleration of the rolling motor down to accommodate for any increase in mechanical loading in the machine. See Section - Setup - [Motion Control] MDX61B Screen

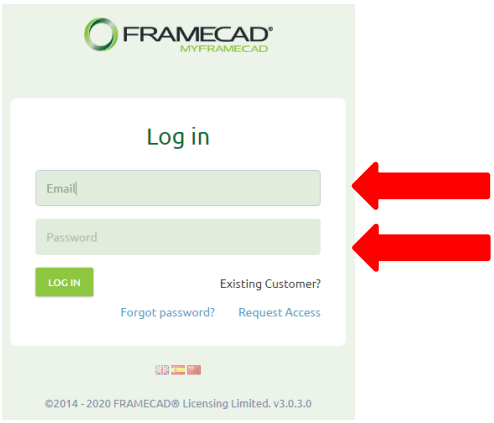
Rollers shudder or oscillate back and forth during forward motion	Chain tension loose OR insufficient lubrication on steel strip OR roller station is no longer in contact with steel strip.	• Tighten chain tension • Check sufficient lubrication on the steel strip • Check to make sure all roller stations are in contact with steel
Emergency Stop alarm ***without*** an Emergency stop switch/push-button being pressed	Decoiler Dancing Arm has been lifted too high OR Decoiler VFC has tripped. The Decoiler is integrated into the safety control circuit, so if the Decoiler has stopped running for any reason then both machines will halt in an Emergency Stop alarm state.	• Restart Decoiler. • Check Decoiler Dancing Arm calibration (see Section 9 - Check Calibration of Decoiler Dancer Arm) • Reset power to the Decoiler.
Frame component length is inaccurate	Strip encoder guide wheel at in-feed section of machine is loose OR encoder belt drive (if applicable) is loose OR encoder shaft/coupling is loose. If the length error is *inconsistent* then this typically indicates "looseness" in the encoder assembly at the in-feed of the machine which is allowing the encoder wheel/shaft or belt to slip whenever steel is moved through the machine. If the length error is *consistent* across all lengths then this typically indicates a machine calibration issue	• Check encoder wheel is not slipping on steel strip at in-feed of machine. • If applicable, check to make sure encoder belt is not loose. • Check all encoder couplings to make sure there is no looseness allowing slip. • Recalibrate the machine (see Section 12 - Scale-Factor (Strip Encoder) Calibration)
Build Up On Rollers		Clean the residue by either scraping or rubbing the build up with fine emery paper
Machine speed is slow	Feed rate setting is too low OR hydraulic pressure is struggling to maintain pressure. If hydraulic tooling actuation is slow then this indicates a hydraulic system issue.	• Check Feedrate setting on Setup/MDX61 screen • Check for hydraulic leaks and hot spots in or around the hydraulic cylinders, valves or unloader block that may indicate hydraulic seal leakage (bypassing) • Check hydraulic pump and accumulator pressure - contact FRAMECAD for further support.
No or faint printing	Blocked or clogged printer heads	• Manually clean and purge the printer head ink
Display Fault Message – "Hydraulics pressure low"	The system cannot build and/or maintain hydraulic loading pressure (195Bar). Whilst this can indicate an issue with the hydraulics circuit and/or seals within valves or cylinders, it can also be the result of electrical supply issues to the machine.	• To confirm hydraulic pressure related issues, a test gauge must be used: • Check for hydraulic leaks and hot spots in or around the hydraulic cylinders, valves or unloader block that may indicate hydraulic seal leakage (bypassing) – minimum loaded pressure must be >160Bar (Hydraulic operating pressure range is 160 to 195Bar) • The accumulator vessel is pre-charged to 120Bar – if the hydraulic system pressure is very sluggish to reach 120Bar then replace accumulator bladder • Have a registered Electrician check the electrical supply to the machine (voltage and frequency) • Check hydraulic pump and accumulator pressure - contact FRAMECAD for further support. • Check pressure switch settings for both the Enable and Unload pressure points

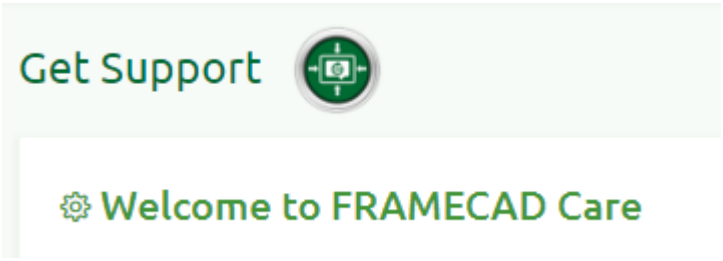
Display Fault Message – “Phase Rotation Relay”	The Phase Rotation Relay (5K1) has detected that the incoming supply phase sequence is reversed.	• Have a registered electrician reverse any 2 of the 3 incoming phases to the Isolation switch mounted in the AC Electrical Cabinet
Display Fault Message – “Decoiler Not Ready”	Decoiler Emergency Stop has been pressed OR the Decoiler Dancer Arm was raised above the trip setting Or Decoiler isolation switch is in the OFF position	• Check Decoiler Emergency Stop Push-button has been fully release and safety circuit has been reset • Check Decoiler Dancer Arm potentiometer calibration (see Section 12 - Scale-Factor (Strip Encoder) Calibration • Make sure power is switched on to the Decoiler (i.e. it is plugged into the TF550H and isolator switch is in the ON position)

13.4 FRAMECAD Support

For further support or assistance please contact your regional FRAMECAD office or visit MyFRAMECAD at my.framecad.com.

For direct access to our FRAMECAD® Care support web-site go to http://care.framecad.com, login and raise a support ticket with our Client Services team.





When requesting support, please try to be specific about the issue, investigations already undertaken and include photographs where appropriate. The more information you can provide the faster our Aftersales team will be able to answer any questions you may have. Full guidelines can be found at our MyFRAMECAD® web-site my.framecad.com.

You can also email our Aftersales team directly at helpdesk@framecad.com

14 Recommended Spares

FRAMECAD recommends the following spare parts inventory. This is a *typical* list covering basic requirements. For extended lists please contact your regional FRAMECAD office for more information.

PART NUMBER	DESCRIPTION	QUANTITY	LEAD TIME[1)]
SAP#	PUNCH, Dimple (Machine Variant)	4	15-20 days
SAP#	BLADE, Shear, (Machine Variant)	1	10-15 days
005011	BELT, Encoder	1	5 days
301543	FILTER, Hydraulic Return Oil Filter Cartridge	1	5 days
012901-SK	SEAL, Complete Seal Kit, 63x45 Cylinders	1 Set	5 days
002904-SK	SEAL, Complete Seal Kit, 80x55 Cylinders	1 Set	5 days
301542	VALVE, Hydraulic Directional Solenoid Valve	1	5 days
004389	PRINTER, Waste Bottle Cap	2	20 days
300927	PRINTER, 4X00, High Pressure Ink Cap and Filter	1	20 days
301681	VALVE, Lubricator Delivery Valve	1	10-15 days

NOTE 1)

- **Lead times may vary beyond FRAMECAD's control.**
- **Lead times DO NOT include international delivery time: allow additional 3-5 days depending on freight option**
- **Lead times represent the *typical* time required from placement of order for items if not currently in FRAMECAD stock.**

14.1 Requesting Spares

Whenever requesting spare parts, please take note of the following guidelines that will assist our Client Services team in providing a prompt and efficient turnaround of all queries and requests:

1. Where practical, always request spare parts via a support ticket on our FRAMECAD Care website. This allows complete track and traceability of all queries.
2. Always supply the FRAMECAD TF550H serial number. This will ensure we have the right machine specification.
3. Where possible provide the part number for the components required. If the part number is not available, please provide a photo(s) or detailed description of the part you are after and attach to the FRAMECAD Care ticket.
4. Be specific about quantities required.
5. Always include delivery address details, contact information and any specific shipping, customs or packaging requirements.

14.2 Consumable Items

Some items such as the Shear blade, Dimple punches, printer ink and hydraulic filters are deemed *consumable* items, meaning that they will require recurrent ordering as/when they wear or are discarded.

It is highly recommended that the minimum stock levels shown for these items above are always maintained.

15 Appendix A – Starter Kit

⚠ PLEASE NOTE!

THE EXACT ITEMS INCLUDED IN THE *STARTER KIT* MAY VARY DEPENDING ON AVAILABILITY AND/OR OTHER REQUIREMENTS (E.G. MATERIAL THICKNESS). THE KIT IS ORDERED AS A GUIDE ONLY.

PART NUMBER	DESCRIPTION	QUANTITY
001883	Hitachi Cordless Impact Driver Kit, 18V Li-ion Battery	1
000397	Super Drive 05 (with Dimple Nosepiece)	1
000416	Superdrive Coupler for Hitachi Cordless Impact Driver	2
030176	Superdrive Nose Piece - half dimple for dual thread screws	1
001428	Manual Stud Punch 34mm	1
002977	Gloves - Black Ninja (size M)	2
001404	Driver Bit Holder, Magnetic 50mm	2
002959	Driver Bit - Ph#3, 50mm, blunt	5
001441	Driver Bit - X#1, 50mm (stickfit)	10
002793	Driver Bit X#1, 153mm – SD	5
001554	Driver Bit Magnetic Hex Socket 5/16" bit x 150mm	2
002962	10g x19mm, XDrive Framer SP, 1000hrs SST, Collated	1xBox
001236	10g x 19mm, XDrive Framer SP, 1000hrs SST, Loose	8xBox
001877	10g x 19mm, XDrive Framer DP, 100hrs SST, Loose	1xBox
001792	M6 Fastite x 17mm, Wafer, Ph#3, PP, 1000hrs, Loose	1xBox
001789	10g x 19mm, HWH Drivall® Panel Joiner, 1000hrs, Loose	1xBox
002958	Grommets 34mm, Orange	500

16 Appendix B - Ink Material Safety Data Sheet

Ink Material Data Sheet is kept up to date in the Framecad Knowledge Centre.

https://knowledge.framecad.com/home

17 Appendix C – Cleaner Material Safety Data Sheet

Cleaner Material Data Sheet is kept up to date in the Framecad Knowledge Centre.

https://knowledge.framecad.com/home