E-CFW OPERATIONAL MANUAL

Continuous Filament Winder

TOPFIBRA

EFFECTIVE FILAMENT WINDING® PIONEERS

E-CFW OPERATIONAL MANUAL

Continuous Filament Winder

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1. INTRODUCTION

TOPFIBRA D.O.O. is an engineering company and it is indicated in the Manual with the name: Manufacturer.

The Company purchasing the machine is indicated in the manual with the name: Customer.

The manufacturer recommends a training course for personnel responsible for operating and maintaining the machine to increase familiarity and knowledge of the various procedures.

This manual contains the features, performances, instructions for use, and references to the preventive and remedial operations of the machine.

The manufacturer compels the personnel in charge of operating and maintaining the machine, as well as the personnel in charge of transport and possible assembly operations, to read this document.

This document is the Operational Manual for the: E-CFW ND 300-3000.

The Operational Manual is to be considered an integral part of the system and is to be kept until final dismantling. It is to be kept by the person in charge of the machining service after the final installation.

1.1. Definitions and abbreviations

When reading the manual, you will come up against different symbols and abbreviations. Their proper interpretation is indicated below.

In this document, the following definitions and abbreviations are used:

PLC - Programmable logic controller

HMI - Human Machine Interface, operating panel

EFW – Effective Filament Winding

E-CFW – Effective Continuous Filament Winding

DN – Nominal diameter of the pipe

1.2. Purpose of this document

The Operational Manual is intended for all users of the E-CFW ND 300-3000. They provide the necessary information for the easy, safe, and smooth operation of the system. The individual screen images of the operator panel, the methods of system management, and the described procedures in case of errors or troubleshooting are also explained.

If you not understand parts of this manual, please contact our technicians.

We suggest that you to read this manual in its entirety and to scrupulously respect the instructions. Full implementation of the necessary conditions of safe operation aims, at each procedure or warning that you will ready, although seemingly obvious, at the total knowledge of the machine. The information contained in this manual must be communicated to all the people who will work with the E-CFW ND 300-3000.

1.3. General

The E-CFW ND 300-3000 may only be operated and maintained by persons designated by the investor and qualified to work on such a system. In addition to the instructions for use and the accident prevention regulations applicable in this area, it must also comply with the technical rules for the safe and appropriate operation of the system.

The instructions provide basic information to be observed during operation and maintenance.

It is therefore essential that operators, maintenance staff, and anyone else working with the line read them before starting work and that they are always available at the point of use.

In addition to the safety instructions in the "Safety" chapter, all safety instructions in the field of occupational safety must be observed.

To ensure a trouble-free operation of the system, the following must be met:

- The system must be properly set up and maintained.
- Work and maintenance personnel must be properly selected and trained.
- Operators must be well informed about the functions, capabilities, and limitations of the equipment.
- Operators must read and follow the instructions for the use and maintenance of the equipment.

- An adequate set of spare parts must be provided.

1.4. Machine conversion

Conversion, additions, or modifications to the system are not permitted without the consent of the manufacturer. Written permission from the manufacturer is required for all recovery operations. Parts of the system that are not in perfect condition must be replaced immediately!

Use only original spare parts!

IMPORTANT!

Read the instructions carefully before using the device and save them for future reference.

WARNING!

BE SURE TO SWITCH OFF AND LOCK THE MAIN SWITCH BEFORE MAINTENANCE WORK ON THE SYSTEM!

The person in charge of maintenance work is responsible for safety during maintenance work. The manufacturer is not responsible for irregularities in case of improper use, unqualified and unauthorized persons, various modifications inconsistent with the rules, or the use of non-original parts. The operator is responsible for the proper operation and regular inspection of the surroundings of the transport system. A qualified person must carry out lifting, transport, installation, and maintenance.

Inspect the system regularly for damage or malfunctions. Only an authorized and qualified person may interfere with the main cabinet and other Electrical cabinets. Take a good look at the wiring diagrams before the procedure.

Before intervening in any part of the equipment, observe the principles of safe work and safety regulations.

It is not allowed to interfere or modify anything related to the PLC, as it may cause the program to be deleted or affect the security functions of the system. Prolonged power outages may cause the program and/or Settings to be deleted.

In the case of manual or service mode, the operator who manages the system is responsible for the operation, safety, and consequences.

Never leave a working system unattended.

The E-CFW ND 300-3000 is not intended to be used by persons with a lack of experience and knowledge unless they are supervised or advised by the person responsible for their safety.

When finished, turn off and lock the main switch or press the emergency button.

1.5. Extinguishing the fire

When extinguishing a fire, be sure to turn off the main switch of the machine, otherwise, the effective extinguishing of electrically conditioned fires is not possible!

1.6. Technical data

E-CFW ND 300-3000

Voltage:	400 V/3ph+N+E
Power:	280 kW
Frequency:	50 Hz
Pf:	0,79

2. E-CFW ND 300-3000 DESIGN

2.1. General

The E-CFW ND 300-3000 (Figure 1, Figure 2, Figure 3) is designed to manufacture GRP (Glass Reinforced Pipes) in compliance with the main International Standard Specifications for water and sewer pipes for the range ND 300-3000 mm.

GRP pipes are produced by controlling either the internal diameter (ID) or the external diameter (OD) relative to a fixed value. TOPFIBRA's standard is to produce by controlling the external diameter to a fixed value, as per the required OD's used in international practice.

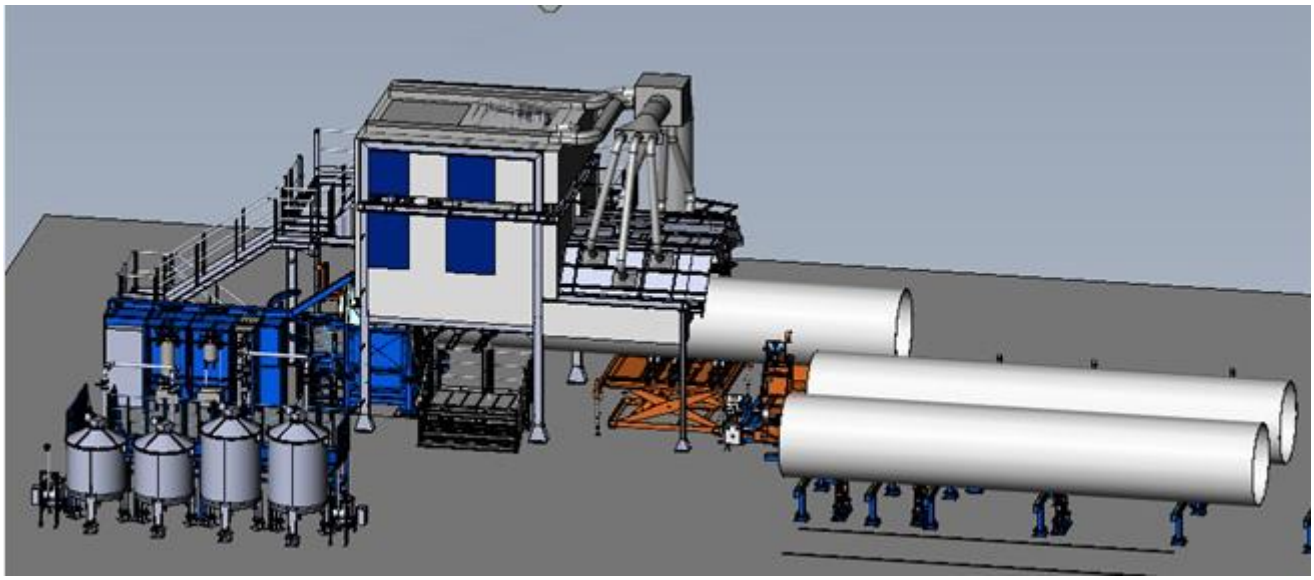


Figure 1

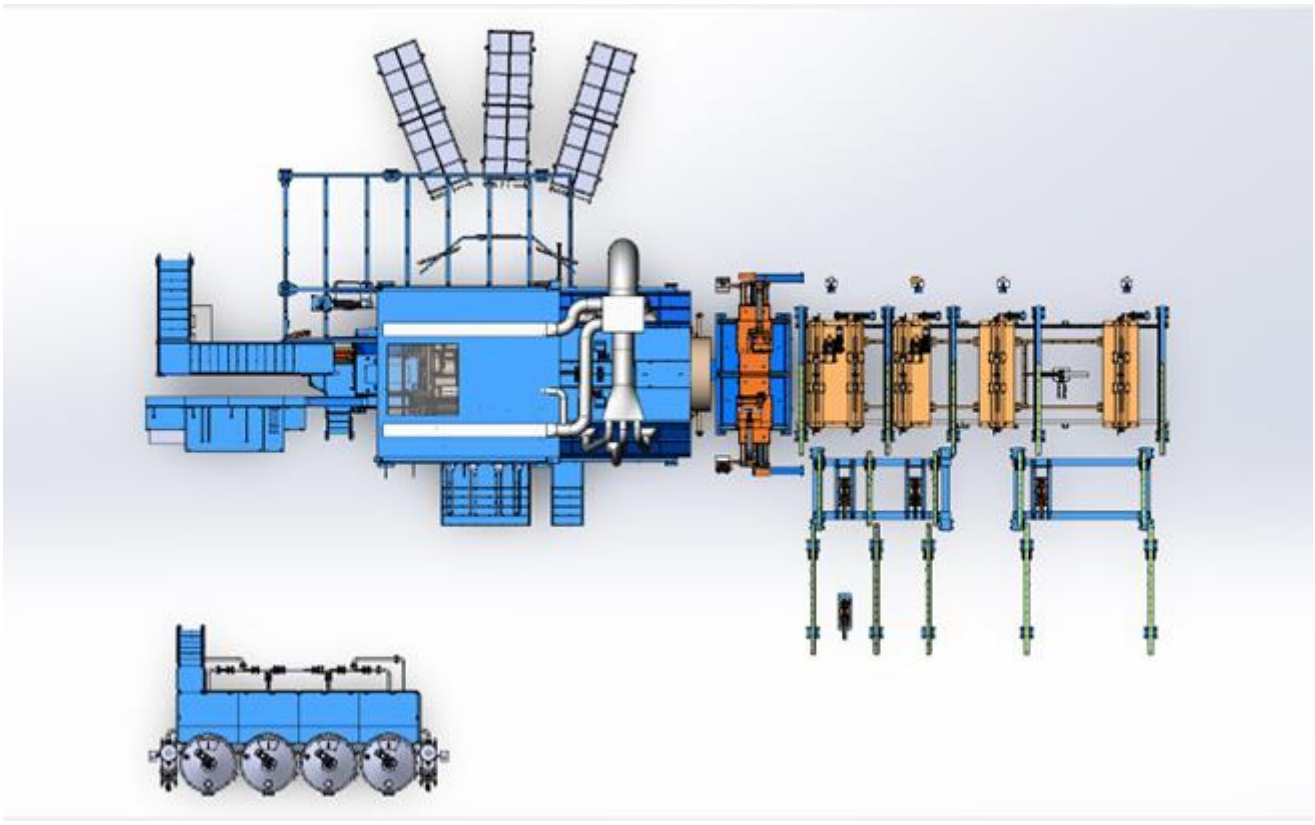


Figure 2

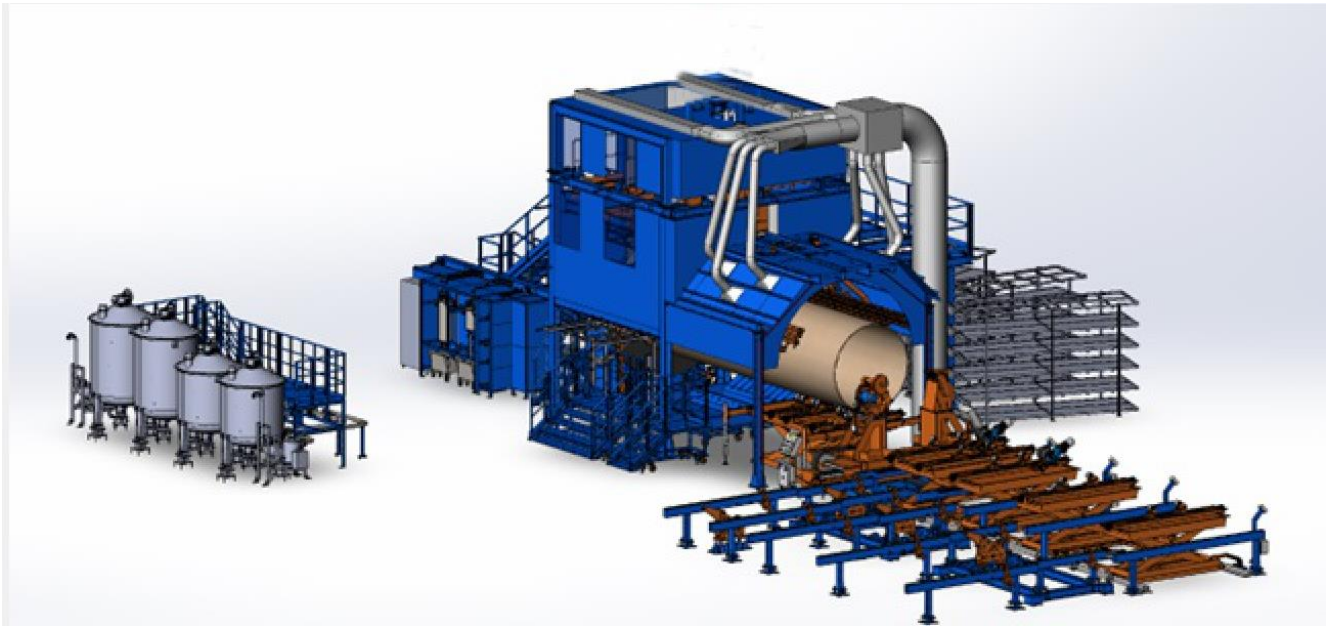
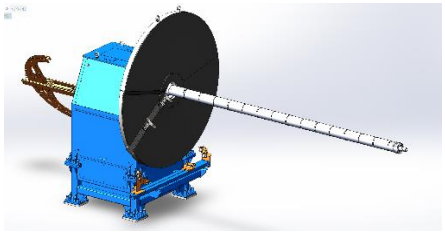


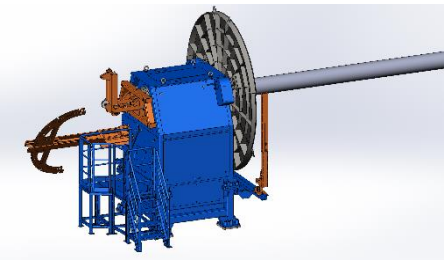
Figure 3

The main components of the E-CFW machine are:

DAILY TANKS

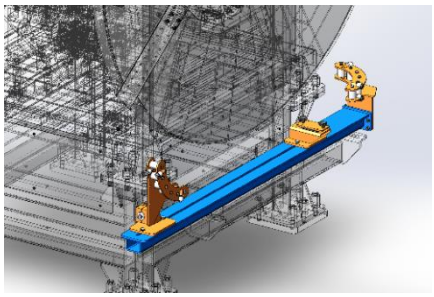
The daily tanks are used to prepare the resins for the production adding styrene and cobalt to fine tune the viscosity and reactivity.





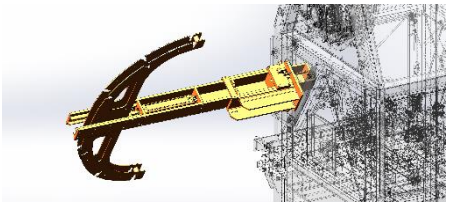
MAIN CASING WITH SHAFT AND EXIT HEAD

The main casing and the shaft are used to hold the mandrels needed fort the pipe manufacturing and to keep the constantly rotation related to the production speed. The manufacturing of continuous pipe is carried out on a mandrel assembled with discs, aluminum beams and steel band, sized according to the pipe diameter required. The steel band moves in the axial direction, sliding over the ball bearings inserted in aluminum beam grooves. At the end of the mandrel, an exit head guides the steel band back into the mandrel inner pipe, which supports the exit head. On the opposite end of the mandrel again near the cam plate, forming a smooth surface with simultaneous rotation and advancing in the axial direction.



MAIN CASING GUIDING BEAM

In order to avoid that the steel band overlaps, the guiding beam, which is close to the cam plate, lead the steel band into the correct position. The guiding beam should be positioned in such a way that it has the right winding angle.

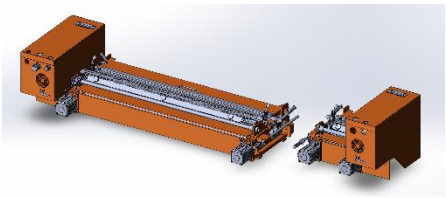


MAIN CASING TENSIONER

The main casing tensioner is used to apply tension to the steel band after the welding and annealing procedure.

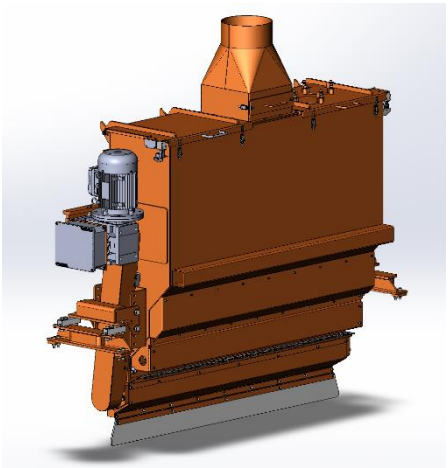
ELEVATOR

The elevator is the platform that adapts to the pipe diameters moving in the vertical direction and hold all the dosing raw material devices. An enclose is supplied for better capture of the styrene fumes during dosing and curing.



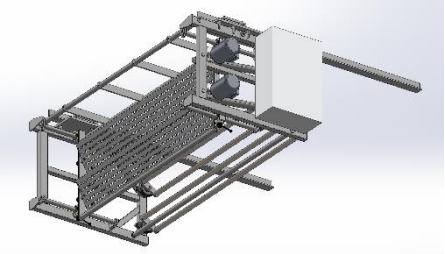
CHOPPER

The scope of the chopper is to cut the continuous glass roving, which, cut to dimensions of cca. 50mm, fall onto the top of the mandrel, guided by the slides. They fall in an "irregular" fashion, all facing in various directions. For more information, please refer to the Chopper Handbook.



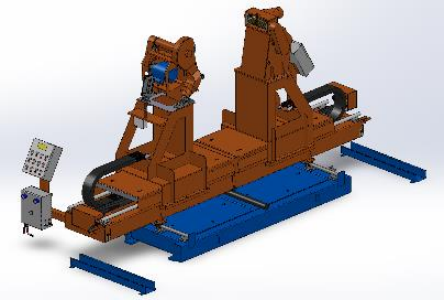
SAND DOSING

The sand dosing system consists of a feeder bin located on the winding machine mounted on load cells.
For more information, please refer to the Sand Dosing Handbook.



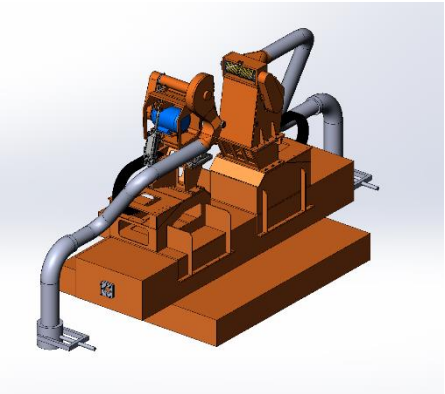
TENSIONER FOR ROVINGS

A PLC program controls Topfibra's electronic fiber tensioner. It regulates and measures the hoop fiber tension during the production.



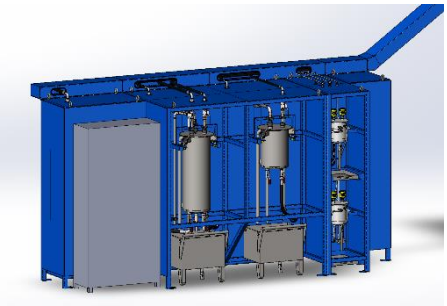
CUTTING AND GRINDING ONLINE

The online unit grinds the pipe before cutting it and cuts it to predetermined lengths. In this area, the manufactured pipe is grinded, chamfered and cut to the correct length. During the grinding operations, the pipe end is worked and the spigot is manufactured.
The grinding, chamfering and cutting are online and automatic, so there is no need to stop the production of the pipe for the working its end. After the pipe has been cut, four lifting tables discharging beams with load cells unload it.



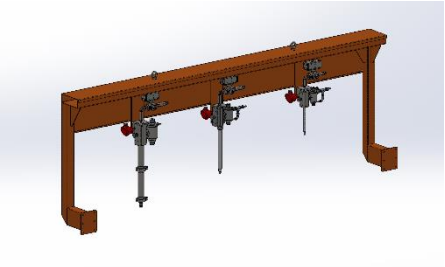
DUST SUCTION POINT

The unit is provided with suitable hoods and carters to be connected to the aspiration system, for dust extraction during operation.



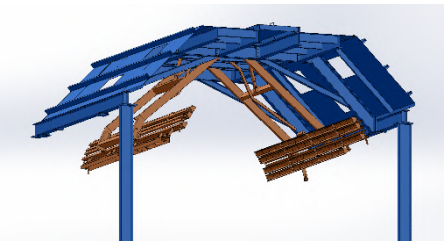
DOSING STATION

In the dosing station, the exact quantity of resin and catalyst is measured and controlled, as well the resin temperature. The dosing station is composed of intermediate tanks that receive resin and catalyst from the mixing and storage tanks, by dosing pumps and electronic sensors. For more information, please refer to the Resin and Catalyst Dosing Handbook.



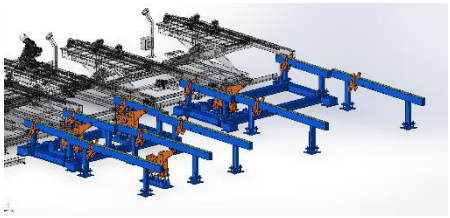
STATIC MIXERS

Mixing is carried out in three separate mixers, one for the liner and two for the structure. The second mixer for the structure is used for big diameter production. Resin and catalyst are delivered separately to the mixers by dosing pumps, controlled and calibrated by mass-flowmeters. The required quantity of resin and catalyst depends on pipe design and production speed.



CURING STATION-IR OVENS

In this area, the manufactured pipe is hardened after winding. The curing station consists of four infrared lamps batteries, independent of each other. They allow you to set different temperatures for the polymerization of the resin. In order to measure the pipe's temperature during the cure, ten pyrometers are located along the lengths of the lamps.



WEIGHING STATION

Once the pipe is cut, the lifting tables lower and discharge the pipe to lateral guides, thus removing the product from the machine. The weighing station stops the pipe, takes and records its weight and releases the pipe to the waiting beams.

COMMAND CONSOLE

The command console (HMI system) is provided with the machine, with an industrial PC, back-up hard disk, with its own monitor and all the connections that are needed to work with the machine. It is also possible, through "team-viewer" software to check the HMI on a phone and on computers with other operative systems.

CONTROL PANEL AND ELECTRIC BOARD

The control panel and electric board are prepared with *ABB, Schneider and Beckhoff* components, for a complete compatibility of the electric system. The main panels have their own automatic cooling and self-protection system.

Some devices of the E-CFW machine have their own electric board, to improve the erection and start up time.

TABLES AND DISJUNCTION ELECTRIC BOARD

The electric board controls the table's movement and disjunction.

DOSING STATION ELECTRIC BOARD

The electric board controls the resin and catalyst dosing station.

BRIDGE ELECTRIC BOARD

The electric board controls the dosing devices on the elevator.

ELEVATOR ELECTRIC BOARD

The control panel and electric board controls the valves for the static mixers and temperature sensors.

GRINDING AND TABLE 0 CONTROL PANEL

The Grinding and tables control panel is used to set up the values of both devices during production.

DAILY TANKS ELECTRIC BOARD

The electric board controls the daily mixing tanks.

2.2. Software

The system is operated via buttons on the control panels and via an HMI.

The HMI is based on MOVICOM 11 platform.

The PLC is BECKHOFF and a PROFINET bus is used to control the system, which, in addition to a more transparent design of connecting electrical elements, also enables easy system upgrades and communication from remote desktops.

The system management application enables:

- display the operation of system elements;
- change settings;
- editing data;
- display alarms.

2.3. Electrical equipment

Electrical equipment consists of various components, ranging from simple keys, signal lamps, and sensors to frequency regulators and safety components. Among them is also a series of devices for the management, control, and protection of the transport system. Fuses and motor protection switches provide overload control and short-circuit protection for various parts of the system. A rectifier is used to provide a lower voltage constant. Soft starters enable motor soft start. The frequency regulators make it possible to change the speed of the motors and

the servo drive serves for precise movements where needed. The PLC and distributed input-output components make up the central control part of the system. They respond to various input signals and control the output signals accordingly. For the safety of workers, safety components are installed in appropriate places to shut down the system in the event of an emergency. All safety components are connected to the safety modules of the safety controller.

2.3.1. Electrical equipment marking

To facilitate the identification of electrical elements and the diagnosis of operating and alarm conditions, the elements of the device are marked accordingly.

Sensors, circuit breakers, drives, and other electrical equipment are marked according to the page in the project documentation.

The same applies to all other sensors, signals, and keys.

3. SAFETY

3.1. General

The operating instructions contain basic information to be observed when operating and maintaining the E-CFW machinery. For this reason, it is essential that they are read in full and that they are always available at the place of use.

Regulations and measures to ensure the safety of workers were taken into account when designing the system. In addition to safety devices, hazard-warning labels are also affixed to potentially hazardous locations. The system of safety devices is designed to ensure the safe operation of the device.

Operators and maintainers must be familiar with all elements of device management and control. During operation, the E-CFW machinery must be monitored and appropriate action taken concerning the condition of the system and the status of warnings and alarms. Emergency procedures should be performed regularly.

In the event of a warning or alarm, the following must be done:

- Analyze a warning or alarm;
- If necessary, carry out emergency operations;
- Inform the responsible supervisor and equipment maintainer.

Safety devices installed on the system are intended to protect workers working with or maintaining the system**.**

As a result, they should in no way be removed or disabled.

It is also not allowed to remove security labels. Operators or system maintainers must ensure that safety devices function properly. They must also ensure that the safety labels are legible.

WARNING!

If the safety element does not work properly, working with the E-CFW machine is not permitted.

Be sure to turn off the main switch before performing maintenance.

When working with electrical assemblies, always obtain the permission of the responsible person. Switch off the power supply before repairing or maintenance work. During maintenance work, take care not to damage the wiring.

Do not touch the areas of moving parts as they can cause serious injury or even death. Wear suitable protective equipment when working near moving parts.

After completing maintenance work, always test the device in manual mode.

3.2. Safety signs

HAZARD!

HIGH VOLTAGE HAZARD

ELECTROMAGNETIC HAZARD

TRIPPING HAZARD

DROP (FALL) HAZARD

BURN HAZARD

RISK OF SQUEEZING THE LEGS

HAND CRUSH HAZARD

COUNTER ROTATING ROLLERS HAZARD

PINCH POINT HAZARD

CRUSHING HAZARD

COUNTER ROTATING ROLLERS HAZARD

SUDDEN LOUD NOISE HAZARD

LINE TRANSPORT SYSTEM

NO PACEMAKER WEARERS

NO METAL OR WATCHES

DO NOT STAND HERE

FOOT CRASHING HAZARD

HAND CRASHING HAZARD

WEAR EAR PROTECTION

WEAR EYE PROTECTION AND EAR MUFFS

WEAR HARD HAT AND EAR MUFFS

WEAR EYE PROTECTION

WEAR EYE PROTECTION AND HARD HAT

WEAR SAFETY GLOVES

WEAR HARD HAT

WEAR A MASK

WEAR A RESPIRATOR

CAUTION AIR SYSTEM UNDER PRESSURE

FORBIDDEN TO OPEN

DO NOT WORK UNDER THE TABLE
IF NOT MECHANICALLY BLOCKED

DANGER!
The operator may only use the machine in accordance with its intended use in a safe and technically perfect condition!

DANGER!
Competent personnel must ensure that unauthorized persons avoid dangerous areas!

DANGER!
The electrical equipment of the machine must be tested regularly. Defective cable insulation, loose connections, and burnt cables must be removed immediately. The main electrical cabinet must always be locked. Only authorized personnel are allowed access.

DANGER!
Work on the electrical system may only be carried out by competent and authorized workers! There is a risk of electric shock, which can range from severe burns to heart failure!

WARNING!
Observe all safety and accident prevention regulations!

WARNING!
When carrying out hazardous work, the main switch must be switched off and secured against being switched on again!

WARNING!
When installing the machine, the relevant safety rules must be observed and accidents must be avoided by prudent handling! This mainly concerns the use of safe means of transport and lifting devices! In addition, all dangerous places created, even if only temporary, must be adequately insured!

3.3. Safety functions

The E-CFW machinery contain the following safety features:

- Emergency stop (function to switch off the system in case of activation of the STOP button);
- Stopping the mandrel if the back tensioner arrived to the end of the stroke;
- Stopping the chopper if the carter or the heavy pressure roller is not in the working position;
- Stopping the arm moving if they are too near to the pipe;
- Stopping the induction is the speed is less than 2,5m/h;
- Confirmation of reconnection of safety functions.

If the safety function is activated, the alarm must be confirmed and the failed safety element must be reactivated.

3.3.1. Emergency STOP button

The following emergency stop buttons are in the E-CFW winder.

Figure 4

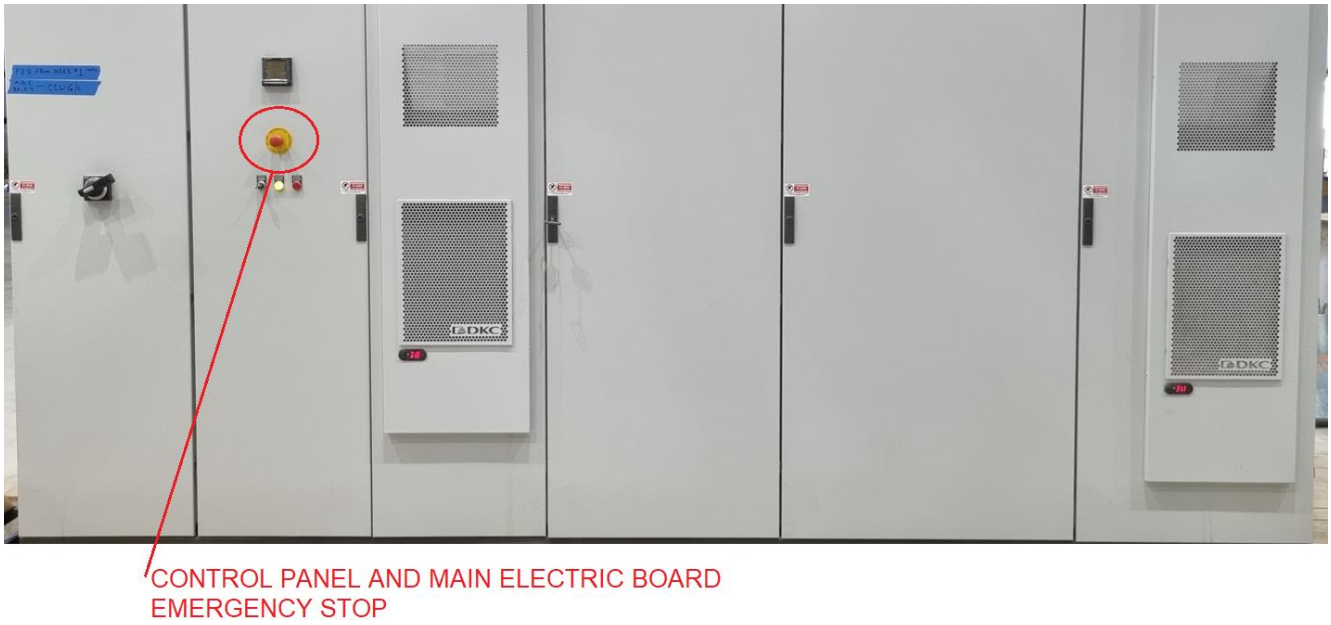


Figure 5

Figure 6

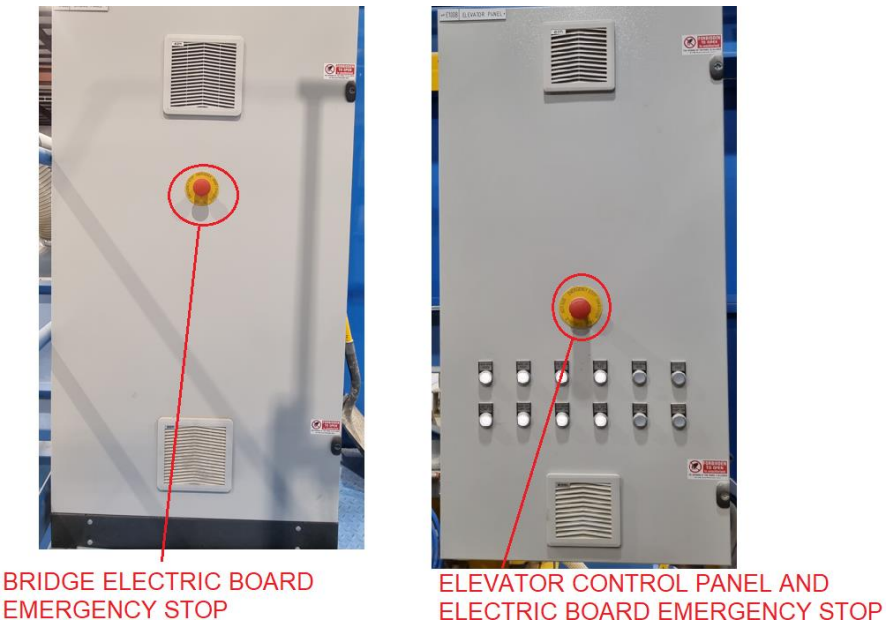


Figure 7

Figure 8

Figure 9

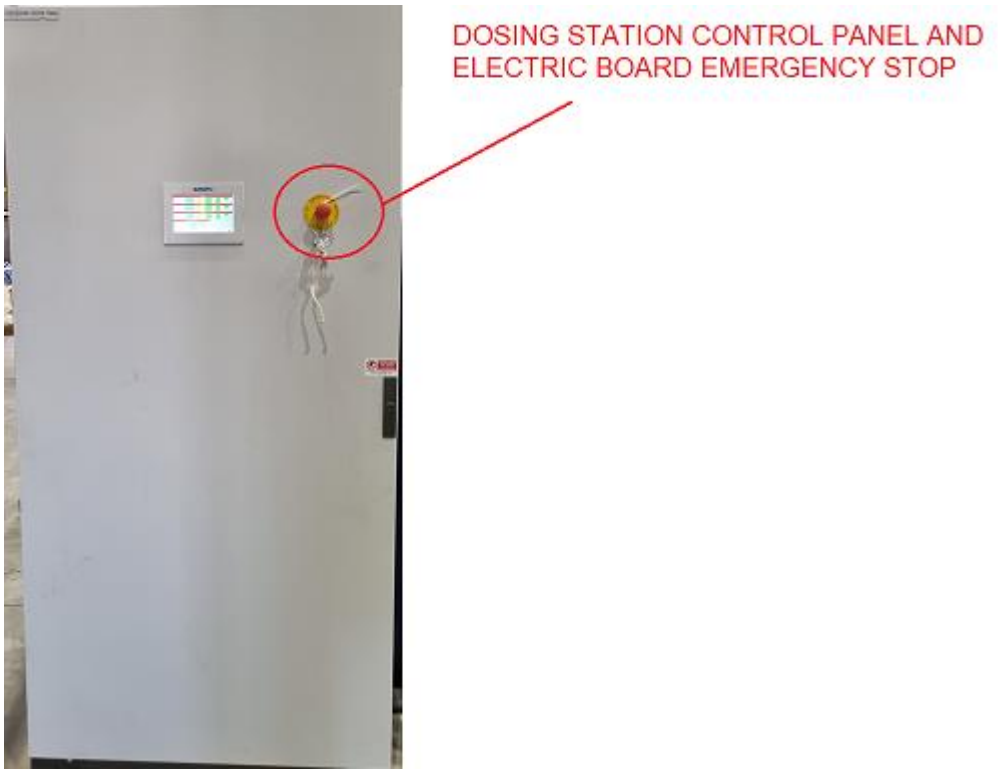


Figure 10

3.3.2. Procedure for reactivating the security module

- Ensure safe operation of the machinery;
- Turn the activated key clockwise to return to the working position;
- Reset the safety system on the HMI pressing the CLEAR button (see Figure 11);

Figure 11

- Reset the alarms on the HMI pressing the RESET button until the alarms disappear (see Figure 12).

Figure 12

3.3.3. Alarms system, alarms reset and horn silence

To help the operators in the troubleshooting of the events, the machine is provided with an alarm system to show faulty situations or situations that can bring to faults or stop the production.

The HMI has a log to show the alarms (see HMI section) and the machine has a main horn a local beeper and a red light to show the alarm's condition.

The correct sequence to follow when you have an alarm condition is:

- Silence the alarm with the key on the panel;
- Open the alarm log on the HMI system (see the HMI section);
- Remove the faulty condition;
- Reset the alarm with reset alarm button;
- Acknowledge and reset all the alarm on the log to keep only active alarms on the page.

NOTE:

- Some alarms are enabled only in the automatic mode;
- The absence of mylar is a self-resetting alarm if the sensor senses the mylar presence;
- If the alarm is shown active on the log, the faulty condition is active and can't be considered 'cleared';
- Some alarms can stop some devices or machine.

4. INSTALLATION

4.1. Positioning, fixing and connecting

The alignment of the machine is crucial for the correct operation. During the installation follow the following instructions:

- AL NARJESS - Main casing installation procedure;
- AL NARJESS - Installation Highlights;

4.2. Diagrams

4.2.1. Electric diagram

See AL NARJESS – Electrical diagram.

5. CONTROL AND SIGNAL ELEMENTS

5.1. Buttons

5.1.1. Buttons on the control console

Figure 13

BUTTON	FUNCTION	DESCRIPTION
	TABLES MAN.-AUTO	The function of this button is to enable or disable the automatic mode for the lifting tables and disjunction. If the tables and disjunction are in "manual mode" (automatic mode disable) the light will be continuously on. If the table and disjunction are in "automatic mode" the light will blink.
	TABLES DOWN-UP	The function of this button is to move the table up or down.
	DISJUNCTION BW-FW	The function of this button is to move the tables forward or backwards (disjunction procedure).

BUTTON	FUNCTION	DESCRIPTION
	PIPE TROLLEY BW-FW	The function of this button is to move the trolley of the cutting and grinding unit forward of backwards.
	ACCELERATOR BW-FW	The function of this button is to activate the accelerator (or accelerators if both are enabled).
	PIPE CUT START	The function of this button is to activate the cycle of grinding (if the grinding is enabled) and cutting.

BUTTON	FUNCTION	DESCRIPTION
	PIPE CUT STOP	The function of this button is to stop the cycle of pipe grinding (if the grinding is enabled) and pipe cutting.
	SAMPLE ENABLE	The function of this button is to enable the function for the sample cutting.
	OVEN FAN STOP-RUN	The function of this button is to enable or disable the vapor aspiration system unless the activation is customized.

BUTTON	FUNCTION	DESCRIPTION
	DUST SUCTION STOP-RUN	The function of this button is to enable or disable the dust aspiration system unless the activation is customized.

Figure 14

BUTTON	FUNCTION	DESCRIPTION
	LINER RESIN PUMP STOP-RUN	The function of this button is multiple: If only the button is pressed, the resin liner pump is enabled or disabled. If the button is pressed together with LAUNCH PUMP SELECTION button, it enables or disable the resin launch pump for the liner.

BUTTON	FUNCTION	DESCRIPTION
	LINER CATALYST PUMP STOP-RUN	The function of this button is multiple: If only the button is pressed, the catalyst liner pump is enabled or disabled. If the button is pressed together with LAUNCH PUMP SELECTION button, it enables or disable the catalyst launch pump for the liner.
	STRUCTURE 1 RESIN PUMP STOP-RUN	The function of this button is multiple: If only the button is pressed, the resin structure 1 pump is enabled or disabled. If the button is pressed together with LAUNCH PUMP SELECTION button, it enables or disables the resin launch pump for the structure 1 and 2.
	STRUCTURE 1 CATALYST PUMP STOP-RUN	The function of this button is multiple: If only the button is pressed, the catalyst structure 1 pump is enabled or disabled. If the button is pressed together with LAUNCH PUMP SELECTION button, it enables or disables the catalyst launch pump for the structure 1 and 2.

BUTTON	FUNCTION	DESCRIPTION
	STRUCTURE 2 RESIN PUMP STOP-RUN	If the button is pressed, the resin structure 2 pump is enabled or disabled.
	STRUCTURE 2 CATALYST PUMP STOP-RUN	If the button is pressed, the catalyst structure 2 pump is enabled or disabled.
	LINER RESIN RECYCLE-FEED	If the button is pressed, the resin liner line switch from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).

BUTTON	FUNCTION	DESCRIPTION
	LINER CATALYST RECYCLE-FEED	If the button is pressed, the catalyst liner line switch from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).
	STRUCTURE 1 RESIN RECYCLE-FEED	If the button is pressed, the resin structure 1 line switch from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).
	STRUCTURE 1 CATALYST RECYCLE-FEED	If the button is pressed, the catalyst structure 1 line switch from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).

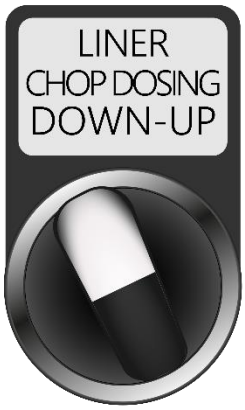
BUTTON	FUNCTION	DESCRIPTION
	STRUCTURE 2 RESIN RECYCLE-FEED	If the button is pressed, the resin structure 2-line switch from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).
	STRUCTURE 2 CATALYST RECYCLE-FEED	If the button is pressed, the catalyst structure 2-line switch from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).
	LINER RESIN DOSING DOWN-UP	The selector increases or decreases the dosing of the resin liner.

BUTTON	FUNCTION	DESCRIPTION
	LINER CATALYST DOSING DOWN-UP	The selector increases or decreases the dosing of the catalyst liner.
	STRUCTURE 1 RESIN DOSING DOWN-UP	The selector increases or decreases the dosing of the resin structure 1.
	STRUCTURE 1 CATALYST DOSING DOWN-UP	The selector increases or decreases the dosing of the catalyst structure 1.

BUTTON	FUNCTION	DESCRIPTION
	STRUCTURE 2 RESIN DOSING DOWN-UP	The selector increases or decreases the dosing of the resin structure 2.
	STRUCTURE 2 CATALYST DOSING DOWN-UP	The selector increases or decreases the dosing of the catalyst structure 2.
	LAUNCH PUMPS SELECTION	If the button is pressed together with RESIN AND CATALYST RUN STOP BUTTONS button, it enables or disable the launch pumps.

Figure 15

BUTTON	FUNCTION	DESCRIPTION
	LINER CHOPPER STOP-RUN	Enable or disable the liner chopper.

BUTTON	FUNCTION	DESCRIPTION
	STRUCTURE CHOPPER STOP-RUN	Enable or disable the chopper for the structure.
	STRUCTURE SAND STOP-RUN	Enable or disable the structure sand dosing system.
	LINER CHOP DOSING DOWN-UP	Increase or decrease the dosing of the liner chopper.

BUTTON	FUNCTION	DESCRIPTION
	STRUCTURE SAND DOSING DOWN-UP	Increase or decrease the dosing of the structure chopper.
	DOSING MODE AUTO-MANUAL	Enable or disable the manual dosing of all devices.

Figure 16

BUTTON	FUNCTION	DESCRIPTION
	RESIN HEATERS DOWN-UP	Not in use.
	SAND HEATERS DOWN UP	Increase or decrease the power of the sand heaters.

BUTTON	FUNCTION	DESCRIPTION
	OVEN 1 DOWN-UP	Increase or decrease the power of the sector 1 of the ovens.
	OVEN 2 DOWN-UP	Increase or decrease the power of the sector 2 of the ovens.
	OVEN 3 DOWN-UP	Increase or decrease the power of the third sector of the ovens.

BUTTON	FUNCTION	DESCRIPTION
	OVEN 4 DOWN-UP	Increase or decrease the power of the third sector of the ovens.
	OVEN ARMS U/D SELECTION	Pressing this button it is possible to move the arm of the oven using the selector OVEN 1 DOWN – UP OVEN 2 DOWN-UP or both arms simultaneously using the selector OVEN 3 DOWN UP.
	RESIN HEATERS MAN.-AUTO STOP-RUN	This selector enable the power line to start the chiller and the resin heaters.

BUTTON	FUNCTION	DESCRIPTION
	OVEN 1 MAN.-AUTO STOP-RUN	This selector has 2 functions: enable the manual and automatic mode of the oven sector 2 and turn it on and off.
	OVEN 2 MAN.-AUTO STOP-RUN	This selector has 2 functions: enable the manual and automatic mode of the oven sector 1 and turn it on and off.
	OVEN 3 MAN.-AUTO STOP-RUN	This selector has 2 functions: enable the manual and automatic mode of the oven sector 3 and turn it on and off.

BUTTON	FUNCTION	DESCRIPTION
	OVEN 4 MAN.-AUTO STOP-RUN	This selector has 2 functions: enable the manual and automatic mode of the oven sector 4 and turn it on and off.

Figure 17

BUTTON	FUNCTION	DESCRIPTION
	HORN	This is the horn for the alarms.
	EMERGENCY STOP	An emergency and non-automatic release, stop button (red on a yellow background): By pressing this button the machine and the whole line stop immediately. The emergency button must be pulled in order to restore them. To be used only for emergencies.

BUTTON	FUNCTION	DESCRIPTION
	CLEAR	Pressing the CLEAR button, the safety system is enabled.
	SILENCE	This button is to silence the alarm horn.

Figure 18

BUTTON	FUNCTION	DESCRIPTION
	RESET 1	This button acknowledges or reset (if the alarm is not active anymore) the alarms.

BUTTON	FUNCTION	DESCRIPTION
	RESET 2	The reset 2 is not used inside the logic.
	START	The start button starts the machine in automatic mode (if the selector MAN/AUT is in automatic mode.
	STOP	The STOP button stops the machine when the machine is running in automatic mode.

BUTTON	FUNCTION	DESCRIPTION
	FAST STOP	Same function as STOP.
	FAKE SPEED	The fake speed is a reference speed for the dosing units different from the real speed of the mandrel. The fake speed is used for a re-start of the machine if the operator needs to overdose the new start-up of the production. The value of the fake speed is set on the main page of the HMI and is enabled with the FAKE SPEED button. The value of the fake speed set on the HMI must be higher than the value of the production speed. The fake speed mode is disables pressing the FAKE SPEED button once more or when the real production speed is equal or higher the value of the fake speed. Reducing the production speed will not enable the fake speed again.

BUTTON	FUNCTION	DESCRIPTION
	MACHINE AUTO-STOP-MAN	The selector is used to set the machine mode in automatic or manual mode.
	PRODUCTION SPEED DOWN-UP	The selector increases or decreases the production speed of the equipment.
	JOG DOWN-UP	The Jog is used for the manual mode of the machine to move each motor independently.

BUTTON	FUNCTION	DESCRIPTION
	ELEVATOR DOWN-UP	The selector moves the elevator up or down.

5.1.2. Buttons on the Elevator panel

Figure 19

BUTTON	FUNCTION	DESCRIPTION
	EMERGENCY STOP	An emergency and non-automatic release, stop button (red on a yellow background): By pressing this button the machine and the whole line stop immediately. The emergency button must be pulled in order to restore them. To be used only for emergencies.

BUTTON	FUNCTION	DESCRIPTION
	LINER RESIN FEED	If the button is pressed, the resin liner line switch from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).
	LINER CAT. FEED	If the button is pressed, the catalyst liner line switch from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).
	STR. RESIN FEED	If the button is pressed, the resin for the structure 1 line switch from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).

BUTTON	FUNCTION	DESCRIPTION
	STR.CAT. FEED	If the button is pressed, the catalyst for the structure 1 line switch from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).
	STR. 2 RESIN FEED	If the button is pressed, the resin for the structure 2 line switches from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).
	STR. 2 CAT. FEED	If the button is pressed, the catalyst for the structure 2 line switches from recirculation mode to feeding mode (the 3-way valve near to the static mixer switch to feeding or recirculation position).

BUTTON	FUNCTION	DESCRIPTION
	LINER RESIN PUMP ON	If the button is pressed, the pump for the resin for the liner is enabled or disabled.
	LINER CAT. PUMP ON	If the button is pressed, the pump for the catalyst for the liner is enabled or disabled.
	STR. RESIN PUMP ON	If the button is pressed, the pump for the resin for the structure 1 is enabled or disabled.

BUTTON	FUNCTION	DESCRIPTION
	STR. CAT. PUMP ON	If the button is pressed, the pump for the catalyst for the structure 1 is enabled or disabled.
	STR.2 RESIN PUMP ON	If the button is pressed, the pump for the resin for the structure 2 is enabled or disabled.
	STR.2 CAT. PUMP ON	If the button is pressed, the pump for the catalyst for the structure 2 is enabled or disabled.

5.1.3. Button on the Bridge panel

Figure 20

BUTTON	FUNCTION	DESCRIPTION
	EMERGENCY STOP	An emergency and non-automatic release, stop button (red on a yellow background): By pressing this button the machine and the whole line stop immediately. The emergency button must be pulled in order to restore them. To be used only for emergencies.

5.1.4. Button on the Dosing station panel

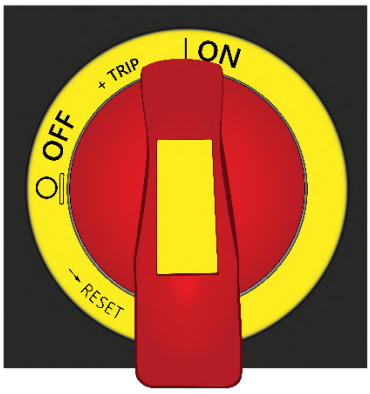
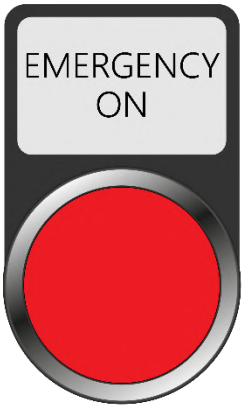
Figure 21

BUTTON	FUNCTION	DESCRIPTION
	EMERGENCY STOP	An emergency and non-automatic release, stop button (red on a yellow background): By pressing this button the machine and the whole line stop immediately. The emergency button must be pulled in order to restore them. To be used only for emergencies.

5.1.5. Buttons on the Daily mixer panel

Figure 22

BUTTON	FUNCTION	DESCRIPTION
	RUN	The button is disabled.
	MIXER START	The button is disabled.

BUTTON	FUNCTION	DESCRIPTION
	STOP	The button is disabled.
	SWITCH	The selector turns on the main power to the electric board.
	EMERGENCY ON	The light shows the emergency circuit is enabled.

BUTTON	FUNCTION	DESCRIPTION
	EMERGENCY STOP	An emergency and non-automatic release, stop button (red on a yellow background): By pressing this button the machine and the whole line stop immediately. The emergency button must be pulled in order to restore them. To be used only for emergencies.
	RESET	The button reset the alarms.

5.1.6. Buttons on the E-CFW Main panel

BUTTON	FUNCTION	DESCRIPTION
	SWITCH	This is the power switch of the main electric panel.
	DOORS EXCLUDED	The key excludes the safety for opening the panel doors with the electric panel with tension.
	DOORS EXCLUDED	If the light is on the safety to open the door with tension is excluded. The door can be open with tension in the panel.

BUTTON	FUNCTION	DESCRIPTION
	PHASE IN ERROR	If the light is on the phases are not correctly wired.

5.1.7. Buttons on the Online Cutting panel

Figure 23

BUTTON	FUNCTION	DESCRIPTION
	EMERGENCY STOP	An emergency and non-automatic release, stop button (red on a yellow background): By pressing this button the machine and the whole line stop immediately. The emergency button must be pulled in order to restore them. To be used only for emergencies.

BUTTON	FUNCTION	DESCRIPTION
	RUN CUTTING	The function of this button is to activate the cycle of grinding (if the grinding is enabled) and cutting.
	POSITION BACK-FWD	The function of this selector is to move the head of the cutting backward or toward the pipe during the set-up of the head position.
	SET ZERO	The SET ZERO button is used to record the chosen position of the cutting head.

BUTTON	FUNCTION	DESCRIPTION
	HEAD UP	The button activates the piston and move the cutting disk to the cutting position. It is used to position the head and do the set up or to verify if the actual position of the head is not too far from the pipe or crashing it.
	TABLE MANUAL	The function of this button is to enable or disable the automatic mode for the lifting tables and disjunction. If the tables and disjunction are in "manual mode" (automatic mode disable) the light will be continuously on. If the table and disjunction are in "automatic mode" the light will blink.
	TABLES BACK-FWD	The selector moves the tables backward and forward (disjunction movement).

BUTTON	FUNCTION	DESCRIPTION
	TABLES DOWN-UP	The function of this button is to move the table up or down.
	ACCELERATOR	The function of this button is to activate the accelerator (or accelerators if both are enabled).

5.1.8. Buttons on the Online Grinding and Table 0 panel

Figure 24

BUTTON	FUNCTION	DESCRIPTION
	EMERGENCY STOP	An emergency and non-automatic release, stop button (red on a yellow background): By pressing this button the machine and the whole line stop immediately. The emergency button must be pulled in order to restore them. To be used only for emergencies.

BUTTON	FUNCTION	DESCRIPTION
	RUN GRINDING	The function of this button is to activate the cycle of grinding (if the grinding is enabled) and cutting.
	HEAD BACK-FWD	The function of this selector is to move the head of the cutting backward or toward the pipe during the set-up of the head position.
	SET ZERO	The SET ZERO button is used to record the chosen position of the cutting head.

BUTTON	FUNCTION	DESCRIPTION
	UP	The button is used to move up the table 0.
	DOWN	The button is used to move down the table 0.
	SET	The button is used to save in the PLC the position of the table 0.

5.1.9. Buttons on the Disjunction and pipe weight panel

Figure 25

BUTTON	FUNCTION	DESCRIPTION
	EMERGENCY STOP	An emergency and non-automatic release, stop button (red on a yellow background): By pressing this button the machine and the whole line stop immediately. The emergency button must be pulled in order to restore them. To be used only for emergencies.

5.1.10. Signal luminous turret

IMAGE	FUNCTION	DESCRIPTION
	RED LIGHT	Signals the presence of serious alarms.
	YELLOW LIGHT	If ON signal that there is at least one motor item not enabled automatic mode status (not ready to start in automatic).
	GREEN LIGHT	If flashing signal start-up of load/unload cycle. If ON signal cycle active.
	ALARM TONE	Signals the presence of alarms, or startup plant.

6. OPERATING INSTRUCTIONS

The control of the E-CFW machine is carried out by the command console (pulpit).

On the command console (pulpit) are located the supervisor program for visual management (HMI), the buttons to manage the operations and the Industrial PC.

6.1. Powering on the machine

In order to power on the machine:

- Check that the power line to the E-CFW is electrically connected and the voltage is inside the limits required by TOPFIBRA;
- Check that the main electrical panel doors are closed or the door's security switch (item 2, picture 1) is excluded;
- Switch on the main board electric panel (Figure 26);

Figure 26

- To switch on the main board electric panel, rotate anticlockwise the main switch. If the main switch is not engaged, rotate it clockwise and then anticlockwise to power on the machine;
- Check also that the phase control (Figure 27) is not showing an alarm condition (red light). If the red light is on, the circuit will prevent to engage the emergency circuit;

Figure 27

- After powering up the main board, the industrial PC will be switched on, and after a short time the MAIN page will be displayed, through this page is possible to control all the main items of the machine and the main settings for the production.

6.2. Activation of the emergency circuit.

Once that the machine is powered up check that all emergency switches are released. For more information, please refer to page 116.

6.2.1. Emergency STOP button

Check that the mains phase control alarm is off.

Reset the safety system on the HMI pressing the CLEAR button:

Figure 28

Reset the alarms with the Reset 1 button:

Figure 29

Check the remaining alarms – please refer to the chapter 3.3.3 Alarms system, alarms reset and horn silence

6.3. Operator panel description

The HMI interface is a PC that runs the supervision project:

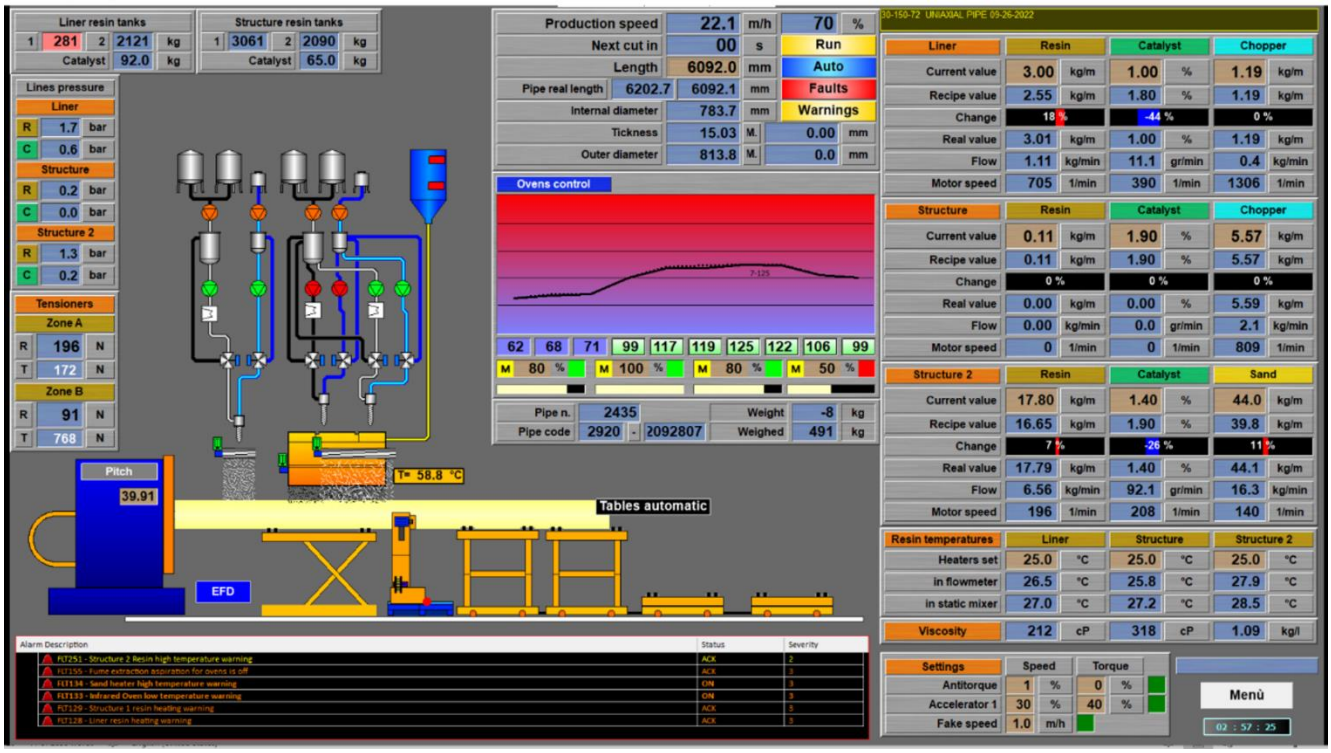


Figure 30

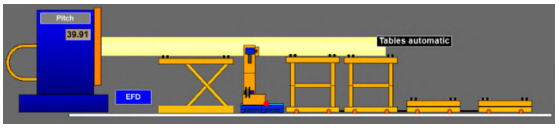
IMAGE	NAMING	DESCRIPTION
	WINDER	This symbol represents the winder and the pipe being produced.

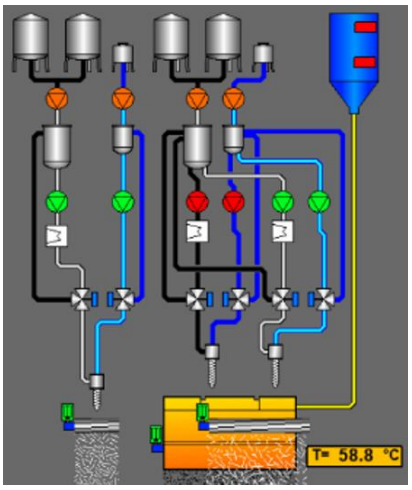
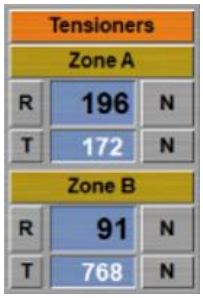
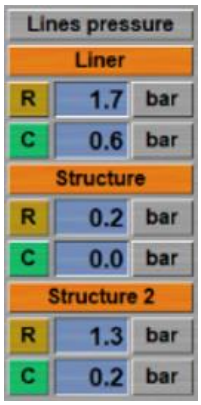
IMAGE	NAMING	DESCRIPTION
	DOSING SYSTEM	This symbol represents the dosing system of resin and catalyst.
	TENSIONERS	This area shows the hoop fiber tension. Zone A is referred to the upper zone and zone B is referred to the lower zone. R is the real value and T the theoretical value.
	LINES PRESSURE	This area shows the pressure of the catalyst and resin lines. R= resin C=catalyst
	LINER RESIN TANKS	This area shows the kg of resin and catalyst in the daily tanks for the liner.

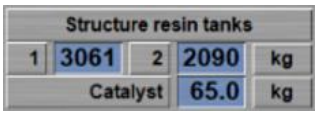
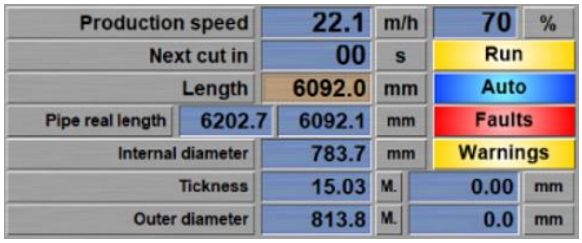
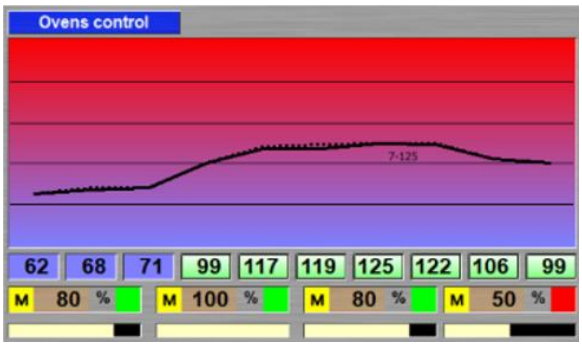
IMAGE	NAMING	DESCRIPTION
	STRUCTURE RESIN TANKS	This area shows the kg of resin and catalyst in the daily tanks for the structure.
	PRODUCTION SPEED	This area shows the information of the pipe produced and the time for the next cut.
	OVENS CONTROL	This area shows the information of the temperature on the pipe surface, the % of the power in each oven and the heating mode. M=Manual A=Automatic
	PIPE NUMBER	This area is for the pipe number and code.
	LINERS VALUES	This area shows the dosing values for the liner: Current value: is the required value by the operator Recipe value: is the value form the recipe Real Value: value measure by the PLC in kg/m Flow Value: value measured by the PLC in Kg/min

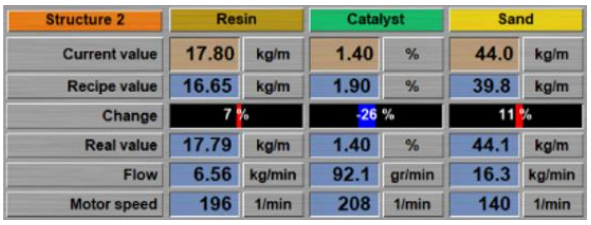
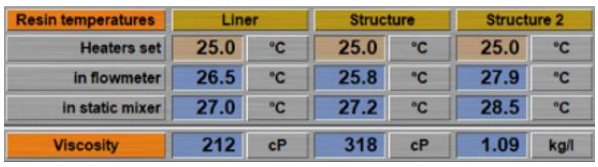
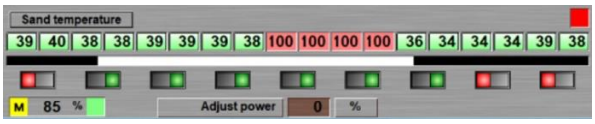
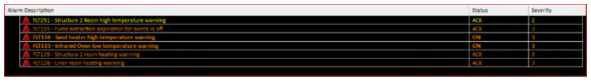
IMAGE	NAMING	DESCRIPTION
		Motor speed: motor rpm
	STRUCTURE 1 VALUES	This area shows the dosing values for the structure 1 including structure chopper: Current value: is the required value by the operator Recipe value: is the value form the recipe Real Value: value measure by the PLC in kg/m Flow Value: value measured by the PLC in Kg/min Motor speed: motor rpm
	STRUCTURE 2 VALUES	This area shows the dosing values for the structure 2 including sand: Current value: is the required value by the operator Recipe value: is the value form the recipe Real Value: value measure by the PLC in kg/m Flow Value: value measured by the PLC in Kg/min Motor speed: motor rpm
	RESIN TEMPERATURES	This area shows the resin temperature in the flowmeter and static mixer for the liner, structure 1 and structure 2.

IMAGE	NAMING	DESCRIPTION
	SAND TEMPERATURE	This area shows the sand temperature and power of the sand heating inside the sand dosing system.
	INDUCTION	This area shows the induction system power.
	GRINDING AND CUTTING VALUES	This area shows Cutting and Grinding values and the Sample cut values.
	SETTINGS	This area shows the values of the Antitorque, Accelerators and Fake Speed.
	ALARMS	This area shows the alarms of the machine.

Under the PC there is the keyboard and mouse to change pages and modify values:

Figure 31

6.3.1. Signal symbols supervisor program

IMAGE	NAMING	DESCRIPTION
	SAND TANK	The symbol represents the sand tank on the highest point of the winder.
	TANK	The symbol represents the resin daily mixers tanks.
	TANK	The symbol represents the catalyst daily mixers tanks.
	TANK	The symbol represents the resin dosing tank for the structure.
	TANK	The symbol represents the resin dosing tank for the liner.
	PUMP	The symbol represents the pump working.
	PUMP	The symbol represents the pump not enabled.
	PUMP	The symbol represents the pump is enabled but not working.
	HEATER EXCHANGER	The symbol represents the heater exchanger.

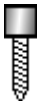
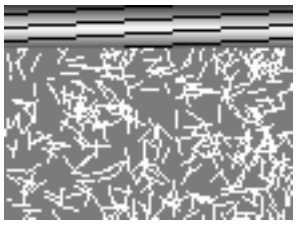
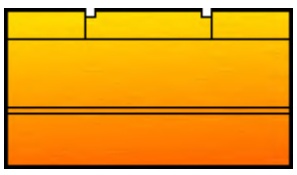
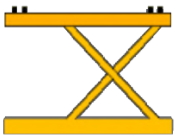
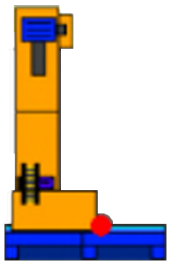
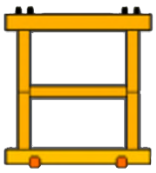
IMAGE	NAMING	DESCRIPTION
	VALV	The symbol represents the 3-way valve.
	VALV	The symbol represents the 3-way valve.
	MIXER	The symbol represents the static mixer for liner.
	MIXER	The symbol represents the static mixer for structure.
	CHOPPER MOTOR	The symbol represents the motor for the chopper not working.
	CHOPPER MOTOR	The symbol represents the motor for the chopper working.
	CHOPPER	The symbol represents the liner chopper working.
	CHOPPER	The symbol represents the structure chopper working.
	SAND DOSER	The symbol represents the sand dosing system.

IMAGE	NAMING	DESCRIPTION
	WINDER	The symbol represents the winder.
	TABLE 0	The symbol represents the table 0.
	ON-LINE CUTTING AND GRINDING	The symbol represents the online cutting and grinding.
	TABLE	The symbol represents the tables 1-2-3-4 in upper position.
	TABLE	The symbol represents the tables 1-2-3-4 in lower position.

6.3.2. Description of the pages

6.3.2.1. Main page – F2

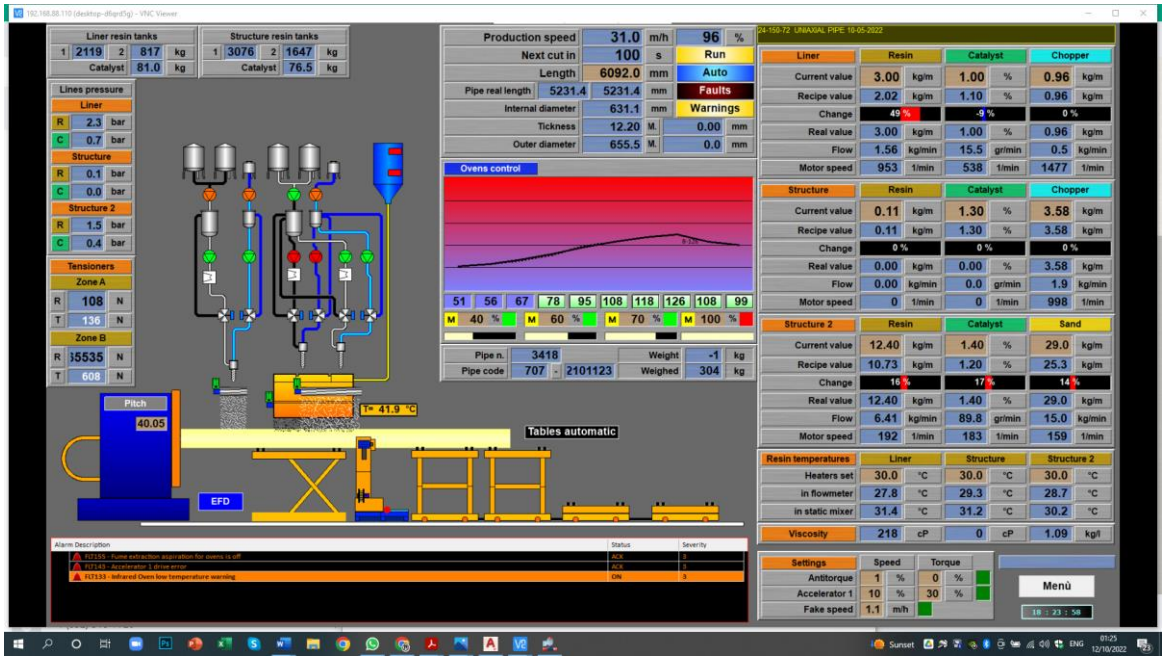


Figure 32

6.3.2.2. Recipe page – F3

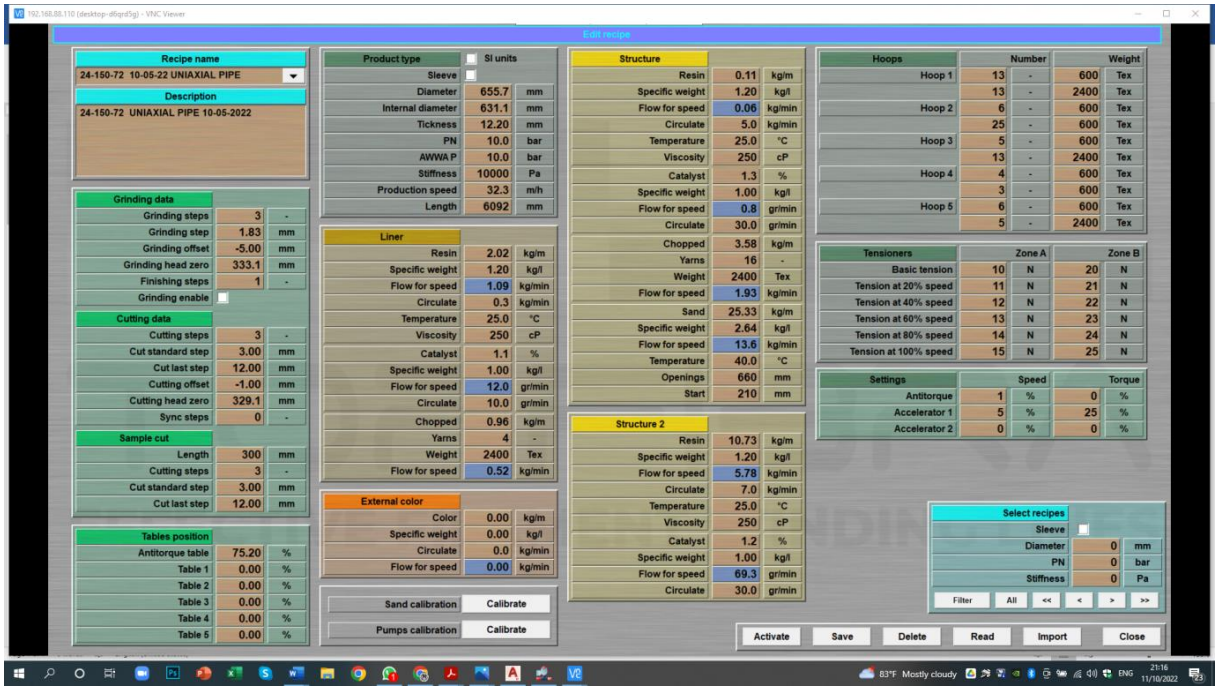


Figure 33

6.3.2.3. Position of Cam Plate and Load

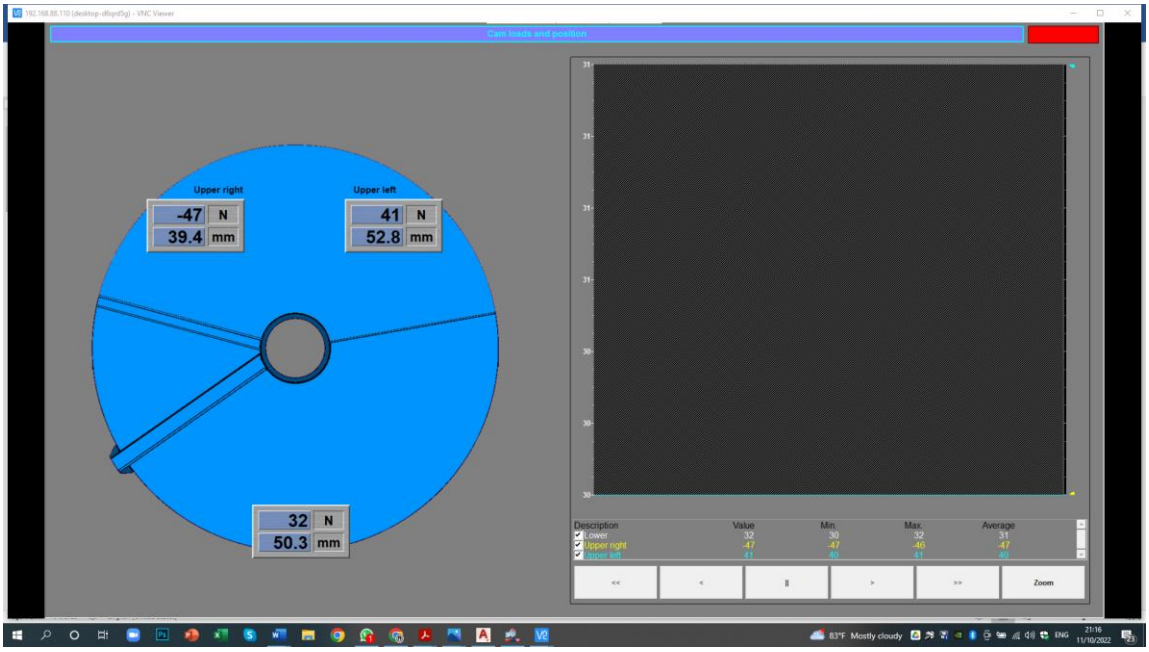


Figure 34

6.3.2.4. Thickness measurement page

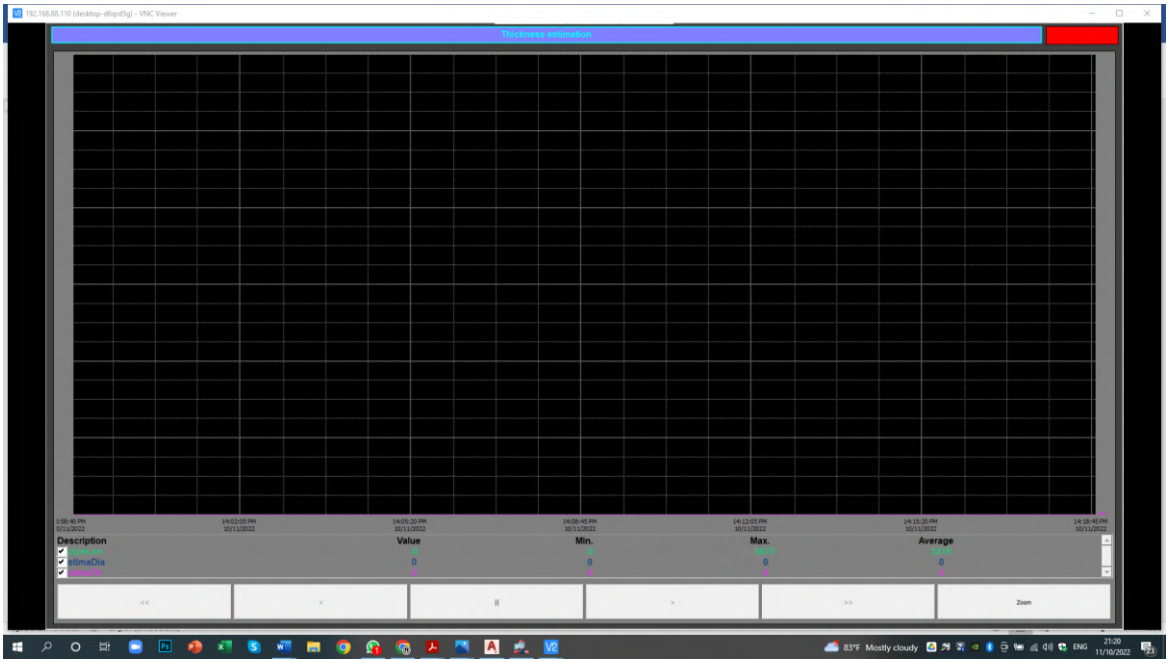


Figure 35

6.3.2.5. Alarm page

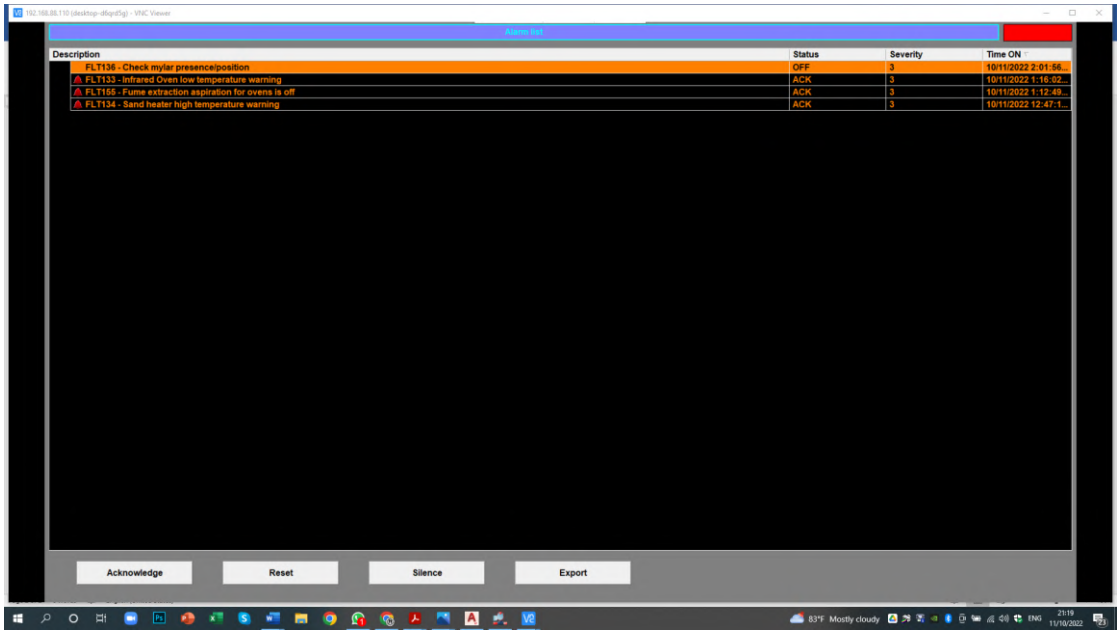


Figure 36

6.4. Manual mode and automatic mode

The E-CFW machine is prepared to work in two modes: MANUAL MODE and AUTOMATIC MODE.

The MANUAL MODE or the AUTOMATIC MODE is selected moving the selector in the desired position.

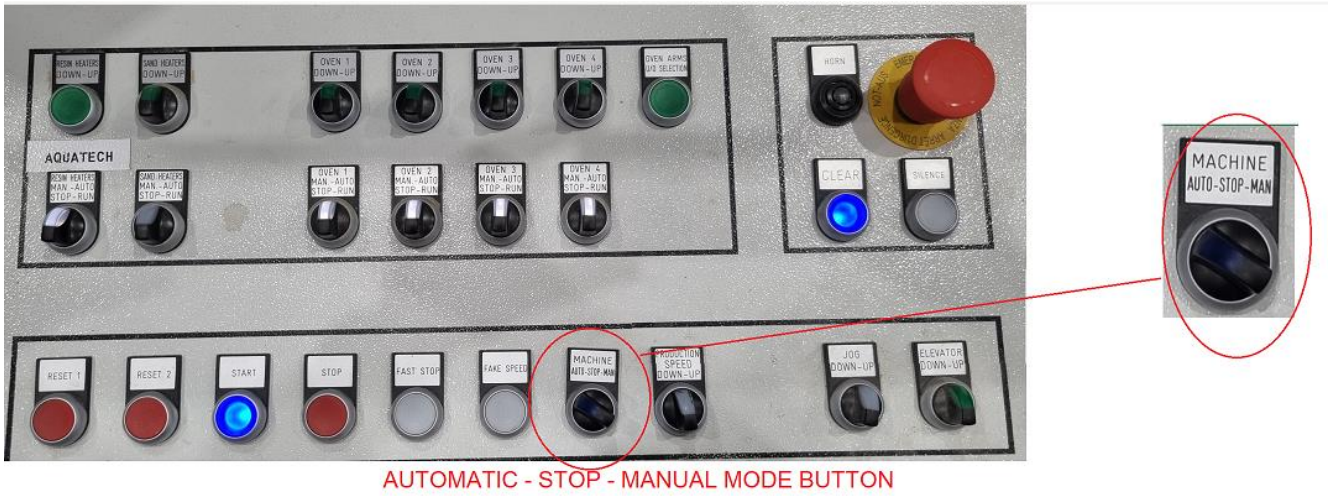


Figure 37

6.5. Manual mode

6.5.1. General description

The manual mode allows you to command every single device of the machine connected to system. The manual mode doesn't allow to produce the pipe and it's only intended for testing purposes, maintenance, setup of devices, assembling of mandrel and steel band mounting.

The devices can't be moved at the same time and every device must be selected as active device in manual mode in the main page.

In manual mode, the devices are switched on and off activating them using the Jog enable in the HMI and JOG (DOWN – UP).

Figure 38

6.5.2. Manual mode of the mandrel

To start the rotation of the mandrel in manual mode proceed as follows:

- Confirm that the machine is in manual mode;
- Press shift + F8 to open the sub window JOG;
- Enable the manual movement of the mandrel clicking on the switch located on the same row;
- Hold the jog selector to select the rotation direction and adjust the mandrel speed.

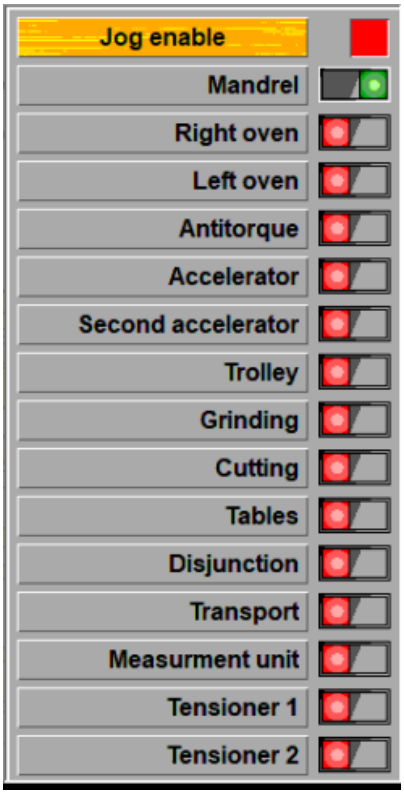


Figure 39

The rotation in the reverse direction may damage the mandrel assembly. Ensure that from the mechanical point of view, the rotation is possible.

The sub window JOG- is only used when installing in or taking out the steel band; takes care not to move the mandrel backwards when the steel band is already completely installed, and take care of pushers, since the backward movement will make pushers clash on the return cam, if an operator is not preventing it manually.

The Mandrel is provided of a mechanical brake that locks the mandrel when the motor is off, in any case, for security reasons, during the assembly of the mandrel keep always balanced mounting the beam on both sides.

6.5.3. Manual mode for the trolley

To move the trolley (for testing and maintenance purposes) proceed as follow:

- Confirm that the machine is in manual mode;
- Press shift + F8 to open the sub window JOG;
- Enable the manual movement of the trolley clicking on the switch located on the same row;
- Move the trolley using the JOG.

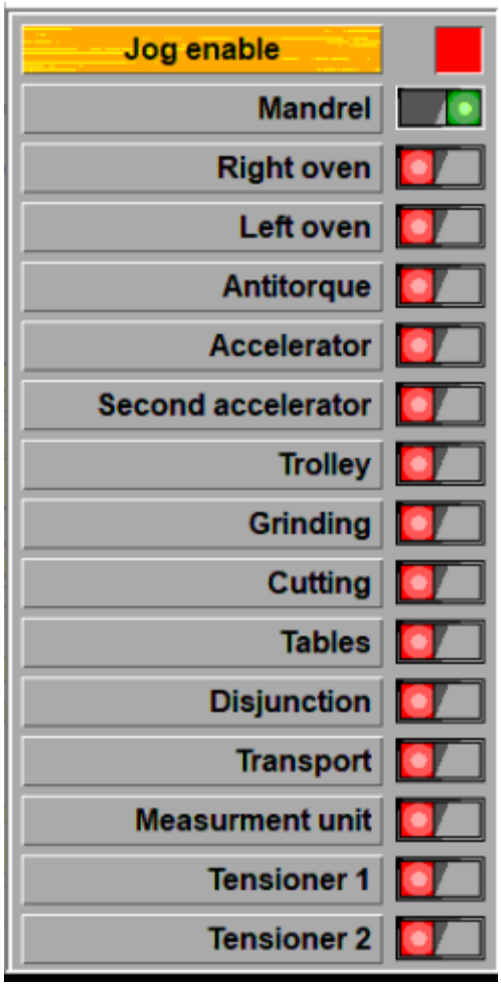


Figure 40

6.5.4. Manual mode for pumps, choppers, and sand distributors.

Also these devices can be moved in manual mode. To do this proceed as follow:

- Confirm that the machine is in manual mode;
- Press shift + F8 to open the sub window JOG;
- Enable the manual movement of the devices by clicking on the switch located on the same row;
- Move the devices using the JOG.

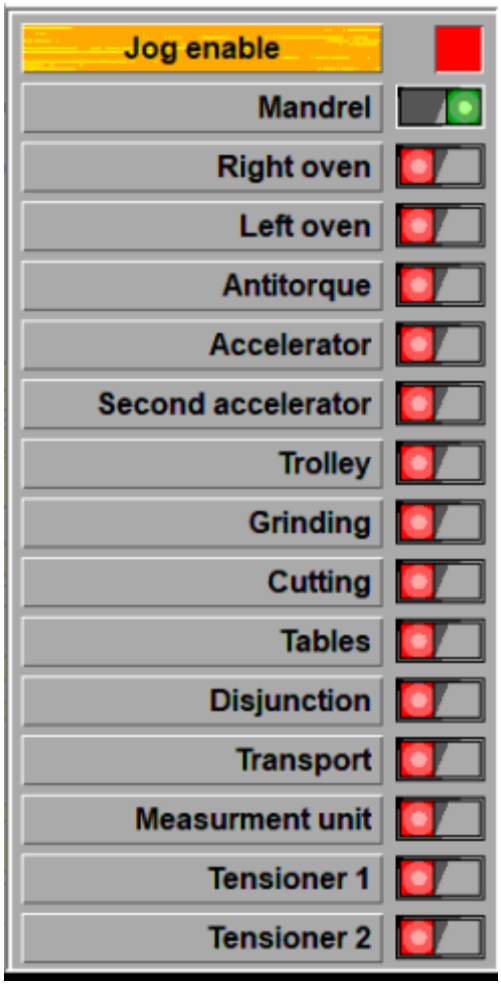


Figure 41

Although is possible for testing purposes, the rotation in the opposite direction must be carefully evaluated because can damage the device itself.

6.6. Setting up the recipe

The first step to produce the pipe is to setup the 'production recipe'.

Press F3 and go to the Recipe page (Figure 42).

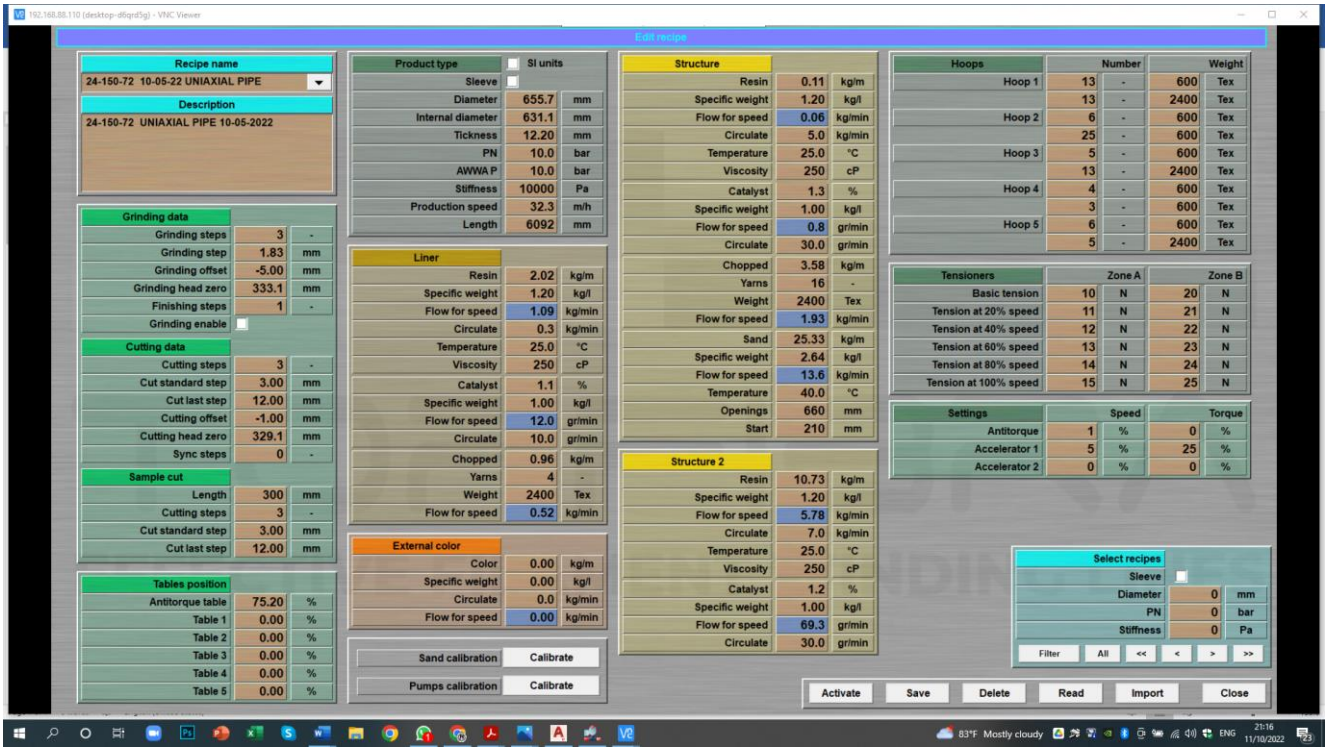


Figure 42

Fill up with the production recipe values and save the recipe with the correct name. Add a comment that will be displayed in the main page F2.

Press ACTIVATE to send the recipe into the control system. The machine will keep the original recipe or the modified recipe also if is turned off. In any case, the operator must check that the values of the parameters are correct.

6.7. Calibration of the sand

The operation can be performed only in manual mode and consists in adjusting the curve that relates the flow and speed of the distributor. The machine retains the calibration for every length of opened slots. In this case you can use a calibration done in the past (we suggest in any case to check with some the tests the goodness of calibration).

The procedure to calibrate the sand system is the following:

- Go to main page F2;
- Click on "Structure Sand" on the table up right;
- The sand window will open;
- Press manual dosing button (Figure 43);
- Enable Man (manual);
- Record the rpm used and the total quantity of sand sampled in the time reference and calculate it as flow per minute. Repeat the steps to have at least 5 couples of values (rpm vs flow). We suggest that you set the rpm in the whole spectrum of flow you will use in production.

Figure 43

In order to input the calibration point and save data, follow the procedure:

- Go to RECIPE PAGE;
- Click on Sand Calibration;
- Input the values;
- Click twice send data.

6.8. Automatic mode

The automatic mode is the only mode useful to produce the pipe.

In the automatic mode there are some interlocks that do not allow to perform certain operations.

For example, for the resin and catalyst dosing system (for more information regarding the resin and dosing catalyst system please refer to Resin and Catalyst Dosing Station Manual) the following interlocks are on:

- Without the rotation of the mandrel, it is only possible to activate the recirculation of resin and catalyst, for the Liner Str 1 and Str 2. It is not possible to activate the feed for any line;
- During the production, with the resin and catalyst line in "feeding mode" (in this mode the catalyst and resin goes to the mandrel), if there is any stoppage of the mandrel rotation, all the valves will switch from the feeding position to recirculation position close, with some delay for the catalyst (before the resin valve will switch and after some seconds the catalyst valve will switch). Even if the valves will switch in recirculation mode, the pump will continue running at the recirculation set point;
- With the mandrel rotating, to switch the resin calve from recirculation to feeding, it must be switch before the catalyst valve from recirculation to feeding for the Liner, Str 1 and Str2;
- The pumps can't be stopped if the valves are in feeding position;
- If the dosing system is not able to feed the quantities chosen in the recipe or by the operator, the machine is stopped (a deviation alarm will appear);
- If the operator would need to test the dosing system without rotating the mandrel, the FAKE SPEED would have to be activated from the console. Such FAKE SPEED simulates the production speed (without rotating the mandrel).

To set the automatic mode, just rotate the selection mode selector (Figure 44).

Figure 44

The automatic or manual mode of the tables is not related to the current mode of the machine and can be changed using the TABLES MAN-AUTO buttons (Figure 45).

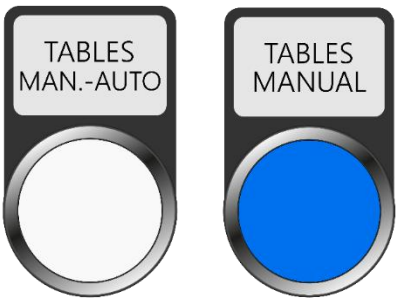


Figure 45

6.9. Start the winder in automatic mode

To start the winder in automatic mode, press the start button (Figure 46).

Figure 46

If the E-CFW machine do not start on automatic mode check if:

- The CLEAR button (Figure 47) for the emergency circuit is OFF;

  If it is off, check the emergency button and press CLEAR once again.

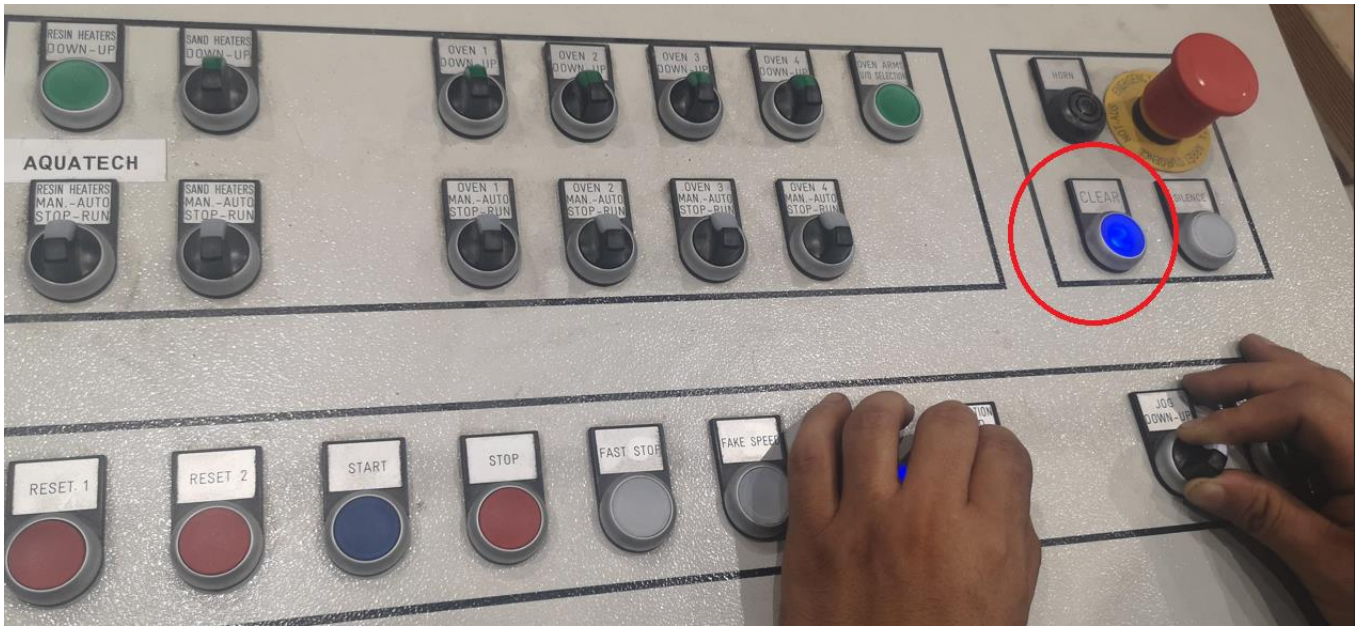


Figure 47

- The selector is in AUTOMATIC MODE from before;

Move the selector to MANUAL MODE and once again to AUTOMATIC MODE (Figure 48).

Figure 48

- The Reset button (Figure 49) was not pressed;

Press the reset button 2 or 3 times to clear the alarms.

Figure 49

- Steel band tensioner is at the end stroke;

Regulate the steel band tensioner position.

- Some devices are still running (ALL DEVICES MUST BE STOP);

Check if any motor is ON (for example resin recirculation, or catalyst recirculation) and turn it off (Figure 50).

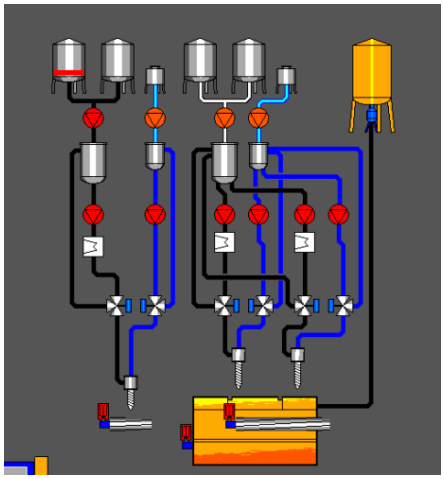


Figure 50

- The set point of the lifting tables is 0% and the tables are in a higher position (Figure 51).

Put all the tables 1-2-3-4- in 0 position.

NOTE: the table 0 do not work in automatic mode, so you can also leave it as it is and press SET in the table to acquire the position.

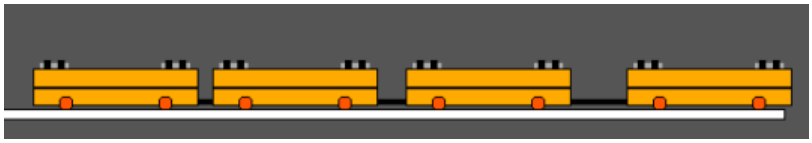


Figure 51

Check the situation in clicking on the table's icon.

- The tables have been moved forward (disjunction) and they are not in the back position;

Move the tables (disjunction) to the zero position (Figure 52).

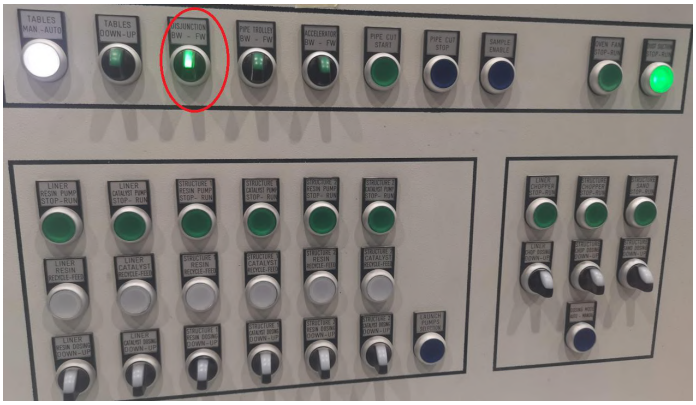


Figure 52

- The set point of the tables is lower than the actual position of the tables - probably moved in manual mode (Figure 53);

Lower the height position of the tables until the real value is lower than the set value.

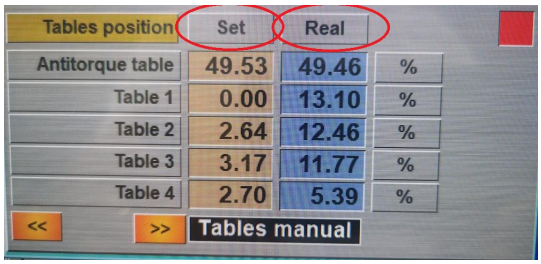


Figure 53

- Dust aspiration is OFF.
- Styrene aspiration is OFF.

6.10. Starting the production

To start the production the operator must also:

- After pressing the button START increase the mandrel speed with the selector (Figure);
- Start heating the steel band of the mandrel using the induction or the ovens;
- Set the distance of the ovens from the pipe surface;
- Set the position of the elevator;
- Check the values of the recycle flows for the resin and the catalyst (see RECIPE PAGE);

Figure 54

- Activate of the resin and catalyst pumps (the pumps will start in recirculation mode);
- Check that the chopper cut properly;
- Set the temperature or the power of ovens, resin heaters, induction system, sand heaters;
- After putting the mylar and veil switch the flows from the recycle circuit to the mandrel using the FFED buttons;
- Set the cutting and grinding unit (see detailed procedure);
- Set the working position of the tables pressing SET;
- Put the tables in automatic mode (check detailed procedure);
- Tables in automatic mode.

6.10.1. Set the cutting and grinding

To set the cutting and grinding head proceed as follows:

6.10.1.1. Grinding head

- Put the table in MANUAL MODE (see chapter *Tables in manual or automatic mode*);
- Go to the grinding control panel (Figure);
- Keep pressed for 5 seconds the button SET (Figure);

Figure 55

Figure 56

- When set is blinking, move the grinding head with the selector HEAD BACK-FWD (Figure 57);
- After reaching the desired position press SET (Figure 56).

Figure 57

6.10.1.2. Cutting head

- Put the table in MANUAL MODE;
- Go to the grinding control panel (Figure 58);
- Keep pressed for 5 seconds the button SET (Figure 59).

Figure 59

Figure 58

- When set is blinking, keep pressed the button HEAD UP (Figure 60);

Figure 60

- Keeping pressed HEAD UP button (Figure 60), move the Cutting head to the desired position using the selector POSITION BACK-FWD (Figure 61);
- Keeping pressed the HEAD UP button (Figure 60), press SET button (Figure 59).

Figure 61

- The SET VALUES are shown in the HMI pressing the symbol (Figure 62):

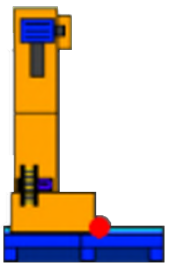


Figure 62

- The following pop up will appear:

Grinding and cutting	Grinding		Cutting		Sample cut	
Step	0.85	mm	3.50	mm	3.50	mm
Last step			15.00	mm	15.00	mm
Steps	6	-	4	-	4	-
Zero reference	414.5	mm	406.8	mm		
Offset	-5.00	mm	-1.00	mm		
Length			6090	mm	305	mm
0 turns - sync turns	1	-	0	-		
Position	414.5	mm	406.8	mm		
Step	7	-	4	-	4	-

Figure 63

6.10.1.3. Cutting and grinding steps

During the production, the pipe will be grinder and cut or only cut.

To set up the cutting steps proceed as follows:

- Check the thickness of the pipe;
- Detract 4 mm to the thickness of the pipe and the divide the value for a number that give as a result a number than 5mm.

For example:

Thickness of pipe: 20mm

20 – 4 = 16

16/4= 4, less than 5

This mean that the correct configuration will be:

4 step of 4 mm

1 step higher than 4 to be sure that we cut the pipe.

Total steps: 5

Step value: 4 mm

Final step: more than 4 (suggested 15mm)

Offset:

The offset value is the distance between the pipe and the blade with the HEAD UP pressed button (Figure Head up above). It is always a negative number. Increasing the negative offset, the blade will move deeper into the cut.

To set the grinding step proceed as follows:

Theoretically, if the pipe is in perfect OD, the grinding steps will have to cover 3mm or 5 mm depending on the chamfer.

The additional correction can be done using the offset position.

The 0 turns value is for the required rotations without keeping the grinding in the final grinding position to reach a better smooth surface of the pipe.

6.10.2. Tables in manual or automatic mode

The E-CFW lifting tables are prepared to work in 2 modes: MANUAL MODE and AUTOMATIC MODE

When the E-CFW machine is set to automatic mode (it means that the main program is active) the lifting tables are automatically set in MANUAL MODE. The MANUAL MODE or the AUTOMATIC MODE is selected pressing the button in the main console (Figure 64).

- Light continuously on: lifting tables in MANUAL MODE;
- Light blinking: lifting tables in AUTOMATIC MODE;

Figure 64

Or pressing the blue button in the panel near the cutting and grinding device (Figure 65):

- Light continuously on: lifting tables in MANUAL MODE;
- Light blinking: lifting tables in AUTOMATIC MODE.

Figure 65

If the lifting tables do not go to AUTOMATIC MODE:

- Some previous alarm was not cleared;

Press the reset button 2 or 3 times (Figure 66).

Figure 66

- The tables have been moved forward (disjunction) (in MANUAL MODE) and they are not in the back position;

Move the tables (disjunction) to the zero position until the light of the disjunction button is ON (Figure 67).

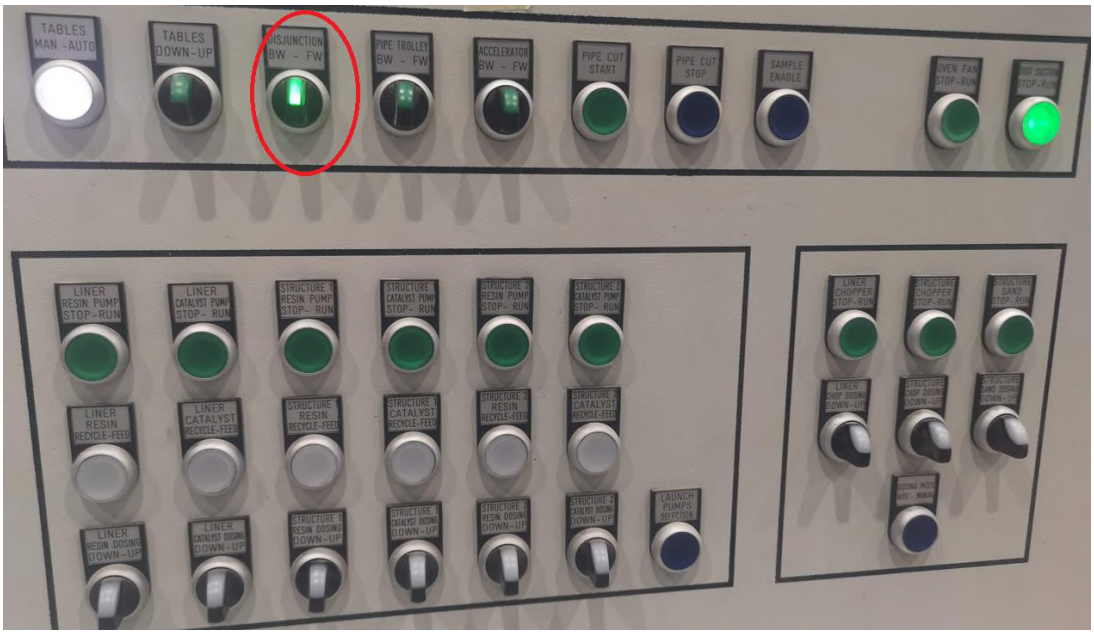


Figure 67

- The tables don't have a height SET point.

When a new recipe is loaded, the lifting tables are without a SET point and are marked with a red line in the HMI (Figure 68).

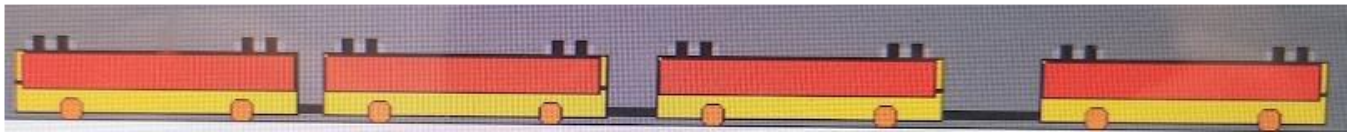


Figure 68

Set the tables in the correct position using the UP and DOWN buttons using the panel near each table (Figure 69).

Figure 69

Press the SET button and check that the SET but gets activated (continuous light).

Figure 70

- The Set point of the tables is lower than the Real position of the tables (probably moved in manual mode);

Lower the height position of the tables until the Real value is lower than the Set value (Figure 71).

Figure 71

- The cutting and grinding trolley is not in the »0« initial position.

Check the position in the HMI clicking on the trolley icon (Figure 72).

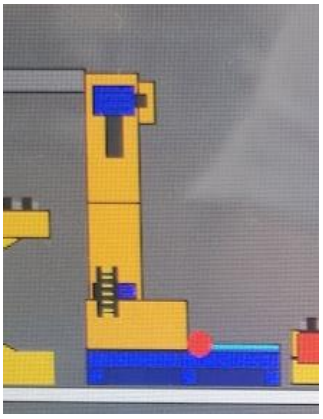


Figure 72

Check the position of the trolley (Figure 73):

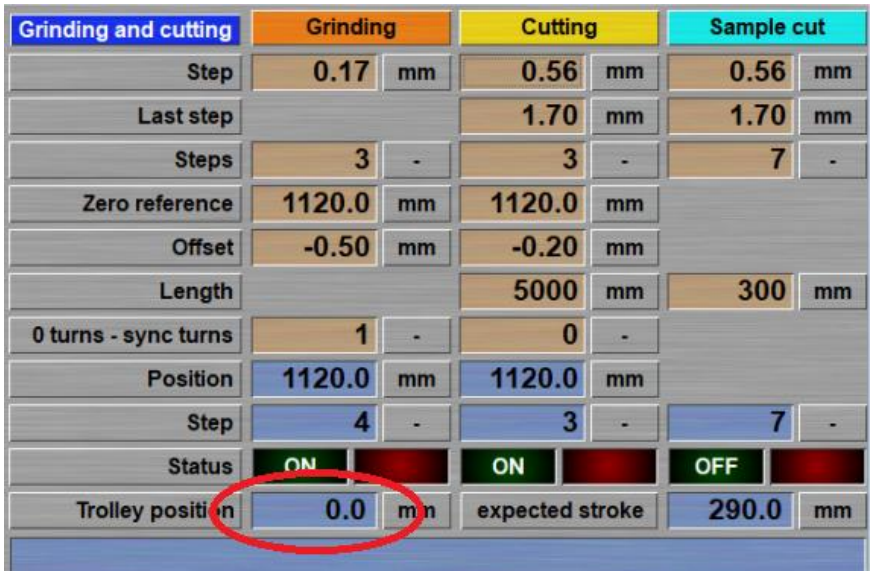


Figure 73

WARNING 1

Before passing in automatic mode, the operator must be sure that all machine parameters regarding the lifting table are correct:

- **Length of the pipe and lifting tables have been set;**
- **Depth of the cutting (see cutting procedure);**
- **Zero reference for the cutting head (see cutting procedure);**
- **Angle of the accelerator.**

7. ALARMS AND WARNINGS

Each alarm and warning can be:

Persistent: Once the cause has been removed, a reset must be performed via one of the reset buttons located on the front panel or console.

Not persistent: Once the cause has been removed, no reset is necessary.

7.1. Alarm list

The alarm list is divided I=in

Level 1: high priority

Level 2: medium priority

Level 3: low priority

Before starting: describe what happen in the machine if the alarm is ON and machine didn't start.

When running: describe what happen in the machine if the alarm is ON and machine is running.

NOTE: if nothing is written means that it is only and informative alarm.

Fault number	Level	Before starting	When running
0	**1**	**Interlocks machine start**	**Stops machine**
Reset emergency circuits			
Restablecer circuitos de emergencia			

Fault number	Level	Before starting	When running
1	**1**	**Interlocks machine start**	**Stops machine**
Firmware data error			
Error de datos de firmware			

Fault number	Level	Before starting	When running
2	**1**	**Interlocks machine start**	**Stops machine**
Firmware error			
Error de firmware			

Fault number	Level	Before starting	When running
3	**2**		
Firmware data not saved			
Datos de firmware no guardados			

Fault number	Level	Before starting	When running
4	**1**	**Interlocks machine start**	**Stops machine**
Mandrel rotation error			
Error de rotación del mandril			

Fault number	Level	Before starting	When running
5	**2**		
Diameter axis fault			
Diameter axis fault			

Fault number	Level	Before starting	When running
6	**2**		
Diameter detector error			
Diameter detector error			

Fault number	Level	Before starting	When running
7	**1**	**Interlocks machine start**	
Trolley positioning error			
Error de posicionamiento del carro			

Fault number	Level	Before starting	When running
8	**1**	**Interlocks machine start**	
Grinding axis fault			
Grinding axis fault			

Fault number	Level	Before starting	When running
9	**2**		
Grindig rotation motor fault			
Grindig rotation motor fault			

Fault number	Level	Before starting	When running
10	**1**	**Interlocks machine start**	
Cutting axis fault			
Cutting axis fault			

Fault number	Level	Before starting	When running
11	**2**		
Cutting blade motor rotation error			
Error de rotación del motor de la cuchilla de corte			

Fault number	Level	Before starting	When running
12	**1**	**Interlocks machine start**	
Cutting blade head piston error			
Error del pistón del cabezal de la cuchilla de corte			

Fault number	Level	Before starting	When running
13	**1**	**Interlocks machine start**	
Cutting & grinding trolley overstroke error			
Error de sobrecarrera del carro de corte y rectificado			

Fault number	Level	Before starting	When running
14	**1**	**Interlocks machine start**	
Cutting & grinding trolley sequence error			
Error de secuencia del carro de corte y rectificado			

Fault number	Level	Before starting	When running
15	**1**	**Interlocks machine start**	
Tool move data error			
Tool move data error			

Fault number	Level	Before starting	When running
16	**1**	**Interlocks machine start**	**Stops machine**
Mandrel encoder axis error			
Mandrel encoder axis error			

Fault number	Level	Before starting	When running
17	**2**		
Measure device axis error			
Measure device axis error			

Fault number	Level	Before starting	When running
18	**2**		
Encoder 1 measure device fault			
Encoder 1 measure device fault			

Fault number	Level	Before starting	When running
19	**1**	**Interlocks machine start**	
Cutting & grinding trolley axis error			
Error del eje del carro de corte y rectificado			

Fault number	Level	Before starting	When running
20	**1**	**Interlocks machine start**	
Grinding head axis error			
Grinding head axis error			

Fault number	Level	Before starting	When running
21	**1**	**Interlocks machine start**	
Cutting head axis error			
Cutting head axis error			

Fault number	Level	Before starting	When running
22	**1**	**Interlocks machine start**	
Disjunction axis error			
Disjunction axis error			

Fault number	Level	Before starting	When running
23	**2**		
Encoder 2 measure device fault			
Encoder 2 measure device fault			

Fault number	Level	Before starting	When running
24	**2**		
Encoder 3 measure device fault			
Encoder 3 measure device fault			

Fault number	Level	Before starting	When running
25	**1**	**Interlocks machine start**	
Grinding head error			
Grinding head error			

Fault number	Level	Before starting	When running
26	**1**	**Interlocks machine start**	
Cutting head error			
Cutting head error			

Fault number	Level	Before starting	When running
27	**1**	**Interlocks machine start**	
Heavy pipe support Table 0 positioning error			
Soporte de tubería pesada Tabla 0 error de posicionamiento			

Fault number	Level	Before starting	When running
28	**1**	**Interlocks machine start**	
Lifting Table 1 positioning error			
Error de posicionamiento de la mesa elevadora 1			

Fault number	Level	Before starting	When running
29	**1**	**Interlocks machine start**	
Lifting Table 2 positioning error			
Error de posicionamiento de la mesa elevadora 2			

Fault number	Level	Before starting	When running
30	**1**	**Interlocks machine start**	
Lifting Table 3 positioning error			
Error de posicionamiento de la mesa elevadora 3			

Fault number	Level	Before starting	When running
31	**1**	**Interlocks machine start**	
Lifting Table 4 positioning error			
Error de posicionamiento de la mesa elevadora 4			

Fault number	Level	Before starting	When running
32	**1**	**Interlocks machine start**	
Table 5 up/down fault			
Table 5 up/down fault			

Fault number	Level	Before starting	When running
33	**1**	**Interlocks machine start**	
Table 0 disjunction fault			
Table 0 disjunction fault			

Fault number	Level	Before starting	When running
34	**1**	**Interlocks machine start**	
Lifting Table 1 disjunction error			
Error de disyunción de la mesa elevadora 1			

Fault number	Level	Before starting	When running
35	**1**	**Interlocks machine start**	
Lifting Table 2 disjunction error			
Error de disyunción de la mesa elevadora 2			

Fault number	Level	Before starting	When running
36	**1**	**Interlocks machine start**	
Lifting Table 3 disjunction error			
Error de disyunción de la mesa elevadora 3			

Fault number	Level	Before starting	When running
37	**1**	**Interlocks machine start**	
Lifting Table 4 disjunction error			
Error de disyunción de la mesa elevadora 4			

Fault number	Level	Before starting	When running
38	**1**	**Interlocks machine start**	
Table 5 disjunction fault			
Table 5 disjunction fault			

Fault number	Level	Before starting	When running
39	**1**	**Interlocks machine start**	
Antitorque table pump fault			
Antitorque table pump fault			

Fault number	Level	Before starting	When running
40	**1**	**Interlocks machine start**	
Table 1 pump fault			
Table 1 pump fault			

Fault number	Level	Before starting	When running
41	**1**	**Interlocks machine start**	
Table 2 pump fault			
Table 2 pump fault			

Fault number	Level	Before starting	When running
42	**1**	**Interlocks machine start**	
Table 3 pump fault			
Table 3 pump fault			

Fault number	Level	Before starting	When running
43	**1**	**Interlocks machine start**	
Table 4 pump fault			
Table 4 pump fault			

Fault number	Level	Before starting	When running
44	**1**	**Interlocks machine start**	
Table 5 pump fault			
Table 5 pump fault			

Fault number	Level	Before starting	When running
45	**1**	**Interlocks machine start**	
Disjunction unit fault			
Disjunction unit fault			

Fault number	Level	Before starting	When running
46	**1**	**Interlocks machine start**	
Disjunction unit filter fault			
Disjunction unit filter fault			

Fault number	Level	Before starting	When running
47	**1**	**Interlocks machine start**	
Disjunction unit temperature fault			
Disjunction unit temperature fault			

Fault number	Level	Before starting	When running
48	**1**	**Interlocks machine start**	
Check Smartwire error - request Topfibra investigation			
Compruebe el error de Smartwire: solicite una investigación de Topfibra			

Fault number	Level	Before starting	When running
49	**1**	**Interlocks machine start**	**Stops machine**
Complete machine Fast Stop button has been pressed			
Se ha presionado el botón de parada rápida de máquina completa			

Fault number	Level	Before starting	When running
50	**1**	**Interlocks machine start**	**Stops machine**
Machine stop			
Machine stop			

Fault number	Level	Before starting	When running
51	**1**	**Interlocks machine start**	
Fan A13100-M2 fault			
Fan A13100-M2 fault			

Fault number	Level	Before starting	When running
52	**1**	**Interlocks machine start**	**Stops machine**
Brake A13300 flt			
Brake A13300 flt			

Fault number	Level	Before starting	When running
53	**1**	**Interlocks machine start**	**Stops machine**
Reload recipe			
Reload recipe			

Fault number	Level	Before starting	When running
54	**1**	**Interlocks machine start**	
Calibrate sand S1			
Calibrate sand S1			

Fault number	Level	Before starting	When running
55	**1**	**Interlocks machine start**	
Liner resin heating fault			
Liner resin heating fault			

Fault number	Level	Before starting	When running
56	**1**	**Interlocks machine start**	
Structure 1 resin heating fault			
Structure 1 resin heating fault			

Fault number	Level	Before starting	When running
57	**1**	**Interlocks machine start**	
Structure 2 resin heating fault			
Structure 2 resin heating fault			

Fault number	Level	Before starting	When running
58	**1**	**Interlocks machine start**	
Premix resin heating fault			
Premix resin heating fault			

Fault number	Level	Before starting	When running
59	**2**		
Chiller fault			
Chiller fault			

Fault number	Level	Before starting	When running
60	**1**	**Interlocks machine start**	**Stops machine**
Mandrel drive overload			
Mandrel drive overload			

Fault number	Level	Before starting	When running
61	**1**	**Interlocks machine start**	**Stops machine**
Steel band error			
Error de banda de acero			

Fault number	Level	Before starting	When running
62	**1**	**Interlocks machine start**	**Stops machine**
Steel band tensioner set limit exceeded			
Se excedió el límite establecido del tensor de la banda de acero			

Fault number	Level	Before starting	When running
63	**2**		
Sand heaters overload			
Sand heaters overload			

Fault number	Level	Before starting	When running
64	**2**		
Oven heaters overload			
Oven heaters overload			

Fault number	Level	Before starting	When running
65	**1**	**Interlocks machine start**	**Stops machine**
Trolley drive fault			
Trolley drive fault			

Fault number	Level	Before starting	When running
66	**1**	**Interlocks machine start**	**Stops machine**
Grinding drive fault			
Grinding drive fault			

Fault number	Level	Before starting	When running
67	**1**	**Interlocks machine start**	**Stops machine**
Cutting drive fault			
Cutting drive fault			

Fault number	Level	Before starting	When running
68	**1**	**Interlocks machine start**	**Stops machine**
DC Line L11+ error in main electrical board			
DC Line L11+ error en el tablero eléctrico principal			

Fault number	Level	Before starting	When running
69	**1**	**Interlocks machine start**	**Stops machine**
DC Line L12+ error in main electrical board			
DC Line L12+ error en el tablero eléctrico principal			

Fault number	Level	Before starting	When running
70	**1**	**Interlocks machine start**	**Stops machine**
FLT070 - DC Line L13+ error in main electrical board			
FLT070 - Línea CC L13+ error en el tablero eléctrico principal			

Fault number	Level	Before starting	When running
71	**1**	**Interlocks machine start**	**Stops machine**
FLT071 - DC Line L14+ error in main electrical board			
FLT071 - DC Line L14+ error en el tablero eléctrico principal			

Fault number	Level	Before starting	When running
72	**1**	**Interlocks machine start**	**Stops machine**
FLT072 - DC Line L15+ error in main electrical board			
FLT072 - Error de línea de CC L15+ en el tablero eléctrico principal			

Fault number	Level	Before starting	When running
73	**1**	**Interlocks machine start**	
Main Board power supply sequence/voltage error			
Secuencia de alimentación de la placa principal/error de tensión			

Fault number	Level	Before starting	When running
74	**2**		
Line high voltage			
Line high voltage			

Fault number	Level	Before starting	When running
75	**2**		
Line low voltage			
Line low voltage			

Fault number	Level	Before starting	When running
76	**3**		
Trolley may overtravel			
Trolley may overtravel			

Fault number	Level	Before starting	When running
77	**3**		
Local commands for tables			
Local commands for tables			

Fault number	Level	Before starting	When running
78	**3**		
Activate manual mode			
Activar modo manual			

Fault number	Level	Before starting	When running
79	**3**		
Press reset 1			
Presione restablecer 1			

Fault number	Level	Before starting	When running
80	**3**		
Liner Resin deviation from set flow rate			
Desviación de la resina del liner del caudal establecido			

Fault number	Level	Before starting	When running
81	**3**		
Liner Catalyst flow deviation			
Liner Catalyst flow deviation			

Fault number	Level	Before starting	When running
82	**3**		
Liner Chopper flow deviation			
Liner Chopper flow deviation			

Fault number	Level	Before starting	When running
83	**3**		
Liner Sand flow deviation			
Liner Sand flow deviation			

Fault number	Level	Before starting	When running
84	**3**		
Structure Resin deviation from set flow rate			
Estructura Desviación de la resina del caudal establecido			

Fault number	Level	Before starting	When running
85	**3**		
Structure Catalyst flow deviation			
Structure Catalyst flow deviation			

Fault number	Level	Before starting	When running
86	**3**		
Structure Chopper flow deviation			
Structure Chopper flow deviation			

Fault number	Level	Before starting	When running
87	**3**		
Structure Sand flow deviation			
Structure Sand flow deviation			

Fault number	Level	Before starting	When running
88	**3**		
Structure 2 Resin flow deviation			
Structure 2 Resin flow deviation			

Fault number	Level	Before starting	When running
89	**3**		
Structure Catalyst flow deviation			
Structure Catalyst flow deviation			

Fault number	Level	Before starting	When running
90	**3**		
Structure 2 Chopper Unit 10 flow deviation			
Structure 2 Chopper Unit 10 flow deviation			

Fault number	Level	Before starting	When running
91	**3**		
Structure 2 Sand Dosing flow deviation			
Structure 2 Sand Dosing flow deviation			

Fault number	Level	Before starting	When running
92	**3**		
Premix Resin Unit 12 flow deviation			
Premix Resin Unit 12 flow deviation			

Fault number	Level	Before starting	When running
93	**3**		
Premix Catalyst flow deviation			
Premix Catalyst flow deviation			

Fault number	Level	Before starting	When running
94	**3**		
Premix Sand Dosing flow deviation			
Premix Sand Dosing flow deviation			

Fault number	Level	Before starting	When running
95	**3**		
Color flow deviation			
Color flow deviation			

Fault number	Level	Before starting	When running
96	**3**		
Liner Resin in low flow limit			
Liner Resin in low flow limit			

Fault number	Level	Before starting	When running
97	**3**		
Liner Catalyst in low flow limit			
Liner Catalyst in low flow limit			

Fault number	Level	Before starting	When running
98	**3**		
Liner Chopper in low flow limit			
Liner Chopper in low flow limit			

Fault number	Level	Before starting	When running
99	**3**		
Liner Sand in low flow limit			
Liner Sand in low flow limit			

Fault number	Level	Before starting	When running
100	**3**		
Structure Resin in low flow limit			
Structure Resin in low flow limit			

Fault number	Level	Before starting	When running
101	**3**		
Structure Catalyst in low flow limit			
Structure Catalyst in low flow limit			

Fault number	Level	Before starting	When running
102	**3**		
Structure Chopper in low flow limit			
Structure Chopper in low flow limit			

Fault number	Level	Before starting	When running
103	**3**		
Structure Sand in low flow limit			
Structure Sand in low flow limit			

Fault number	Level	Before starting	When running
104	**3**		
Structure 2 Resin in low flow limit			
Structure 2 Resin in low flow limit			

Fault number	Level	Before starting	When running
105	**3**		
Structure Catalyst in low flow limit			
Structure Catalyst in low flow limit			

Fault number	Level	Before starting	When running
106	**3**		
Structure 2 Chopper Unit 10 in low flow limit			
Structure 2 Chopper Unit 10 in low flow limit			

Fault number	Level	Before starting	When running
107	**3**		
Structure 2 Sand Dosing in low flow limit			
Structure 2 Sand Dosing in low flow limit			

Fault number	Level	Before starting	When running
108	**3**		
Premix Resin Unit 12 in low flow limit			
Premix Resin Unit 12 in low flow limit			

Fault number	Level	Before starting	When running
109	**3**		
Premix Catalyst in low flow limit			
Premix Catalyst in low flow limit			

Fault number	Level	Before starting	When running
110	**3**		
Premix Sand Dosing in low flow limit			
Premix Sand Dosing in low flow limit			

Fault number	Level	Before starting	When running
111	**3**		
Color in low flow limit			
Color in low flow limit			

Fault number	Level	Before starting	When running
112	**3**		
Liner Resin in high flow limit			
Liner Resin in high flow limit			

Fault number	Level	Before starting	When running
113	**3**		
Liner Catalyst in high flow limit			
Liner Catalyst in high flow limit			

Fault number	Level	Before starting	When running
114	**3**		
Liner Chopper in high flow limit			
Liner Chopper in high flow limit			

Fault number	Level	Before starting	When running
115	**3**		
Liner Sand in high flow limit			
Liner Sand in high flow limit			

Fault number	Level	Before starting	When running
116	**3**		
Structure Resin in high flow limit			
Structure Resin in high flow limit			

Fault number	Level	Before starting	When running
117	**3**		
Structure Catalyst in high flow limit			
Structure Catalyst in high flow limit			

Fault number	Level	Before starting	When running
118	**3**		
Structure Chopper in high flow limit			
Structure Chopper in high flow limit			

Fault number	Level	Before starting	When running
119	**3**		
Structure Sand in high flow limit			
Structure Sand in high flow limit			

Fault number	Level	Before starting	When running
120	**3**		
Structure 2 Resin in high flow limit			
Structure 2 Resin in high flow limit			

Fault number	Level	Before starting	When running
121	**3**		
Structure Catalyst in high flow limit			
Structure Catalyst in high flow limit			

Fault number	Level	Before starting	When running
122	**3**		
Structure 2 Chopper Unit 10 in high flow limit			
Structure 2 Chopper Unit 10 in high flow limit			

Fault number	Level	Before starting	When running
123	**3**		
Structure 2 Sand Dosing in high flow limit			
Structure 2 Sand Dosing in high flow limit			

Fault number	Level	Before starting	When running
124	**3**		
Premix Resin Unit 12 in high flow limit			
Premix Resin Unit 12 in high flow limit			

Fault number	Level	Before starting	When running
125	**3**		
Premix Catalyst in high flow limit			
Premix Catalyst in high flow limit			

Fault number	Level	Before starting	When running
126	**3**		
Premix Sand Dosing in high flow limit			
Premix Sand Dosing in high flow limit			

Fault number	Level	Before starting	When running
127	**3**		
Color in high flow limit			
Color in high flow limit			

Fault number	Level	Before starting	When running
128	**3**		
Liner resin heating warning			
Liner resin heating warning			

Fault number	Level	Before starting	When running
129	**3**		
Structure 1 resin heating warning			
Structure 1 resin heating warning			

Fault number	Level	Before starting	When running
130	**3**		
Structure 2 resin heating warning			
Structure 2 resin heating warning			

Fault number	Level	Before starting	When running
131	**3**		
Premix resin heating warning			
Premix resin heating warning			

Fault number	Level	Before starting	When running
132	**3**		
Infrared Oven high temperature warning			
Advertencia de alta temperatura del horno infrarrojo			

Fault number	Level	Before starting	When running
133	**3**		
Infrared Oven low temperature warning			
Advertencia de baja temperatura del horno infrarrojo			

Fault number	Level	Before starting	When running
134	**3**		
Sand heater high temperature warning			
Advertencia de alta temperatura del calentador de arena			

Fault number	Level	Before starting	When running
135	**3**		
Sand heater low temperature			
Sand heater low temperature			

Fault number	Level	Before starting	When running
136	**3**		
Check mylar presence/position			
Compruebe la presencia/posición de mylar			

Fault number	Level	Before starting	When running
137	**3**		
Check steel band tension			
Comprobar la tensión de la banda de acero			

Fault number	Level	Before starting	When running
138	**3**		
Liner chopper vibrator fault			
Liner chopper vibrator fault			

Fault number	Level	Before starting	When running
139	**3**		
Structure 1 chopper vibrator fault			
Structure 1 chopper vibrator fault			

Fault number	Level	Before starting	When running
140	**3**		
Antitorque fan fault			
Antitorque fan fault			

Fault number	Level	Before starting	When running
141	**3**		
Accelerator fan fault			
Accelerator fan fault			

Fault number	Level	Before starting	When running
142	**3**		
Heavy pipe support Table 0 Antitorque drive error			
Soporte de tubería pesada Tabla 0 Error de accionamiento antitorque			

Fault number	Level	Before starting	When running
143	**3**		
Accelerator 1 drive error			
Error de la unidad del acelerador 1			

Fault number	Level	Before starting	When running
144	**3**		
PLC UPS battery fault			
PLC UPS battery fault			

Fault number	Level	Before starting	When running
145	**3**		
PLC UPS error			
Error del SAI/UPS del PLC			

Fault number	Level	Before starting	When running
146	**1**	**Interlocks machine start**	**Stops machine**
Left hand panel Mandrel emergency button has been pressed			
Se ha presionado el botón de emergencia del mandril del panel izquierdo			

Fault number	Level	Before starting	When running
147	**1**	**Interlocks machine start**	**Stops machine**
Emergency button mandrel right			
Emergency button mandrel right			

Fault number	Level	Before starting	When running
148	**1**	**Interlocks machine start**	**Stops machine**
Emergency button on consolle has been pressed			
Se ha presionado el botón de emergencia en la consola			

Fault number	Level	Before starting	When running
149	**1**	**Interlocks machine start**	**Stops machine**
Emergency button on main electrcial panel has been pressed			
Se ha presionado el botón de emergencia en el panel eléctrico principal			

Fault number	Level	Before starting	When running
150	**2**		
Sand in tank 1 low level warning			
Advertencia de nivel bajo de arena en el tanque 1			

Fault number	Level	Before starting	When running
151	**2**		
Sand low level in tank 2			
Sand low level in tank 2			

Fault number	Level	Before starting	When running
152	**3**		
Left oven arm fault			
Left oven arm fault			

Fault number	Level	Before starting	When running
153	**3**		
Right oven arm fault			
Right oven arm fault			

Fault number	Level	Before starting	When running
154	**3**		
Elevator motor fault			
Elevator motor fault			

Fault number	Level	Before starting	When running
155	**3**		
Fume extraction aspiration for ovens is off			
La aspiración de extracción de humos para hornos está apagada			

Fault number	Level	Before starting	When running
156	**3**		
Oven fan fault			
Oven fan fault			

Fault number	Level	Before starting	When running
157	**1**	**Interlocks machine start**	**Stops machine**
Emergency button of dosing unit has been pressed			
Se ha presionado el botón de emergencia de la unidad de dosificación			

Fault number	Level	Before starting	When running
158	**2**		
Resin liner dosing tank valve to waste			
Resin liner dosing tank valve to waste			

Fault number	Level	Before starting	When running
159	**2**		
Catalyst liner dosing tank valve to waste			
Catalyst liner dosing tank valve to waste			

Fault number	Level	Before starting	When running
160	**2**		
Resin structure dosing tank valve to waste			
Resin structure dosing tank valve to waste			

Fault number	Level	Before starting	When running
161	**2**		
Catalyst structure dosing tank valve to waste			
Catalyst structure dosing tank valve to waste			

Fault number	Level	Before starting	When running
162	**2**		
Resin structure dosing tank valve to waste			
Resin structure dosing tank valve to waste			

Fault number	Level	Before starting	When running
163	**2**		
Catalyst structure dosing tank valve to waste			
Catalyst structure dosing tank valve to waste			

Fault number	Level	Before starting	When running
164	**2**		
Sand tank generic fault			
Sand tank generic fault			

Fault number	Level	Before starting	When running
165	**1**	**Interlocks machine start**	**Stops machine**
Emergency button bridge panel has been pressed			
Se ha presionado el panel del puente del botón de emergencia			

Fault number	Level	Before starting	When running
166	**2**		
Bridge gate power supply error			
Error de fuente de alimentación de la puerta del puente			

Fault number	Level	Before starting	When running
167	**2**		
Liner resin dosing pump fan fault			
Liner resin dosing pump fan fault			

Fault number	Level	Before starting	When running
168	**2**		
Liner catalyst dosing pump fan error			
Error del ventilador de la bomba dosificadora del catalizador de revestimiento			

Fault number	Level	Before starting	When running
169	**2**		
Structure resin dosing pump fan fault			
Structure resin dosing pump fan fault			

Fault number	Level	Before starting	When running
170	**2**		
Structure catalyst dosing pump fan fault			
Structure catalyst dosing pump fan fault			

Fault number	Level	Before starting	When running
171	**2**		
Structure 2 resin dosing pump fan fault			
Structure 2 resin dosing pump fan fault			

Fault number	Level	Before starting	When running
172	**2**		
Structure 2 catalyst dosing pump fan error			
Error del ventilador de la bomba dosificadora de catalizador de estructura 2			

Fault number	Level	Before starting	When running
173	**2**		
Premix resin dosing pump fan fault			
Premix resin dosing pump fan fault			

Fault number	Level	Before starting	When running
174	**2**		
Premix catalyst dosing pump fan fault			
Premix catalyst dosing pump fan fault			

Fault number	Level	Before starting	When running
175	**2**		
Finishing dosing pump fan fault			
Finishing dosing pump fan fault			

Fault number	Level	Before starting	When running
176	**1**	**Interlocks machine start**	**Stops machine**
Liner resin dosing pump error			
Error bomba dosificadora resina liner			

Fault number	Level	Before starting	When running
177	**1**	**Interlocks machine start**	**Stops machine**
Liner catalyst dosing pump error			
Error de bomba dosificadora de catalizador de liner			

Fault number	Level	Before starting	When running
178	**1**	**Interlocks machine start**	**Stops machine**
Structure 1 resin dosing pump error			
Error de bomba dosificadora de resina de estructura 1			

Fault number	Level	Before starting	When running
179	**1**	**Interlocks machine start**	**Stops machine**
Structure 1 catalyst dosing pump error			
Error de bomba dosificadora de catalizador de estructura 1			

Fault number	Level	Before starting	When running
180	**1**	**Interlocks machine start**	**Stops machine**
Structure 2 resin dosing pump error			
Error de bomba dosificadora de resina de estructura 2			

Fault number	Level	Before starting	When running
181	**1**	**Interlocks machine start**	**Stops machine**
Structure 2 catalyst dosing pump error			
Error de bomba dosificadora de catalizador de estructura 2			

Fault number	Level	Before starting	When running
182	**1**	**Interlocks machine start**	**Stops machine**
Premix resin dosing pump fault			
Premix resin dosing pump fault			

Fault number	Level	Before starting	When running
183	**1**	**Interlocks machine start**	**Stops machine**
Premix catalyst dosing pump fault			
Premix catalyst dosing pump fault			

Fault number	Level	Before starting	When running
184	**1**	**Interlocks machine start**	**Stops machine**
Finishing dosing pump fault			
Finishing dosing pump fault			

Fault number	Level	Before starting	When running
185	**2**		
Liner chopper fan error			
Error del ventilador del picador de revestimiento			

Fault number	Level	Before starting	When running
186	**2**		
Structure 1 chopper fan error			
Error del ventilador del helicóptero de la estructura 1			

Fault number	Level	Before starting	When running
187	**2**		
Structure 2 chopper fan error			
Error del ventilador del picador de estructura 2			

Fault number	Level	Before starting	When running
188	**1**	**Interlocks machine start**	**Stops machine**
Liner chopper main motor error			
Error del motor principal del picador de liner			

Fault number	Level	Before starting	When running
189	**1**	**Interlocks machine start**	**Stops machine**
Structure chopper main motor error			
Error del motor principal del chopper de estructura			

Fault number	Level	Before starting	When running
190	**1**	**Interlocks machine start**	**Stops machine**
Structure 2 chopper main motor error			
Error del motor principal del helicóptero de estructura 2			

Fault number	Level	Before starting	When running
191	**2**		
Sand dosing fan error			
Error del ventilador dosificador de arena			

Fault number	Level	Before starting	When running
192	**1**	**Interlocks machine start**	**Stops machine**
Sand dosing motor error			
Fallo motor dosificador arena			

Fault number	Level	Before starting	When running
193	**1**	**Interlocks machine start**	**Stops machine**
Emergency button elevator panel has been pressed			
Se ha pulsado el botón de emergencia del panel del ascensor			

Fault number	Level	Before starting	When running
194	**1**	**Interlocks machine start**	**Stops machine**
Emergency button elevator 2 has been pressed			
Se ha pulsado el botón de emergencia del ascensor 2			

Fault number	Level	Before starting	When running
195	**1**	**Interlocks machine start**	**Stops machine**
Emergency button on elevator 2 has been pressed			
Se ha pulsado el botón de emergencia del ascensor 2			

Fault number	Level	Before starting	When running
196	**2**		
Liner chopper cover open			
Cubierta del picador de revestimiento abierta			

Fault number	Level	Before starting	When running
197	**2**		
Structure chopper cover open			
Cubierta del picador de estructura abierta			

Fault number	Level	Before starting	When running
198	**2**		
Structure 2 chopper cover open			
Structure 2 chopper cover open			

Fault number	Level	Before starting	When running
199	**2**		
Liner chopper roller high pressure			
Rodillo picador de liner de alta presión			

Fault number	Level	Before starting	When running
200	**2**		
Structure chopper roller high pressure			
Structure chopper roller high pressure			

Fault number	Level	Before starting	When running
201	**2**		
Structure 2 chopper roller high pressure			
Structure 2 chopper roller high pressure			

Fault number	Level	Before starting	When running
202	**3**		
Tensioner 1 stroke error			
Tensioner 1 stroke error			

Fault number	Level	Before starting	When running
203	**3**		
Tensioner 2 stroke error			
Tensioner 2 stroke error			

Fault number	Level	Before starting	When running
204	**3**		
Tensioner 1 load cell error			
Tensioner 1 load cell error			

Fault number	Level	Before starting	When running
205	**3**		
Tensioner 2 load cell error			
Tensioner 2 load cell error			

Fault number	Level	Before starting	When running
206	**3**		
Tensioner 1 command error			
Error comando tensor 1			

Fault number	Level	Before starting	When running
207	**3**		
Tensioner 2 command error			
Error comando tensor 2			

Fault number	Level	Before starting	When running
208	**3**		
Trolley in zero			
Trolley in zero			

Fault number	Level	Before starting	When running
209	**1**	**Interlocks machine start**	
Cutting & Grinding trolley end of forward stroke has been reached			
Se ha alcanzado el final de la carrera de avance del carro de corte y rectificado			

Fault number	Level	Before starting	When running
210	**1**	**Interlocks machine start**	
Trolley overstroke backward			
Trolley overstroke backward			

Fault number	Level	Before starting	When running
211	**3**		
Grinding in zero			
Grinding in zero			

Fault number	Level	Before starting	When running
212	**1**		
Forward overstroke on grinding head was reached			
Se alcanzó la sobrecarrera hacia adelante en el cabezal de rectificado			

Fault number	Level	Before starting	When running
213	**1**		
Grinding overstroke backward			
Grinding overstroke backward			

Fault number	Level	Before starting	When running
214	**3**		
Cutting in zero			
Cutting in zero			

Fault number	Level	Before starting	When running
215	**1**		
Cutting head end of forward stroke has been reached			
Se ha alcanzado el final de la carrera de avance del cabezal de corte			

Fault number	Level	Before starting	When running
216	**1**		
Cutting head end of backward stroke has been reached			
Se ha alcanzado el extremo del cabezal de corte de la carrera hacia atrás			

Fault number	Level	Before starting	When running
217	**1**	**Interlocks machine start**	**Stops machine**
Emergency button grinding panel has been pressed			
Se ha presionado el panel de molienda del botón de emergencia			

Fault number	Level	Before starting	When running
218	**1**	**Interlocks machine start**	**Stops machine**
Emergency button on cutting panel has been pressed			
Se ha presionado el botón de emergencia en el panel de corte			

Fault number	Level	Before starting	When running
219	**2**		
Heavy pipe support Table 0 low position error			
Soporte de tubería pesada Tabla 0 error de posición baja			

Fault number	Level	Before starting	When running
220	**2**		
Pipe disjunction safety arrest			
Detención de seguridad por disyunción de tubería			

Fault number	Level	Before starting	When running
221	**2**		
Lifting Table 1 safety arrest			
Mesa elevadora 1 detención de seguridad			

Fault number	Level	Before starting	When running
222	**2**		
Lifting Table 2 safety arrest			
Mesa elevadora 2 detención de seguridad			

Fault number	Level	Before starting	When running
223	**2**		
Lifting Table 3 safety arrest			
Mesa elevadora 3 detención de seguridad			

Fault number	Level	Before starting	When running
224	**2**		
Lifting Table 4 safety arrest			
Mesa elevadora 4 detención de seguridad			

Fault number	Level	Before starting	When running
225	**2**		
Table 5 lowering safety stop			
Table 5 lowering safety stop			

Fault number	Level	Before starting	When running
226	**2**		
Disjunction unit low oil level			
Disjunction unit low oil level			

Fault number	Level	Before starting	When running
227	**3**		
Disjunction unit filter dirty			
Disjunction unit filter dirty			

Fault number	Level	Before starting	When running
228	**2**		
Disjunction unit filter clogged			
Disjunction unit filter clogged			

Fault number	Level	Before starting	When running
229	**2**		
Disjunction unit high oil temperature			
Disjunction unit high oil temperature			

Fault number	Level	Before starting	When running
230	**1**	**Interlocks machine start**	**Stops machine**
Emergency button disjunction unit			
Emergency button disjunction unit			

Fault number	Level	Before starting	When running
231	**2**		
Cutting blade low head stroke warning			
Advertencia de carrera de cabeza baja de la cuchilla de corte			

Fault number	Level	Before starting	When running
232	**1**	**Interlocks machine start**	
Calibrate sand distributor			
Calibrate sand distributor			

Fault number	Level	Before starting	When running
233	**1**	**Interlocks machine start**	
Stop devices before changing over to automatic mode			
Detenga los dispositivos antes de cambiar al modo automático			

Fault number	Level	Before starting	When running
234	**1**		**Stops machine**
Dosing error fault			
Dosing error fault			

Fault number	Level	Before starting	When running
235	**1**		
Resin liner dosing tank no fill			
Resin liner dosing tank no fill			

Fault number	Level	Before starting	When running
236	**1**		
Catalyst liner dosing tank filling error - check valve			
Error de llenado del tanque de dosificación del revestimiento del catalizador: válvula de retención			

Fault number	Level	Before starting	When running
237	**1**		
Resin structure dosing tank filling error - check valve			
Error de llenado del tanque de dosificación resina de estructura - válvula de retención			

Fault number	Level	Before starting	When running
238	**1**		
Catalyst structure dosing tank filling error - check valve			
Error de llenado del tanque de dosificación de la estructura del catalizador - válvula de retención			

Fault number	Level	Before starting	When running
239	**1**		
Liner resin dosing high pressure			
Liner resin dosing high pressure			

Fault number	Level	Before starting	When running
240	**1**		
Liner catalyst dosing high pressure			
Liner catalyst dosing high pressure			

Fault number	Level	Before starting	When running
241	**1**		
Structure resin dosing high pressure			
Structure resin dosing high pressure			

Fault number	Level	Before starting	When running
242	**1**		
Structure catalyst dosing high pressure			
Structure catalyst dosing high pressure			

Fault number	Level	Before starting	When running
243	**1**		
Structure 2 resin dosing high pressure			
Structure 2 resin dosing high pressure			

Fault number	Level	Before starting	When running
244	**1**		
Structure 2 catalyst dosing high pressure			
Structure 2 catalyst dosing high pressure			

Fault number	Level	Before starting	When running
245	**1**		
Premix resin dosing high pressure			
Premix resin dosing high pressure			

Fault number	Level	Before starting	When running
246	**1**		
Premix catalyst dosing high pressure			
Premix catalyst dosing high pressure			

Fault number	Level	Before starting	When running
247	**1**		
Finishing dosing high pressure			
Finishing dosing high pressure			

Fault number	Level	Before starting	When running
248	**2**		
First cut on pipe is pending			
Pendiente primer corte de tubería			

Fault number	Level	Before starting	When running
249	**2**		
Liner Resin high temperature warning			
Advertencia de alta temperatura de la resina del liner			

Fault number	Level	Before starting	When running
250	**2**		
Structure Resin high temperature warning			
Advertencia de temperatura alta de la resina de la estructura			

Fault number	Level	Before starting	When running
251	**2**		
Structure 2 Resin high temperature warning			
Advertencia de temperatura alta de la resina de la estructura 2			

Fault number	Level	Before starting	When running
252	**2**		
Premix Resin Unit high temperature			
Premix Resin Unit high temperature			

Fault number	Level	Before starting	When running
253	**2**		
Liner Resin low temperature warning			
Advertencia de baja temperatura de la resina del liner			

Fault number	Level	Before starting	When running
254	**2**		
Structure 1 Resin low temperature warning			
Advertencia de baja temperatura de la resina de la estructura 1			

Fault number	Level	Before starting	When running
255	**2**		
Structure 2 Resin low temperature warning			
Estructura 2 Advertencia de baja temperatura de la resina			

Fault number	Level	Before starting	When running
256	**2**		
Premix Resin Unit low temperature			
Premix Resin Unit low temperature			

Fault number	Level	Before starting	When running
257	**2**		
Pipe length has exceeded set length			
La longitud de la tubería ha excedido la longitud establecida			

Fault number	Level	Before starting	When running
258	**2**		
Accelerator 2 drive error			
Error de la unidad del acelerador 2			

Fault number	Level	Before starting	When running
259	**2**		
Accelerator 1 piston error			
Error del pistón del acelerador 1			

Fault number	Level	Before starting	When running
260	**2**		
Accelerator 2 piston error			
Error del pistón del acelerador 2			

Fault number	Level	Before starting	When running
261	**1**	**Interlocks machine start**	
Sync disjunction fault (manual tables)			
Sync disjunction fault (manual tables)			

Fault number	Level	Before starting	When running
262	**2**		
Cam plate top-left movement error			
Error de movimiento superior izquierdo de la placa de leva			

Fault number	Level	Before starting	When running
263	**2**		
Cam plate top-right movement error			
Error de movimiento superior derecho de la placa de levas			

Fault number	Level	Before starting	When running
264	**2**		
Cam plate bottom movement error			
Error de movimiento del fondo de la placa de leva			

Fault number	Level	Before starting	When running
265	**2**		
Cam plate top-left load cell fault			
Cam plate top-left load cell fault			

Fault number	Level	Before starting	When running
266	**2**		
Cam plate top-right load cell fault			
Cam plate top-right load cell fault			

Fault number	Level	Before starting	When running
267	**2**		
Cam plate down load cell fault			
Cam plate down load cell fault			

Fault number	Level	Before starting	When running
268	**2**		
Cam plate top-left measure fault			
Cam plate top-left measure fault			

Fault number	Level	Before starting	When running
269	**2**		
Cam plate top-right measure fault			
Cam plate top-right measure fault			

Fault number	Level	Before starting	When running
270	**2**		
Cam plate down measure fault			
Cam plate down measure fault			

Fault number	Level	Before starting	When running
271	**1**	**Interlocks machine start**	
Low air pressure			
Low air pressure			

Fault number	Level	Before starting	When running
272	**1**		**Stops machine**
mandrel motor not started			
mandrel motor not started			

Fault number	Level	Before starting	When running
273	**2**		
Dust suction error			
Error de aspiración de polvo			

Fault number	Level	Before starting	When running
274	**1**	**Interlocks machine start**	
Pipe disjuntion brake fault			
Pipe disjuntion brake fault			

Fault number	Level	Before starting	When running
275	**1**	**Interlocks machine start**	
Disjunction forward limit			
Disjunction forward limit			

Fault number	Level	Before starting	When running
276	**1**	**Interlocks machine start**	
Disjunction backward limit			
Disjunction backward limit			

Fault number	Level	Before starting	When running
277	**3**		
Cutting short mode			
Cutting short mode			

Fault number	Level	Before starting	When running
278	**1**	**Interlocks machine start**	
Check compatibility of anti-torque table height and pipe diameter			
Check compatibility of anti-torque table height and pipe diameter			

Fault number	Level	Before starting	When running
279	**1**	**Interlocks machine start**	
Check compatibility of Lifting Table 1 height and pipe diameter			
Compruebe la compatibilidad de la altura de la mesa elevadora 1 y el diámetro de la tubería			

Fault number	Level	Before starting	When running
280	**1**	**Interlocks machine start**	
Check compatibility of Lifting Table 2 height and pipe diameter			
Compruebe la compatibilidad de la altura de la mesa elevadora 2 y el diámetro de la tubería			

Fault number	Level	Before starting	When running
281	**1**	**Interlocks machine start**	
Check compatibility of Lifting Table 3 height and pipe diameter			
Verifique la compatibilidad de la altura de la Mesa Elevadora 3 y el diámetro de la tubería			

Fault number	Level	Before starting	When running
282	**1**	**Interlocks machine start**	
Check compatibility of Lifting Table 4 height and pipe diameter			
Compruebe la compatibilidad de la altura de la mesa elevadora 4 y el diámetro de la tubería			

Fault number	Level	Before starting	When running
283	**1**	**Interlocks machine start**	
Check compatibility of table 5 height and pipe diameter			
Check compatibility of table 5 height and pipe diameter			

Fault number	Level	Before starting	When running
284	**2**		
Check the switch of grinding unit on trolley			
Check the switch of grinding unit on trolley			

Fault number	Level	Before starting	When running
285	**2**		
Check the switch of cutting unit on trolley			
Check the switch of cutting unit on trolley			

Fault number	Level	Before starting	When running
286	**1**		
Pipe will fall if cut			
Pipe will fall if cutted			

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support@topfibra.eu

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