E-CFW

Chopper Manual

TOPFIBRA

EFFECTIVE FILAMENT WINDING® PIONEERS

E-CFW

CHOPPER MANUAL

TABLE OF CONTENTS

1. GENERAL INFORMATION

This manual provides all the necessary information for the installation, usage and maintenance of your ROVING CHOPPERS. If you do not understand some parts of this manual, please contact our technicians.

We suggest you to read this manual in its entirety and scrupulously respect the instructions. Each procedure or warning that you will read, although seemingly obvious, is aimed at the total knowledge of the machine by the user and the full implementation of the necessary conditions for a safe operation. The information contained in this manual must be communicated to all the people who will work with the CHOPPERS.

1.1. General description

The scope of the CHOPPER is to cut the continuous glass roving which, cut to a dimension of ~ 50 mm for the CHOPPER LINER and 53.63mm for the CHOPPER STRUCTURE, fall onto the top of the mandrel, guided by slides. They fall in an "irregular" fashion, all facing in various directions. This random disposition will ensure greater axial resistance.

It performs mechanical analyses of raw materials, batch by batch, and on the finished products, in order to verify the correspondence between the mechanical characteristics foreseen in the product design and those determined on the finished products.

The cutting is carried out by blades located on a Steel Roller (called the "Cutting Roller").

LINER CHOPPER: 8 blades

LINER STRUCTURE: 12 blades

The Cutting Roller (Figure 1), is rotated by a gear motor via a belt and pulleys (rotation from 0 to 200 rev/min).

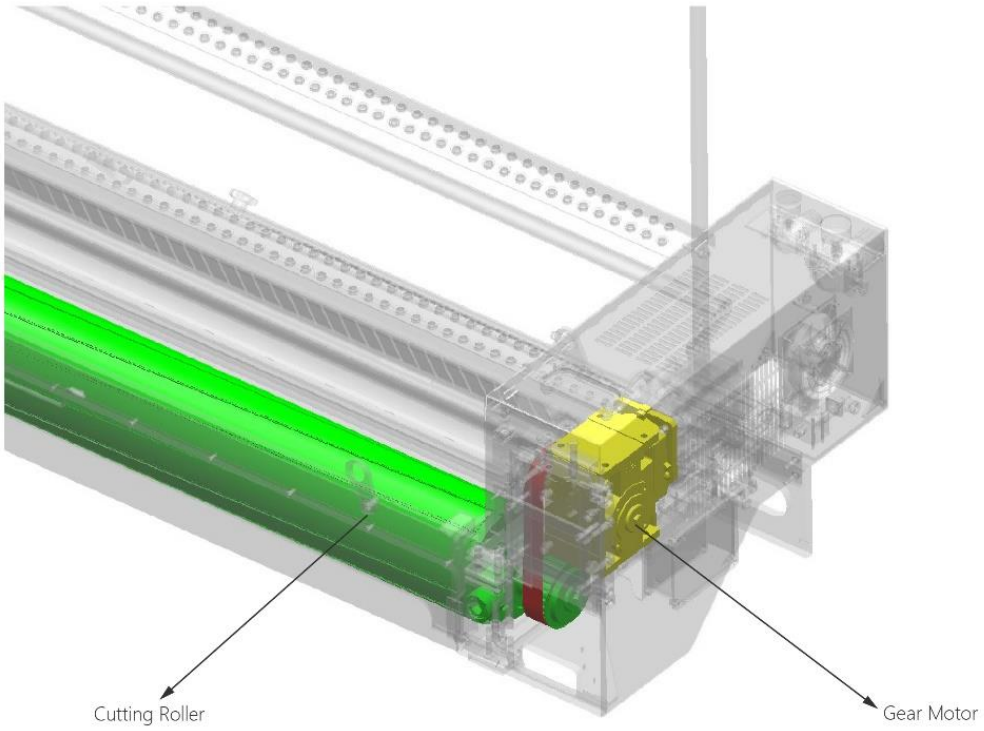


Figure 1

For the cut execution, there should be the contact of the glass roving on the Cutting Roller's blades; for this purpose, a Polyurethane Coated Roller is used, which "pushes" the glass roving on the Cutting Roller, ensuring necessary adherence.

The pressure of the Polyurethane Coated Roller is exerted by the pressure of the two pneumatic cylinders fixed to the main frame (Figure 2).

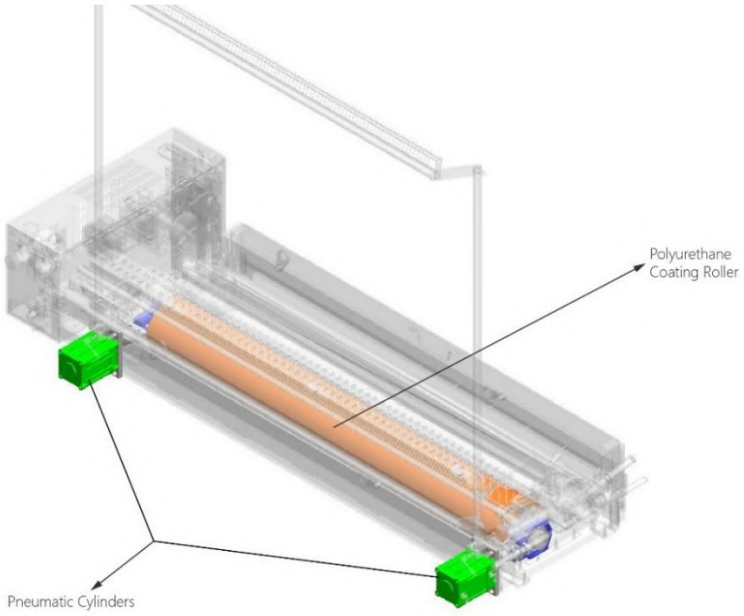


Figure 2

To ensure the "continuous scrolling" of glass roving, a Steel Roller called the "Pressure Roller" is used, which touches the Polyurethane Coated Roller (Figure 3). The glass roving will pass between the two rollers.

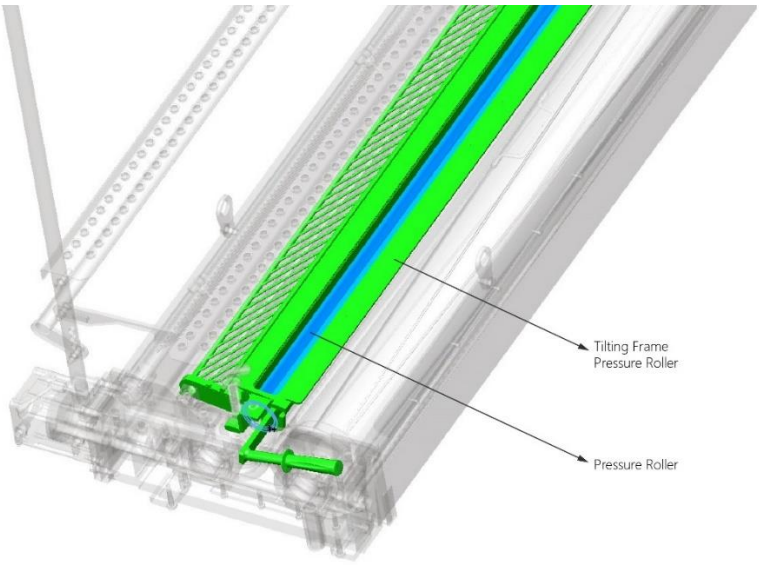


Figure 3

The Pressure Roller and the Cutting Roller are supported by Y Supports, guided by machined Square Plate Profiles (Figure 4).

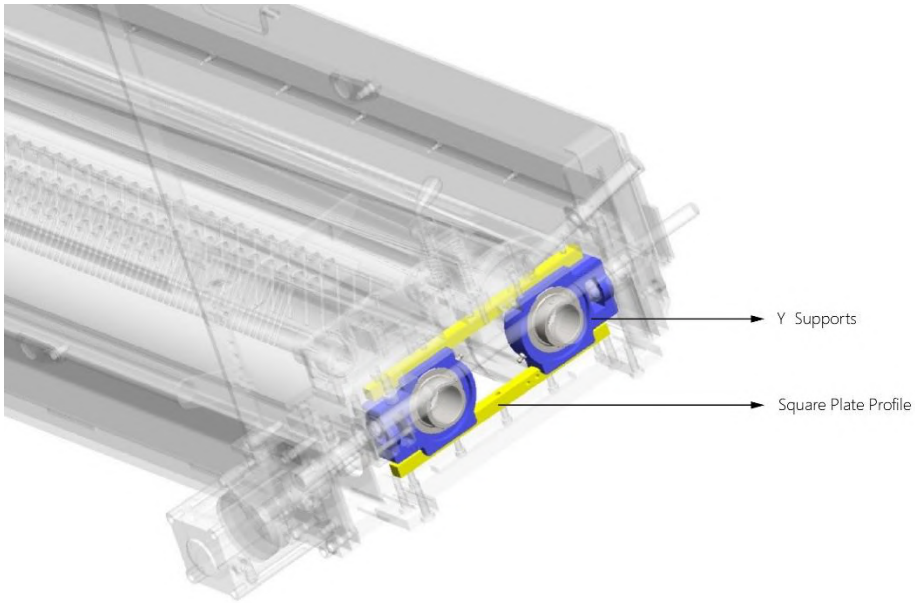


Figure 4

The glass roving in the form of bobbins is located on shelves dedicated to this function; from here they run through ceramic eyelets and steel combs; these items are located respectively, on the shelves, the elevator beam and chopper (Figure 5).

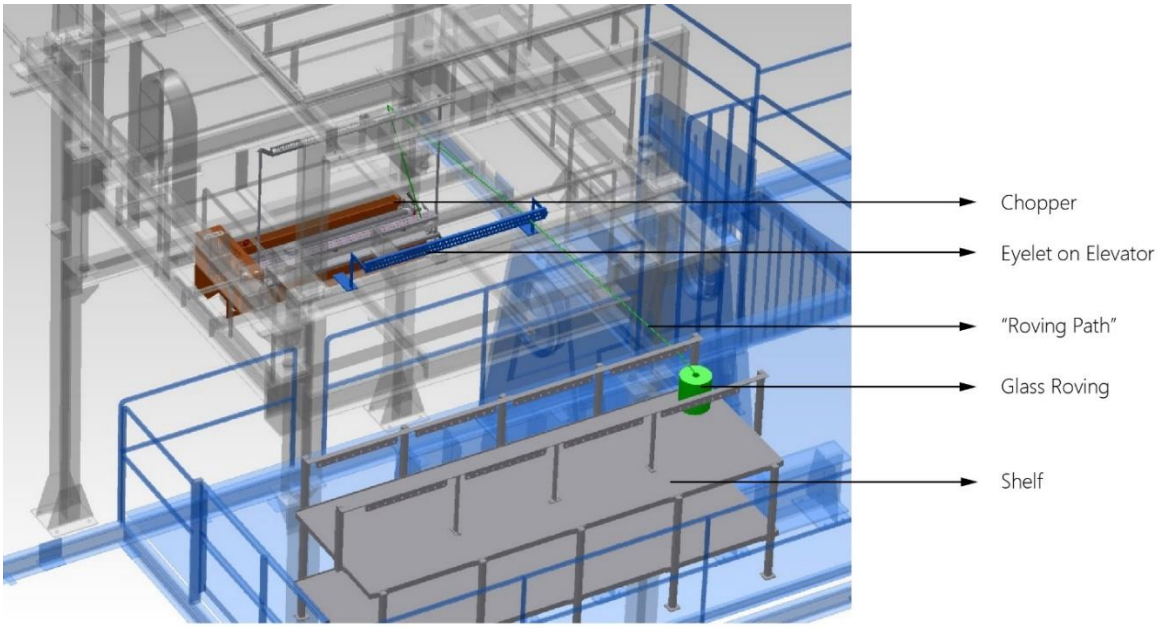


Figure 5

To guide the wires, the chopper is provided with a comb, and below that with 2 Perforated Plates with ceramic eyelets (Figure 6).

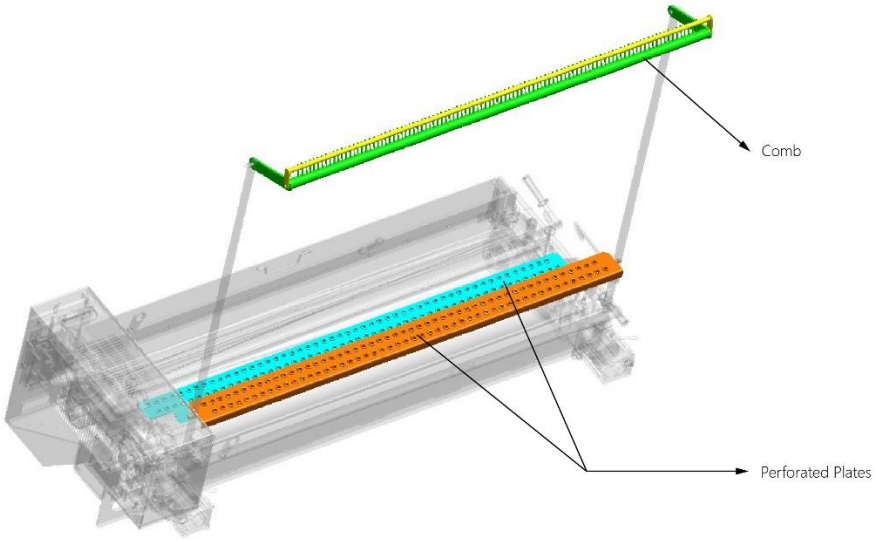


Figure 6

The lower roving guide plate is securely connected to a pneumatic cylinder which opens and closes constantly, increasing the areas of contact between the blades of the Cutting Roller and the glass roving, reducing the wear in specific areas and therefore lengthening the lifetime of the Cutting Roller (Figure 7).

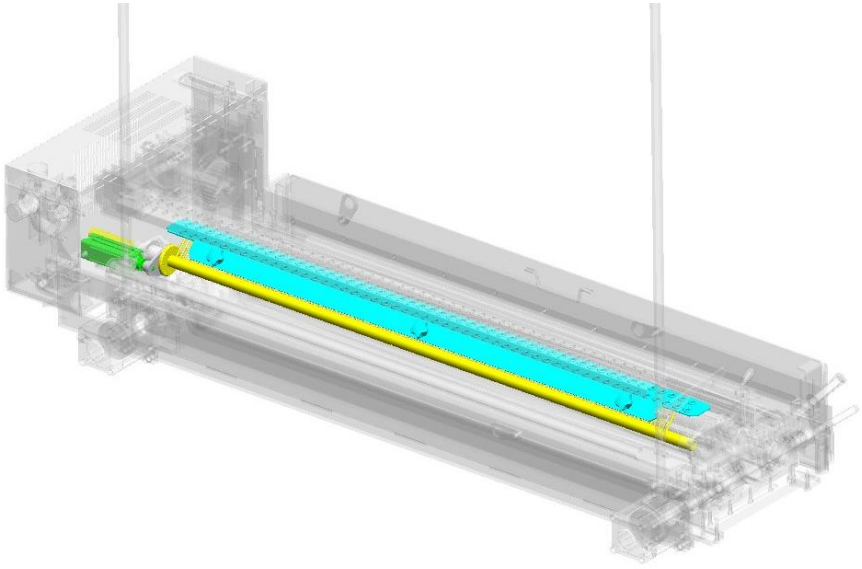


Figure 7

1.2. Technical data

1.2.1. Chopper liner

Gear motor

Power:	1,5 kW - 1800/2000 rpm
Roller Rotation:	0÷200 rpm
I:	1:13

Pressure Roller cylinders

Piston diameter:	100 mm
Piston rod thread:	M20x1.5
Stroke:	25 mm
Positioning sensing:	proximity sensor

Comb cylinder

Piston diameter:	40 mm
Piston rod thread:	M12x1.25
Stroke:	50 mm

Pressure Roller cleaning

Manual

1.2.2. Chopper structure

Gear motor

Power:	2,2 Kw – 1800/2000 rpm
I=	1:13
Roller Rotation:	0÷200 rpm

Pressure Roller cylinders

Piston diameter:	100 mm
Piston rod thread:	M20x1.5
Stroke:	25 mm
Positioning sensing:	proximity sensor

Comb cylinder

Piston diameter:	40 mm
Piston rod thread:	M12x1.25
Stroke:	50 mm

Pressure Roller cleaning

Automatic

2. SAFETY INSTRUCTIONS

2.1. General

Precautions for general use: it is recommended to prohibit access to the operational area of CHOPPER to non-experts and that the operators wear protective gloves, helmet and safety shoes. We recommend that the following labels are installed:

3. INSTALLATION

3.1. Positioning, fixing and connecting

For lifting purposes, the CHOPPER is equipped with hidden lifting brackets (Figure 8), coated with red paint; a different colour highlights that these brackets are only needed for lifting and that they swivel and face downwards when not in use.

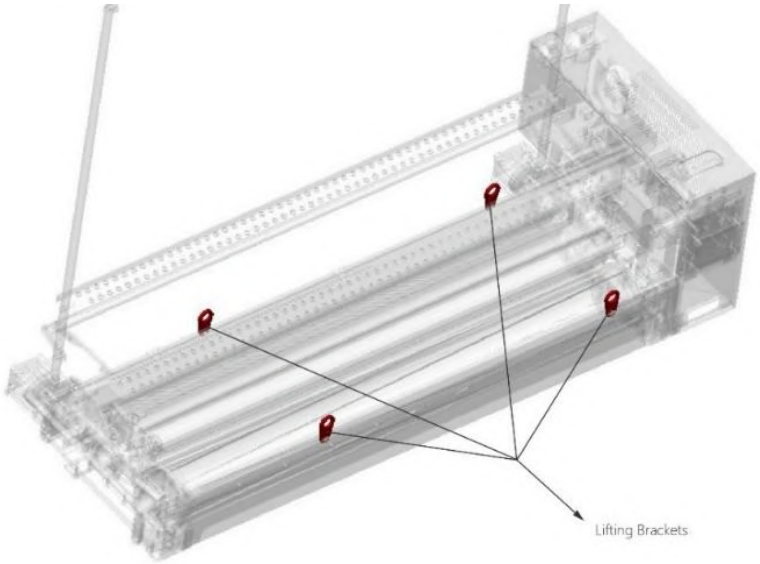


Figure 8: Lifting Brackets

The positioning of the CHOPPER is defined by the General Assembly Drawing for each E-CFW equipment. The fixing is carried out by tightening the four clamps on the bottom area of the CHOPPER (Figure 9), fixing with key No.17.

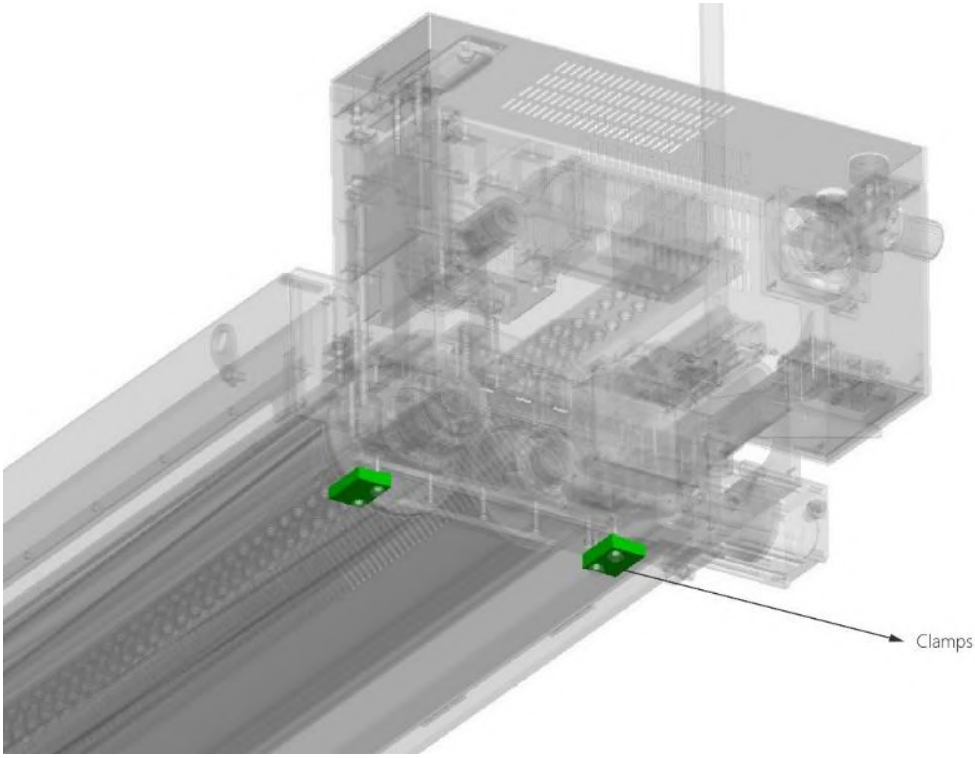


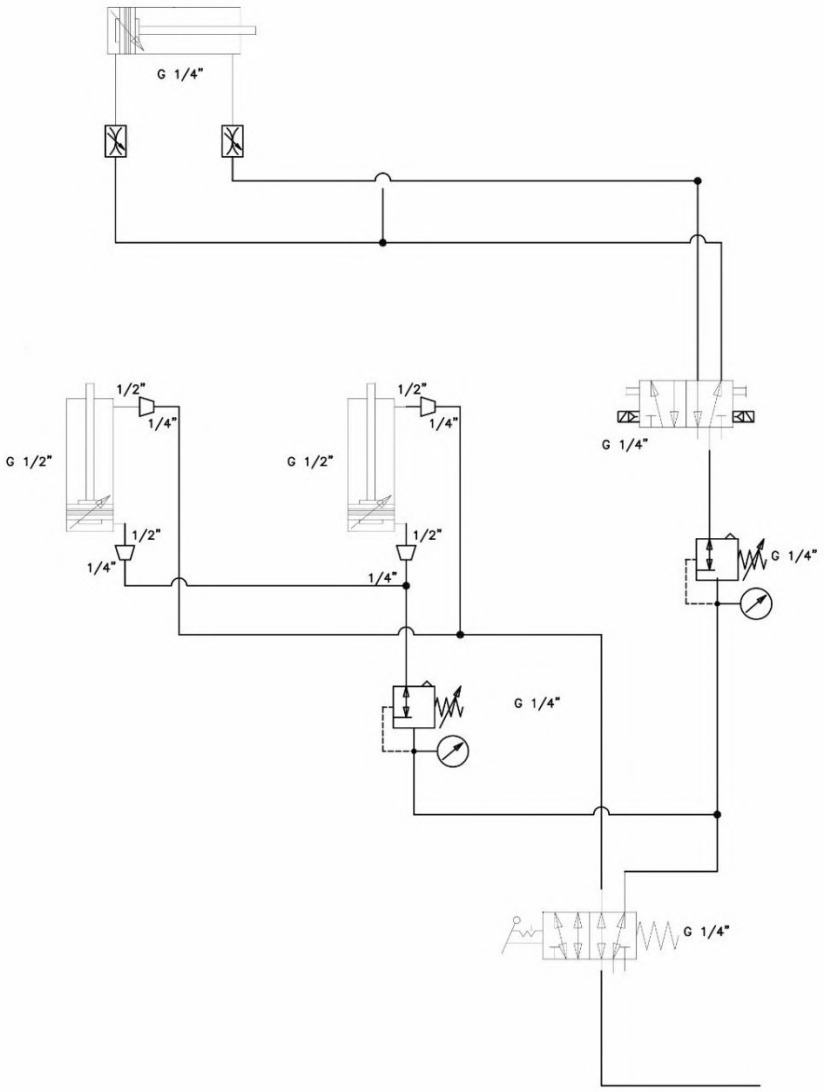
Figure 9: Clamps

3.2. Diagrams

3.2.1. Electric diagram

See Electrical Diagram E-CFW 300-3000.

3.2.2. Pneumatic diagram



4. OPERATING INSTRUCTIONS

4.1. Preparation before use

Verify that each part of the device is perfectly clean.

Check the polyurethane rubber condition. If it is damaged, remove it (see Maintenance chapter).

Install or replace the broken knives (blades) in the Cutting Roller.

To install the knives, proceed as follows:

Remove the side covers of the Cutting Roller (Figure 10 and Figure 11).

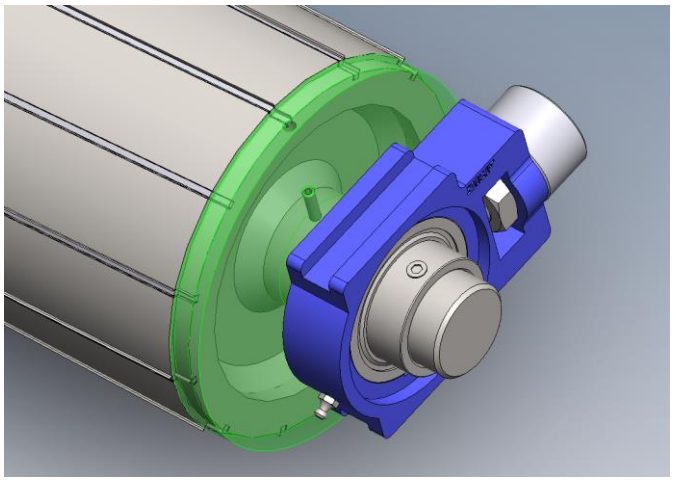


Figure 10

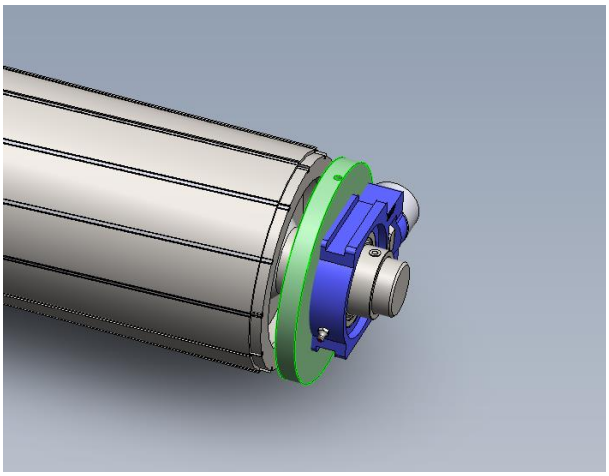


Figure 11

1. Install the knives and fix them with the spacer and springs (Figure 12).

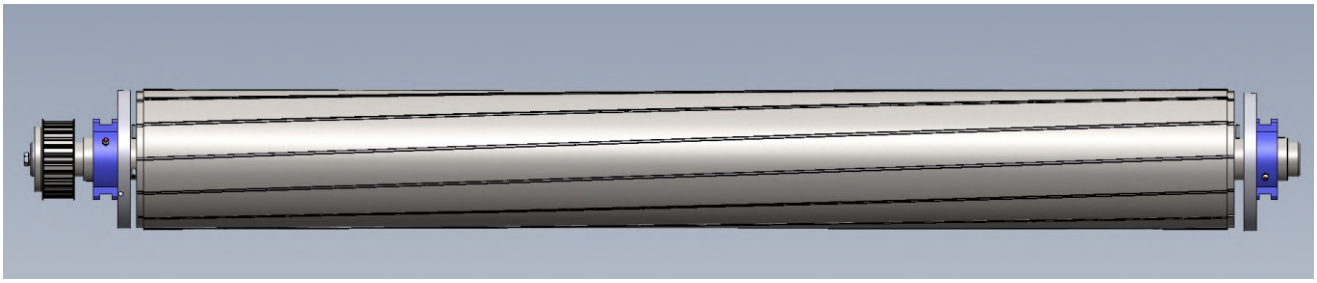


Figure 12

The following picture (Figure 13) shows the recommended installation system to gain more stability for the knife during rotation:

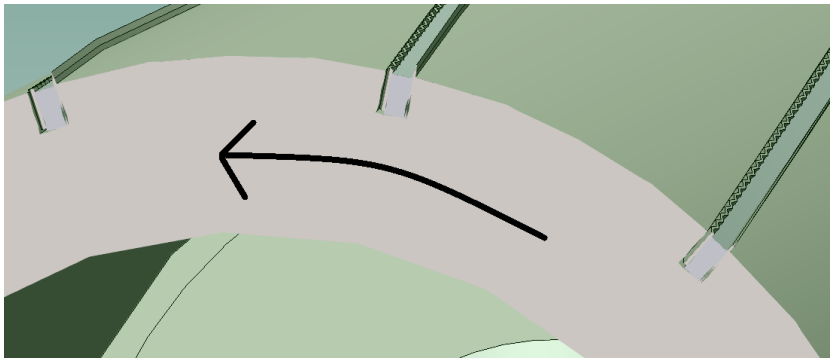


Figure 13

NOTE: The knives can also be installed in the opposite way but problems may occur when the spring are used.

Remember to check the knife quality in case of frequent problems with inconsistent chopped fibre lengths while cutting.

Adjust the distribution of the rovings according to the indications of the pipe design.

The number and positioning of the roving strands for the chopping, for the liner and for each layer of the structural wall is given in the Pipe Design Program.

For the CHOPPER LINER, the number of roving strands is usually three. Only in case of a liner of extra thickness and/or very high advancing speed may be necessary to increase the number of the roving strands in order to reduce the linear speed of the roving strand and the rotational speed of the chopper. The number of roving strands for chop can also be increased (or reduced) to better adjust the distribution of the chop glass and minimize the falling down.

For the CHOPPER STRUCTURE, the total number of roving strands shall be spread according to the indications of the Pipe design.

The distribution and feeding of the chopped roving from the fibreglass bobbins to the CHOPPER are shown in the following scheme (Figure 14):

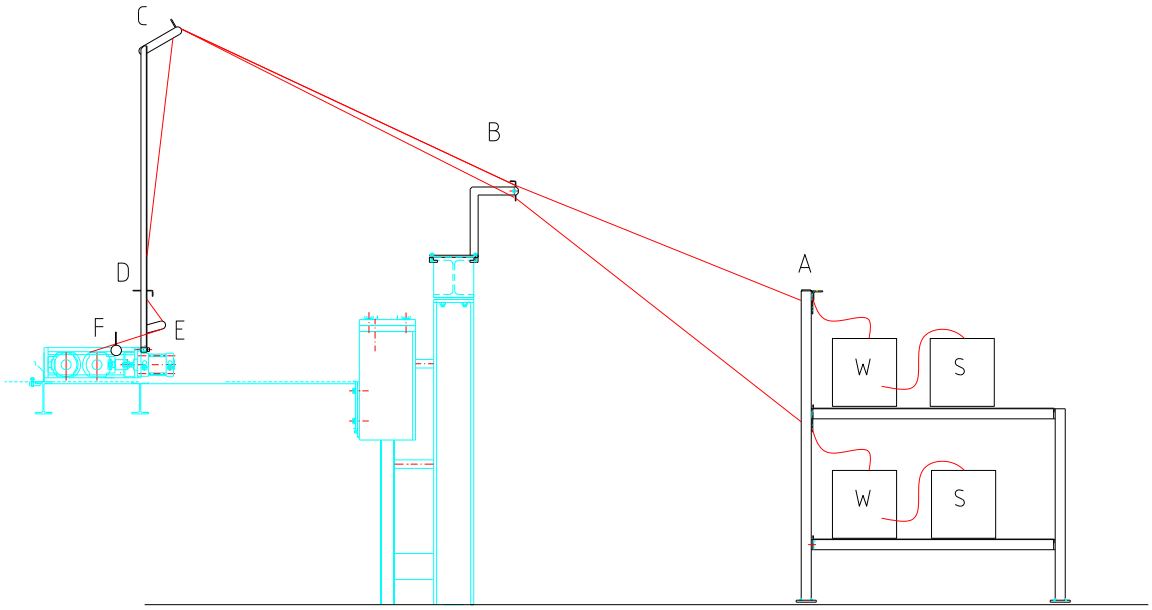


Figure 14

A – Bobbin Creel
B – Filament guide
C – Comb
D – Filament guide
E – Tensioning device
F – Comb

The creel is divided into two levels, two shelves, each of which is equipped with a proper filament guide plate. In this case, it is also advisable to put 2 sets of bobbins on the creel, so that one set is the working bobbins and the other set is in reserve, with its bobbins connected to the working ones (Figure 15).

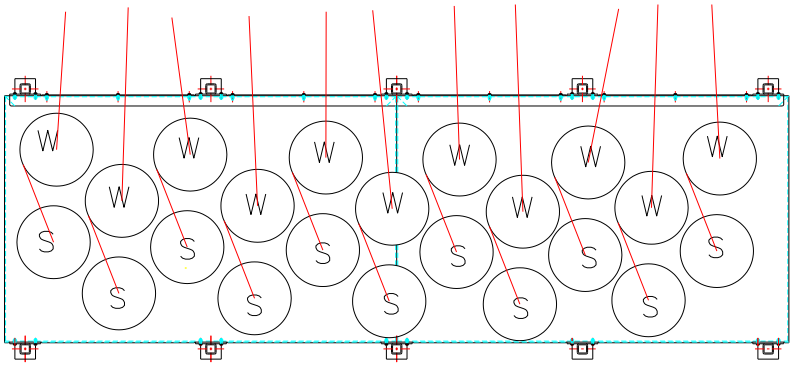


Figure 15

The roving strands are guided towards the filament guiding panel B, equipped with two lines of openings with ceramic eyelets. The upper line of openings is used for positioning the roving from the upper shelf of the creel, while the lower line is used for positioning the roving of the lower creel shelf.

From here, the roving strands are guided to the first comb C. To avoid the tangling of roving, which may damage the integrity of the filaments, it is recommended to position in the openings of panel B alternatively an upper filament (from the upper shelf) and the lower filament (from the lower shelf), as illustrated in the following figure. Repeat this model of distribution in filament guide D and comb F passing the roving strands under the tensioning device E (Figure 16).

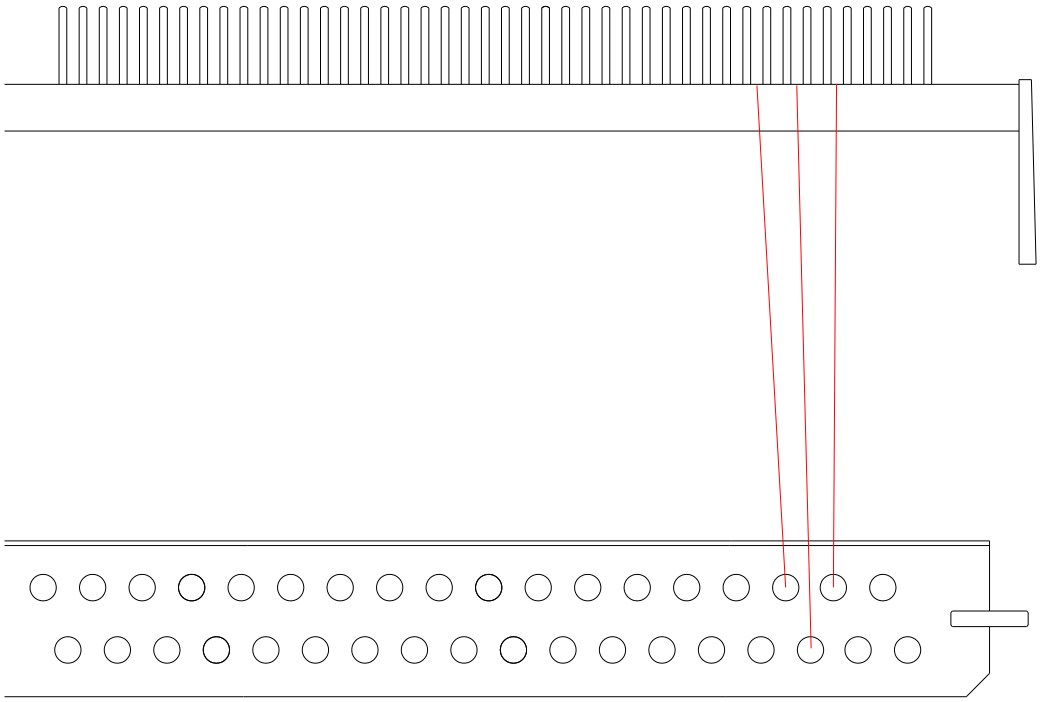


Figure 16

Pressure Roller

The roving is pulled forward by the Polyurethane Coated Roller and the Pressure Roller. The Pressure Roller must be parallel to the Polyurethane Coated Roller.

Check with a paper that the contact between the Pressure Roller and the Polyurethane Coated Roller is equal along the Rollers.

4.2. Start-up procedure

Move the pressure regulator up to 1 bar (Figure 17).

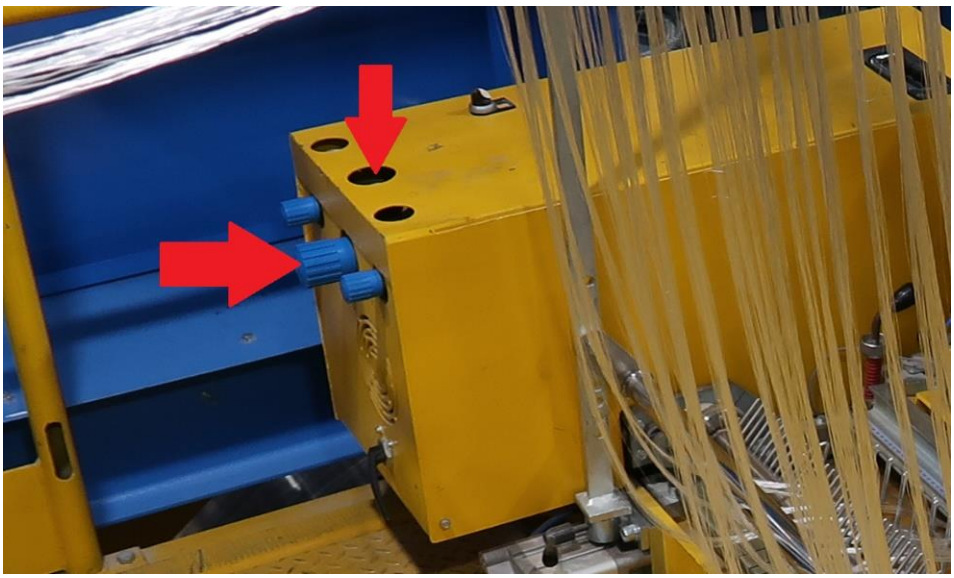


Figure 17

Move the Polyurethane Coated Roller against the Cutting Roller using the pressure handle (Figure 18).

Figure 18

Start the chopper (please refer to the E-CFW manual).

Increase the pressure of the Polyurethane Coated Roller gradually so that the roving strands are chop in the due length. Increase the pressure when the blades or polyurethane rubber are worn out and the roving strands slip and are cut in longer length. When the pressure reaches 2 bar and the length cannot be controlled, the polyurethane rubber and/or blades must be replaced.

Verify the pressure of the pneumatic control of the moving comb in order to have an adequate distribution of the roving. The slow movement is better (Figure 19).

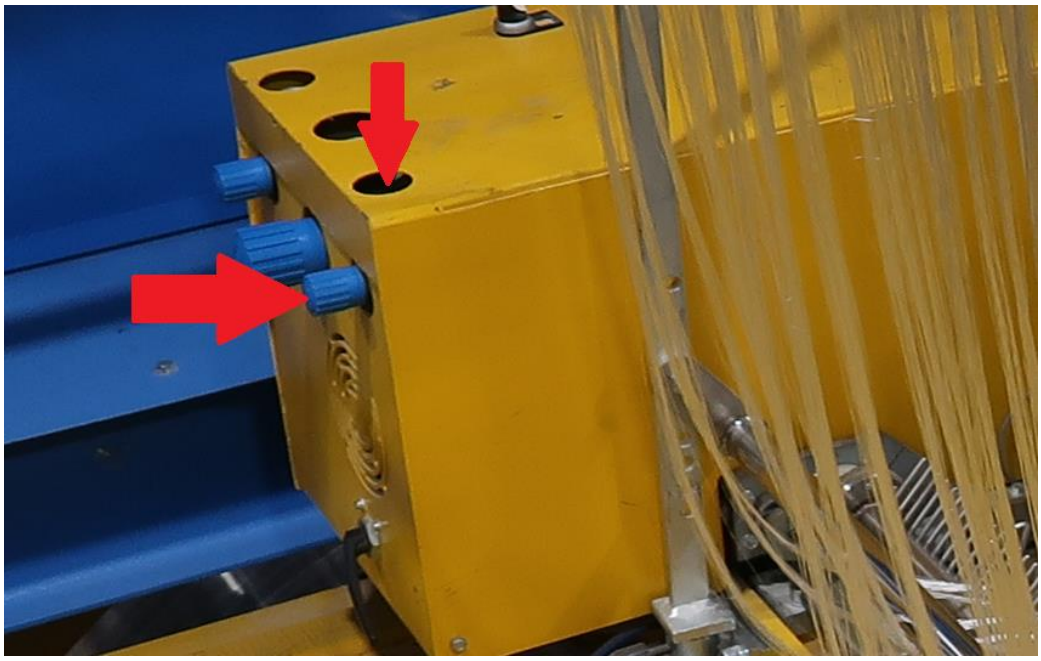


Figure 19

Check that some of the rovings are not blocked during the cutting.

4.3. Operating the device

During the Chopper operation, check that all the chopper roving are pulled equally between the Polyurethane Coated Roller and the Cutting Roller.

Chopper performance depends on several factors. It is very important to keep the focus on the:

- Air pressure;

- Regulation of the optimal air pressure during operation;
- Roving tension;
- Pressure Roller.

4.3.1. Air pressure for the fibre cutting

There are two pneumatic cylinders to ensure a "minimum air pressure" on the Cutting Roller to achieve consistent cutting of the chop rovings. The "minimum air pressure" will enhance the lifetime of the rubber cot of the Polyurethane Coated Roller and reduce the load on the drive motor (better RPM linearity). The minimum air pressure will need to be increased as the Polyurethane Coated Roller wear, the knives lose the sharpening or the number of rovings needs to be increased.

4.3.2. Regulation of the optimal air pressure during operation

Increase the pressure to 0.5 bar and confirm consistent cutting. The pressure needed for cutting will be different for both choppers.

4.3.3. Roving tension

The chop roving tension should be minimized and all rovings must run as smoothly as possible. The number of contact areas and points should be reduced to an absolute minimum. Make sure that the guide system is well maintained, and remove periodically all deposits from the transfer systems. This will reduce the wear of the different components and also result in less fuzz and there are less static problems.

4.3.4. Preventing chop strands wrapping on Pressure Roller

Wrapping on the Pressure Roller is in most cases caused by scratches in the steel surface enabling the rovings to initiate the wrapping. Care should be taken when removing wrapped rovings to make sure that the Pressure Roller surface is not damaged. The scratches should be removed using fine emery paper.

The STRUCTURE CHOPPER has an automatic cleaning system.

Figure 20

The pressure of the cleaning should be kept at a minimum to reduce the load. 0.5 bar has proved to be a sufficient level.

The ON/OFF cycle should be based on experience, but a typical value that is working is 1 minute ON and 10 minutes OFF. Remember to check the quality of the cleaning pad working on the roller. It can occasionally be necessary to remove dirt and deposits from the pad to prevent this from falling into the laminate, causing defects in the pipe.

The LINER CHOPPER should be cleaned manually by using the cleaning tool. The cleaning should be done once every hour of operation.

Use compressed air to remove the cut fibre that did not fall on the pipe during the operation.

4.3.5. Preventing chop strands wrapping on Polyurethane Coated Roller

Wrapping on the Polyurethane Coated Roller is in most cases caused by the sizing of the chop strands if the pressure between the Pressure Roller and Polyurethane Coated Roller is too high.

Regulated the pressure release of the spring clamps and use Teflon spray for the Polyurethane Coated Roller.

4.4. Shutdown procedure

Move back the Polyurethane Coated Roller using the pressure handle (Figure 21).

Figure 21

Reduce the pressure using the pressure regulator (Figure 22).

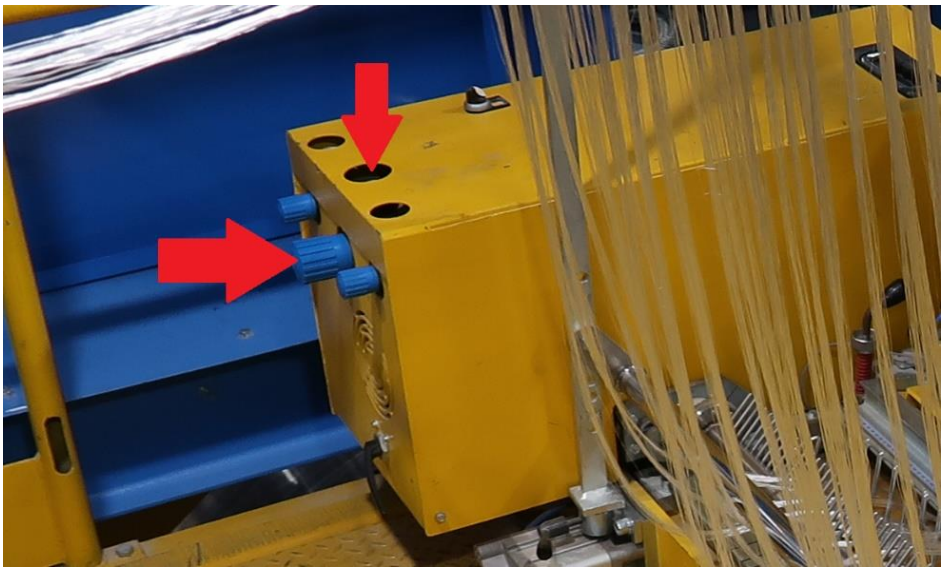


Figure 22

4.5. Warnings and controls

If the motor hood is open or the Pressure Roller is not in position, the CHOPPER will not start.

Never start the rotation of the Cutting Roller if the Polyurethan Coated Roller is not in contact with it and the air pressure reading in the gauge is at least 1 bar.

The Pressure Roller is a heavy part of the chopper. If it is in the lifted position, secure it before performing any activity on the rollers.

5. MAINTENANCE

5.1. Preventive and periodic maintenance operations

Below, there is a list of regular and preventive actions to be performed on some components of the CHOPPER; these actions must be performed to avoid problems such as the replacement of broken/damaged components, which would cause shutdowns. At each point, the number of hours estimated to perform inspections and replacement of fluids is indicated in the tables.

5.1.1. Greasing

The CHOPPER is provided with grease nipples (Figure 23), which should be greased regularly. Those points are indicated in the table below, as well as the type of grease needed, the periodicity of refilling and the estimated quantity. We recall that Topfibra will carry out the "First Filling".

Brand & grease type	Operating temperature (°C)		Quantity (Kg)	Grease substitution (Working hours)
	Min	Max		
18200266 KF LGMT 2	-30	120	0,008	18000

To see the grease technical data sheet, see the document Lubricating oils for enclosed gear drives.

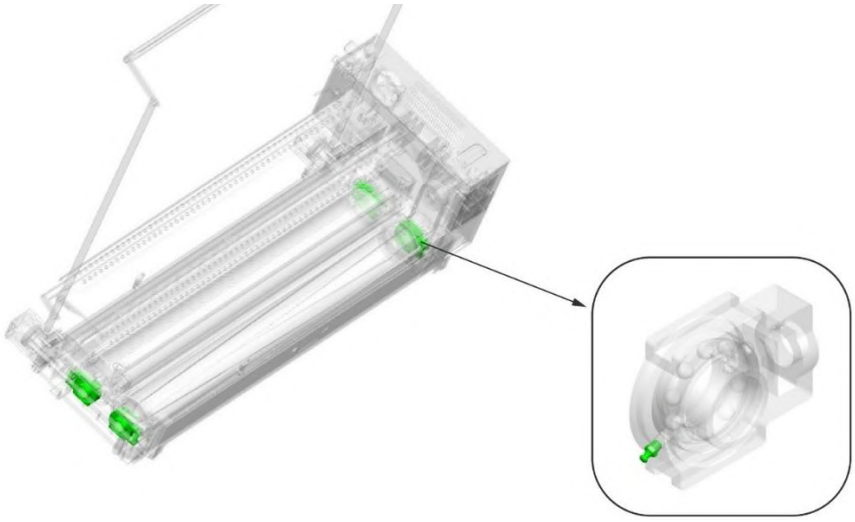


Figure 23

5.1.2. Oil fill

The CHOPPER is provided with oil introduction points (Figure 24), which are used to regularly add and change the oil. These points are indicated below, as well as the type of grease, the period of refilling and the estimated quantity. We recall that Topfibra will carry out the "First Filling".

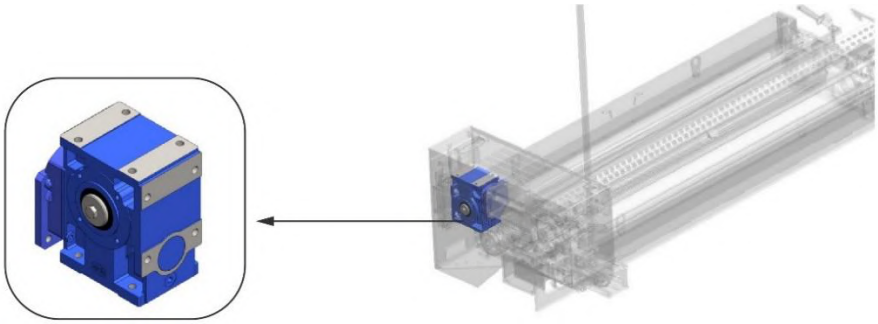


Figure 24

Brand & grease type	Operating temperature (°C)		Quantity (Kg)	Grease substitution (Working hours)
	Min	Max		
KLÜBER KLÜBERSYNTH GH 6-220	-20	500	0,8	12500

To see the grease technical data sheet, see the document LGMT 2 - SKF general purpose industrial and automotive bearing grease.

5.1.3. Knives (Cutting blades) wear

It is recommended to pay attention to the state of wear of the Knives of the Cutting Roller. The wear of these could result in the incorrect cutting of the glass thread, leading to weaving phenomena on the machine, which will inevitably cause the shutdown of the entire E-CFW machine; another risk is that of cutting the roving to a length different than required. We recall that studies show that with a cut of L = 50 mm, the fibres have more possibilities of positioning themselves in a highly random manner, thereby improving the final density of the laminate and thus the mechanical performance.

5.1.4. Belts

The Cutting Roller is driven by a gear motor and a distribution belt (see section Positioning, fixing and connecting). It is recommended to check the tension of the belt every 1000 working hours approx.; if the belts are loose, they must be tightened with the supplied tool for the CHOPPER (fig. 12, 13).

Procedure:

Unhook Guard Hook, lift Guard handle to the end of the stroke (Figure 25).

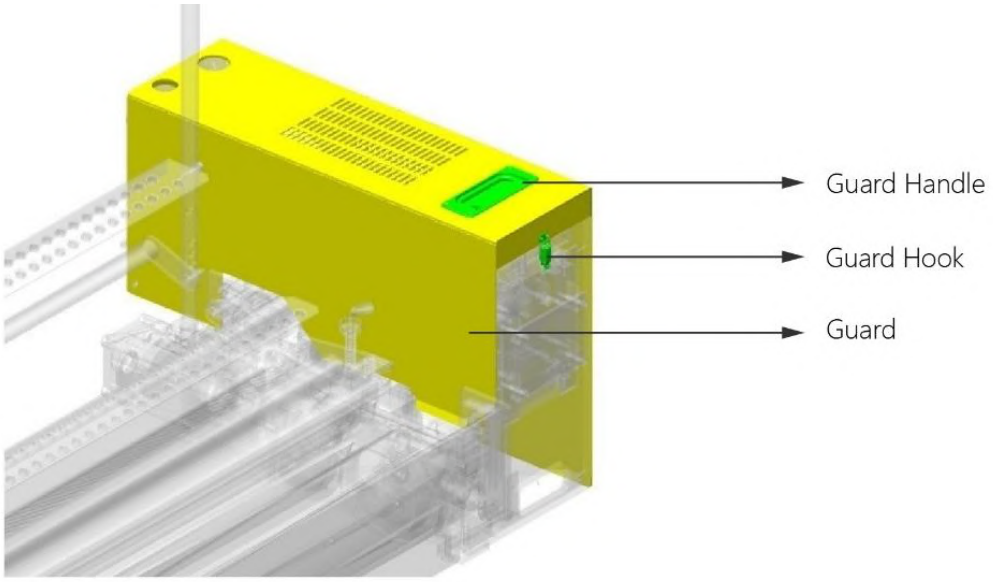


Figure 25

Loosen Plate e PTFE Slides by unscrewing M8 Fixing Screws with hex wrench 6 male, tension belt by Tightening Screws (one with a key No. 17, other with hex wrench 8 male), go to the end of the stroke, tighten mounting screws (Figure 26).

NOTE: check tension only when the E-CFW machine is in shutdown mode.

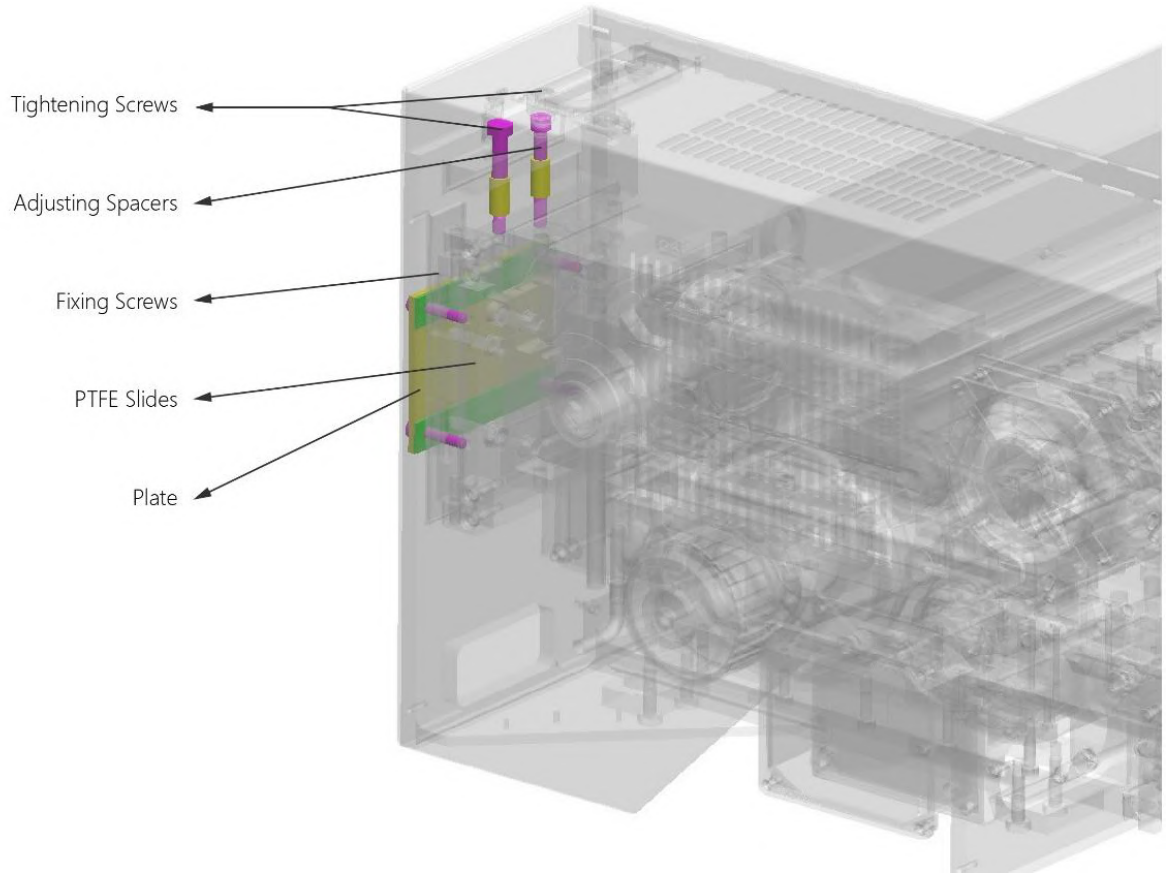


Figure 26

5.1.5. Removal of roving wads

There may be the need to access the area of "Roving Pressure"; this is the area where the roving is pressurized between the Polyurethane Coated Roller, Pressure Roller and Cutting Roller. This need, in most cases, arises due to the forming of the so-called "Roving Wads".

If there is this need, the intervention is explained below (Figure 27 - Figure 31):

NOTE: The following actions must be carried out only when the E-CFW machine is in shutdown mode.

1. Release of spring clamps: manually retract the release levers of the spring clamps.

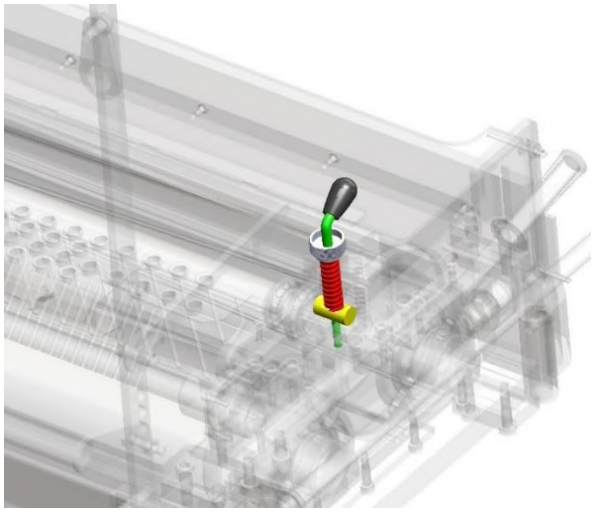


Figure 27

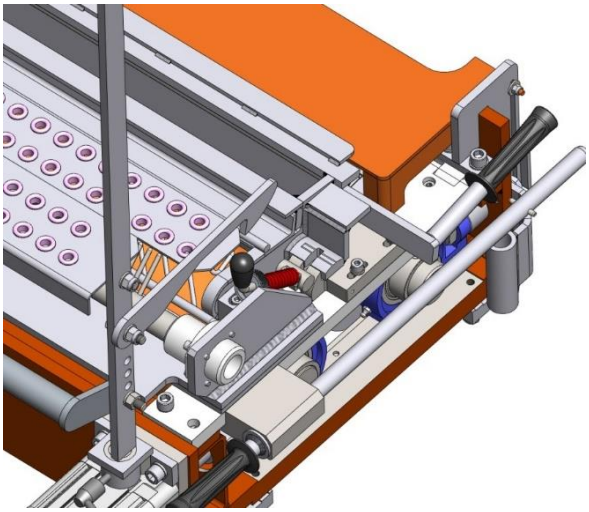


Figure 28

2. Lifting of Pressure Roller: manually lift the lever and lock it into block position, with the locking lever.

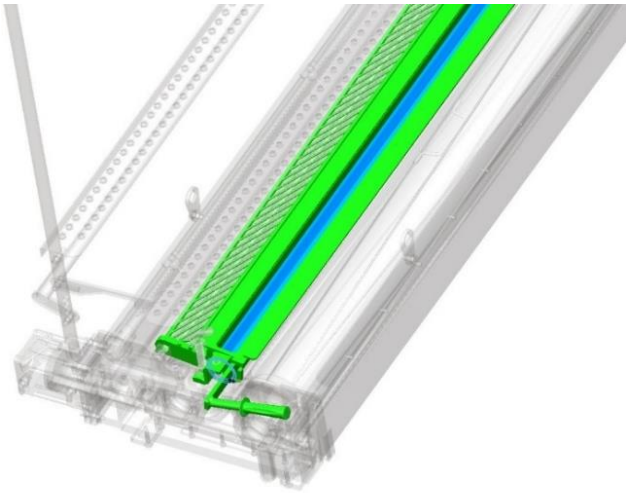


Figure 29

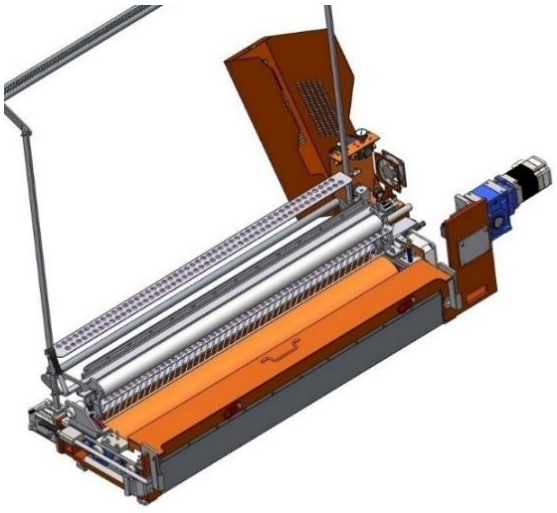


Figure 30

3. Open blade protection guard: use the lifting handle and bring the guard to the end of the stroke.

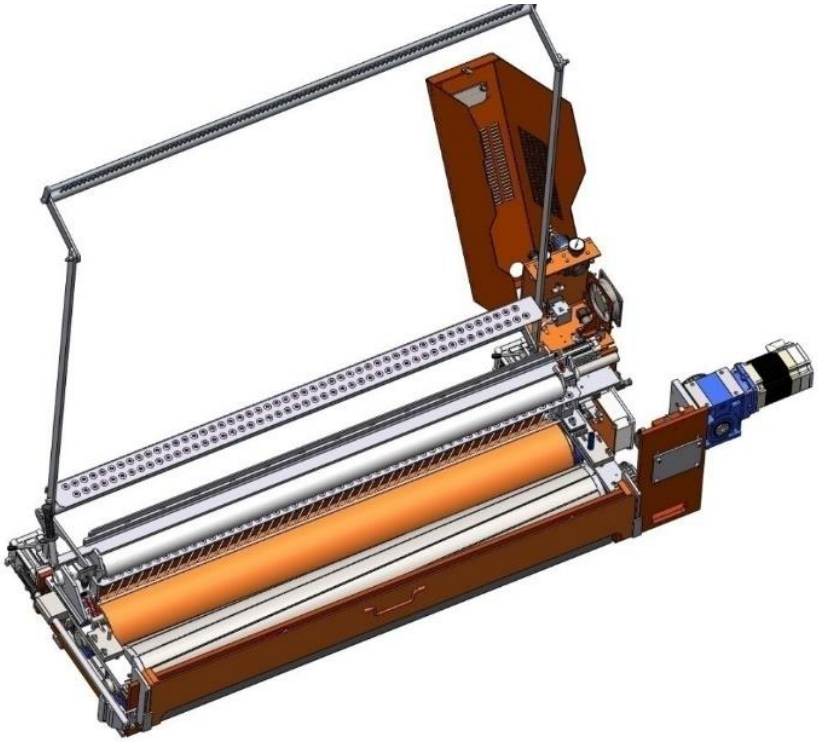


Figure 31

5.2. Dismantling & assembling of items

Below are the instructions for the replacement of consumables – knives of Cutting Roller (Figure 32 - Figure 39).

NOTE: The following actions must be carried out when the E-CFW machine is in shutdown mode.

5.2.1. Cutting Roller replacement

1. **Lift guard**: release Guard Hook, lift Guard with a handle to the end of the stroke.

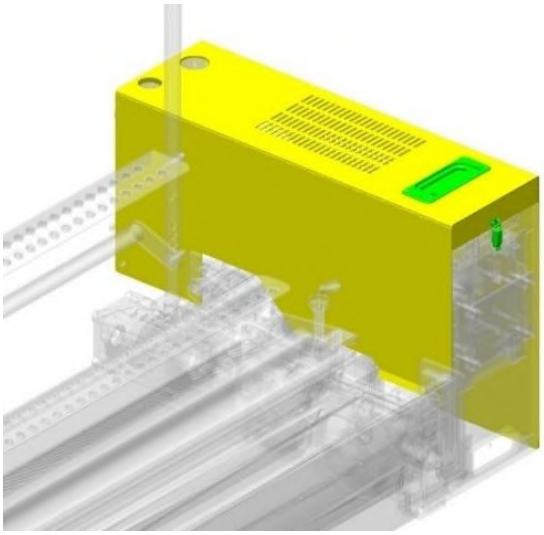


Figure 32

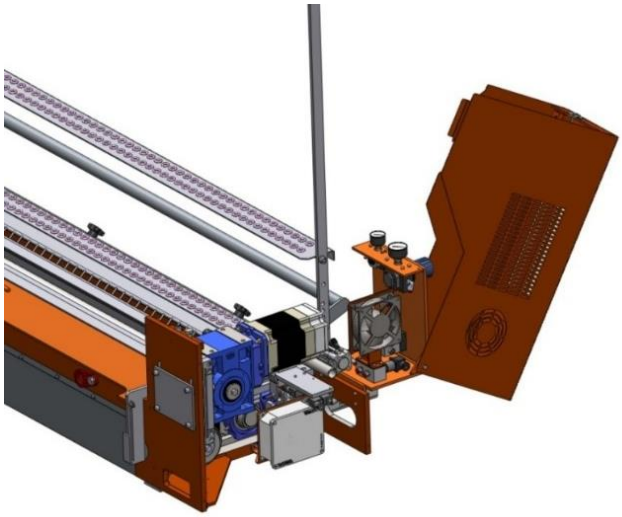


Figure 33

2. **Loosening of belt**: Loosen Plate e PTFE Slides by unscrewing M8 Fixing Screws with hex wrench 6 male, tighten belt by Tightening Screws (one with a key No. 17, other with hex wrench 8 male), go to the end of stroke and finally tighten mounting screws.

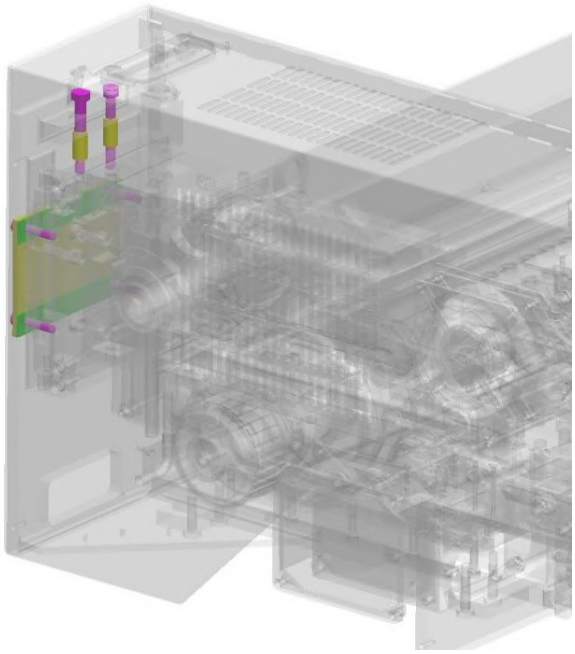


Figure 34

3. **Opening gear motor support door**: unscrew M10 screws with hex wrench male 8, remove the belt, and open the gear motor support door to the end of the stroke.

NOTE: Be careful not to lose the dismantled items.

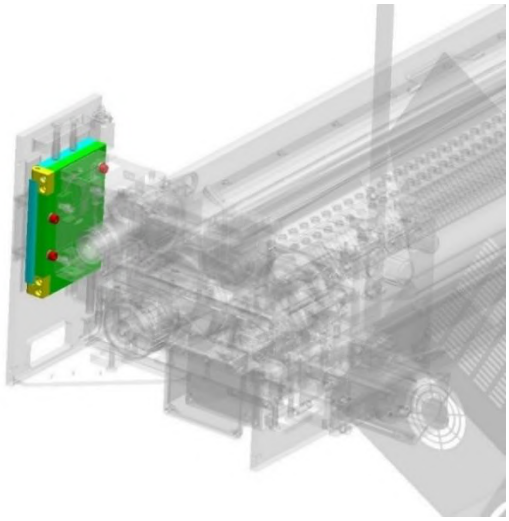


Figure 35

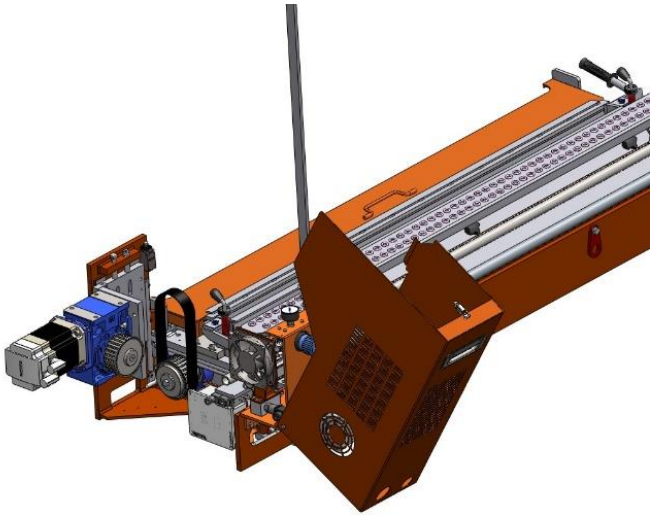


Figure 36

4. **Raise the whole group**: manually lift the lifting lever, remove the M12 screws (one with 10 male hex wrench, the other with a screwdriver); lift the whole group to the end of the stroke and make the lever descend to the opposite housing bush.

NOTE: Be careful not to lose the dismantled items.

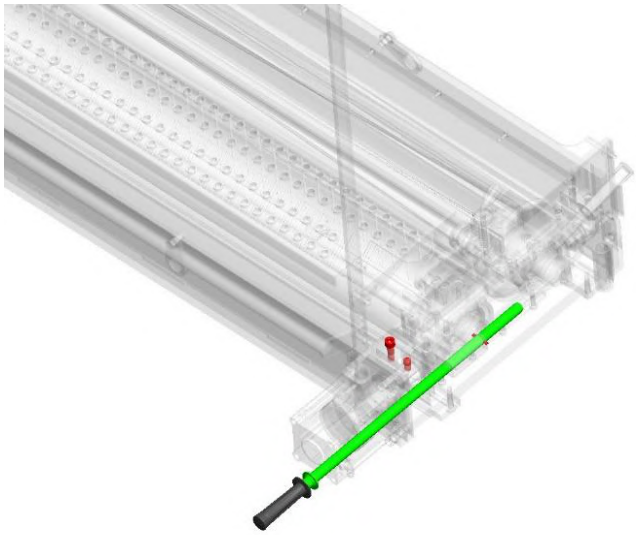


Figure 37

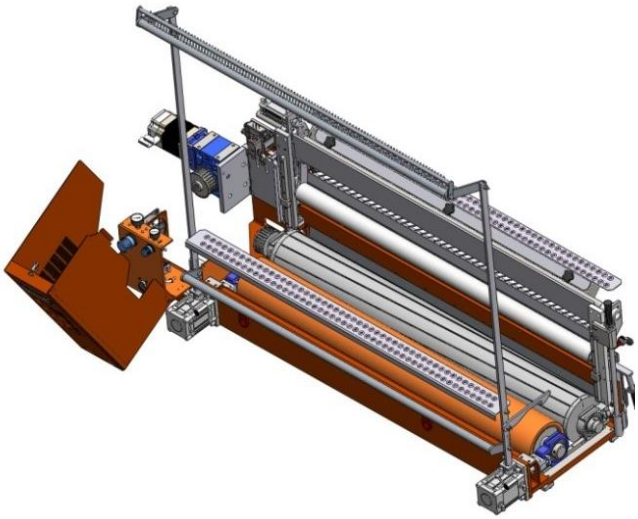


Figure 38

At this point, you can lift the Cutting Rollers by using the lifting device, supplied with the CHOPPER.

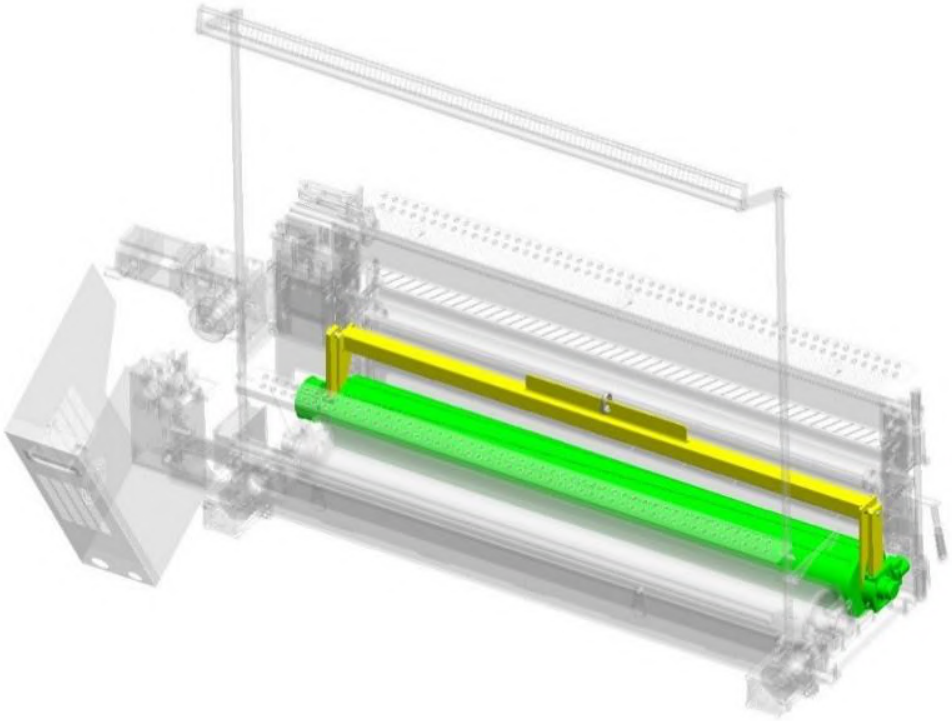


Figure 39

5.3. Recommended spare parts

Here are the components, which always have to be in stock as critical, or wear and tear parts.

Description	Quantity
Blade L= 0300	80
Blade L= 1600	120
Spring L = 0300	40
Spring L = 1600	60
Polyurethane Coated Roller L = 0300	1
Polyurethane Coated Roller L = 1600	1
Transmission pulley	2

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