

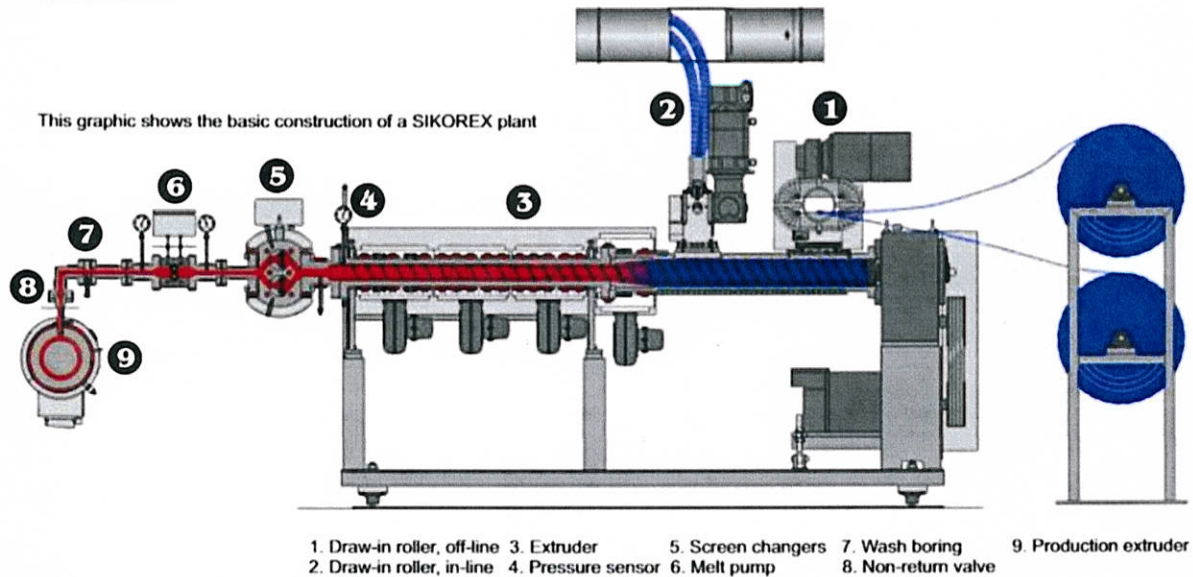
In the SMS non-wovens industry if you could not reclaim at least 95% of yield 2 waste material it would be financially nonviable. Processing waste rolls, trim waste, slab waste and spin waste are unavoidable shrinkages in this industry.

There are a couple of means to reclaim and re-use the waste material. One is pelletizing – melting the reclaimed material and making them back into resin pellets again and feeding that back into the storage silos and the other is by co-extrusion – melting the reclaimed material in a co-extruder and extruding it directly back into the main product extruder.

The co-extruder consists of two main parts, the extruder and the intake feed unit. There were three (3) production lines with a total of ten (10) co-extruders. This is a 24/7 operation. The intake units were suffering from very poor availability. Collectively the **Mean Time Between Failure** was twelve (12) days before they would have a 'melt-down'. A melt-down is when the material would become clogged in the intake unit and the friction of the material infeed nip rollers rubbing together would cause the material to plasticize to a molten liquid and eventually seize the intake unit. The maintenance department would then have to remove the unit, take it to the workshop and chip and break out the hardened plastic and rebuild the unit. **Meantime To Repair** was 1.5 days.

IN-LINE RECYCLING PLANTS FOR THERMOPLASTIC PLASTICS

SIKOREX



HOW IT WORKS

- The material is fed directly from the winder (edge trims) and/or from the unrolling stand (rollers) by one or two infeeders.
- Then it is drawn into the draw-in area of the extruder, compressed and melted.
- The incorporated pressure sensor monitors the melting pressure.
- The screen changer acts as the filter system for the melted material.
- At the melt pump it is possible to set a regulated return quota.
- A wash boring enables easy start up of the plant.
- In the last stage, the melted plastic is taken via a melt pipe into the production plant. An integrated non-return valve prevents melted material returning from the production plant into the SIKOREX extruder.

I would conduct an 'autopsy' each time this happened and I didn't see a failure with the bearings, the drive chain, the drive sprockets, the nip rollers, the shafts or anything else. To cut a long story short; the intake units themselves are a simple machine. I conducted throughput tests and conducted many trials and experiments and everything was pointing predominately to incorrect operational use. I interviewed all twelve (12) of the co-extruder operators and each one had their own way of starting up running and shutting down the units. I of course studied the manufacturer operation manual and consulted with subject matter experts and drafted this standardized work instruction.

I trained all the co-extruder operators to the new work instruction, many of whom had a part in helping me write the work instruction. This way they had a sense of involvement.

Six month later the results were just by increasing operator awareness and training in the proper use of the co-extruder intake units the **Meantime Between Failure** went from **12 days** to **48 days**. That is a **300%** improvement. Not only did it improve uptime, but it freed the maintenance department of having to constantly repair these units on almost daily basis, which was stressful and frustrating for them to have do so.

This is the standardized work instruction document that I produced. It is very detailed, very accurate.

	<h1>WORK INSTRUCTION</h1>	Document Number: S-SM-EXT-7045
		Revision: 9.0
<h2>OPERATION OF CO-EXTRUDERS & INTAKE UNITS</h2>		Created Date: 05/01/2019
		Effective Date: 07/08/2019
		Supersedes Date: 00/00/0000

1. PURPOSE.

1.1. This work instruction document has been created to standardize the operation of the co-extruders and intake units. The job tasks in this document form the best known and agreed upon way for the most reliable methods of operating the co-extruders and intake units. The practice of setting, communicating, training and adherence to these best practices will ensure operational performance, capacity throughput and reliability. Eliminating **variation** in operation shift to shift, individual to individual and legacy modes of operation is essential.

2. SCOPE.

2.1. The scope of this document details the operational use of the co-extruders and intake units for SC1, SC2 and SC3 at the Fitesa, spunbond plant 1 Simpsonville, South Carolina, USA.

3. DEFINITIONS.

3.1. HMI (Human Machine Interface).

4. REFERENCES.

4.1. Documentation.

- 4.1.1. S-SM-EXT-7050 Removal of Material from the Co-extruders
- S-OP-GEN-8203 Co-Extruder Purge out After Extended Down
- S-SM-EXT-7339 Control of Co-Extruder Materials Reclaim

4.2. Forms.

- 4.2.1. EXT-ADM-8100 Co-Extruders Reclaim Control Sheet

5. RESPONSIBILITY.

5.1. Co-extruder Attendant.

6. FREQUENCY.

6.1. As the work content, sequence, timing and outcome determines the work to be performed.

7. MATERIALS.


7.1. No materials are required in this work instruction.

8. TOOLS.

X1, Manual or electric operated pallet truck. X1, Poly rod feed tool. X1, 25 feet poly rope. X1, Scissors.

9. SAFETY.

9.1. All Fitesa, Simpsonville safety policies and practices of personal protection, conduct and housekeeping are in effect with this work instruction.

	<p>WARNING: DO NOT put your hands inside the intake unit. High risk of pinching in moving rollers.</p>
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9.2. Personal Protective Equipment.

9.2.1. Safety shoes, safety glasses, leather gloves, hearing protection.

9.3. Safety Guidelines.

10. APPENDIX 1.

10.1. USE OF THE TABLET REMOTE CONTROL TO ACCESS EXTRUDER/CO-EXTRUDER HEATER PAGES AND CO-EXTRUDER SUPERVISORY PAGES.

11. APPENDIX 2.

11.1. TROUBLE SHOOTING GUIDE & CHILLED WATER BALL VALVES ON/OFF POSITIONS.

12. APPENDIX 3.

12.1. REACTION PLAN TO POLY FEED ROD TOOL BEING PULLED INTO INFEEED UNIT

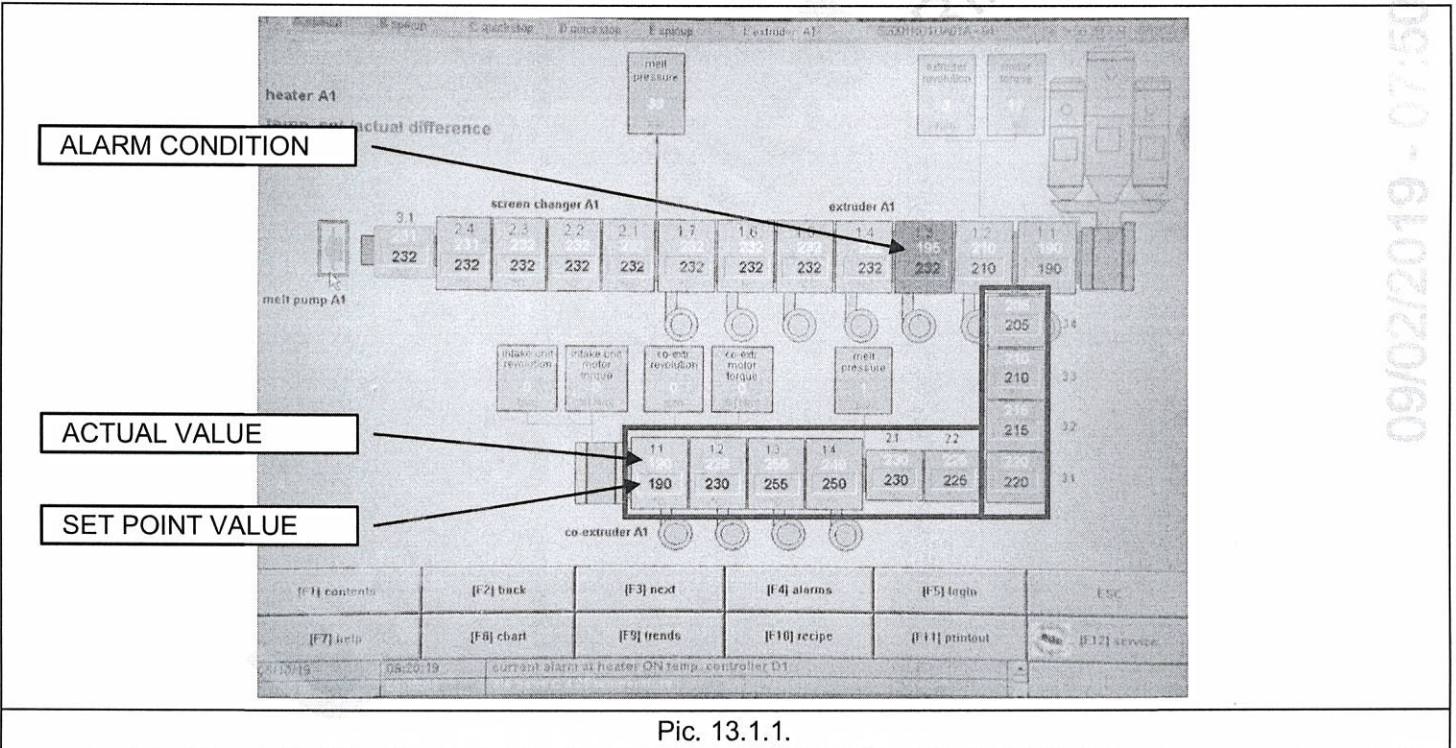
13. PROCEDURE.

13.1. HEATING UP CO-EXTRUDERS SC1-SC2-SC3.

13.1.1. Go to the Reicofil operator HMI console keyboard and access the co-extruder heater pages by using the following keyboard short keys to view the temperatures heater zones of the extruder and co-extruders pages (see red outline (Pic. 13.1.1.). Type A+3, B+3 E+3 (SC1) A+3, B+3, E+3, F+3 (SC2) A+3, B+3, D+3 (SC3) to view each extruder/co-extruder temperature heater zones pages.

13.1.2. At each of the extruder/co-extruder temperature heater zone page, review each co-extruder temperature heating zone (gray boxes) and check that each is within the range of +/- 6°C of the set points. The set point value is the blue font and actual value is the yellow font (Pic. 13.1.1.). If the actual value is above or below the set point value of +/- 6°C or if the grey box is red (alarm condition) call the maintenance department to investigate.

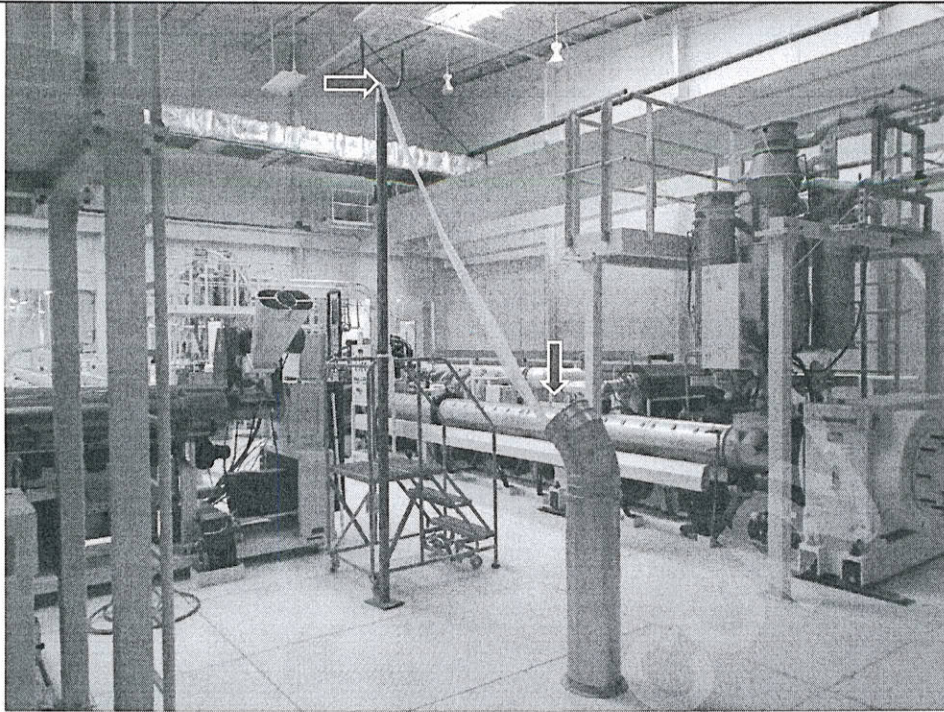
13.1.3. Type L+8 to return to the overview page.



13.2. THREADING THE ROLL MATERIAL.

13.2.1. If the co-extruder intake unit has no existing roll material fed in the intake unit, feed material as detailed in 13.2.1.1.

13.2.1.1. Go to the 3rd floor and using the poly feed rope (kept on 3rd floor) feed it down through the guide ducting to the ground floor. Go to the ground floor and tie the amount of roll materials to the poly feed rope. Go back to the 3rd floor and pull up the roll materials from the ground floor to the third floor and feed over the guide post – if installed (Pic. 13.1.2.).



Pic. 13.1.2.

- 13.2.2.** If the co-extruder does have existing roll material fed into the intake unit ensure that there are no clogs or problems at the intake unit. If there is a clog contact maintenance and enter a work order to have the intake unit unclogged.

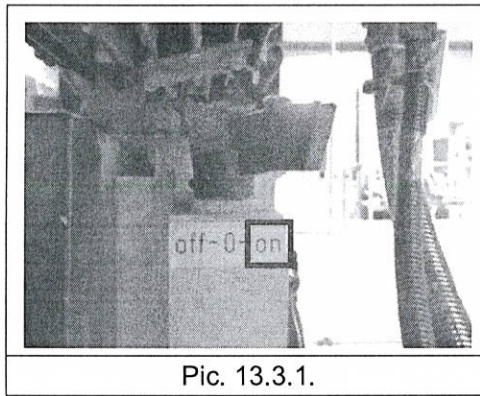


NOTE:

If the co-extruder has been down for longer than 4 hours refer to document S-OP-GEN-8203 Co-Extruder Purge out After Extended Down.

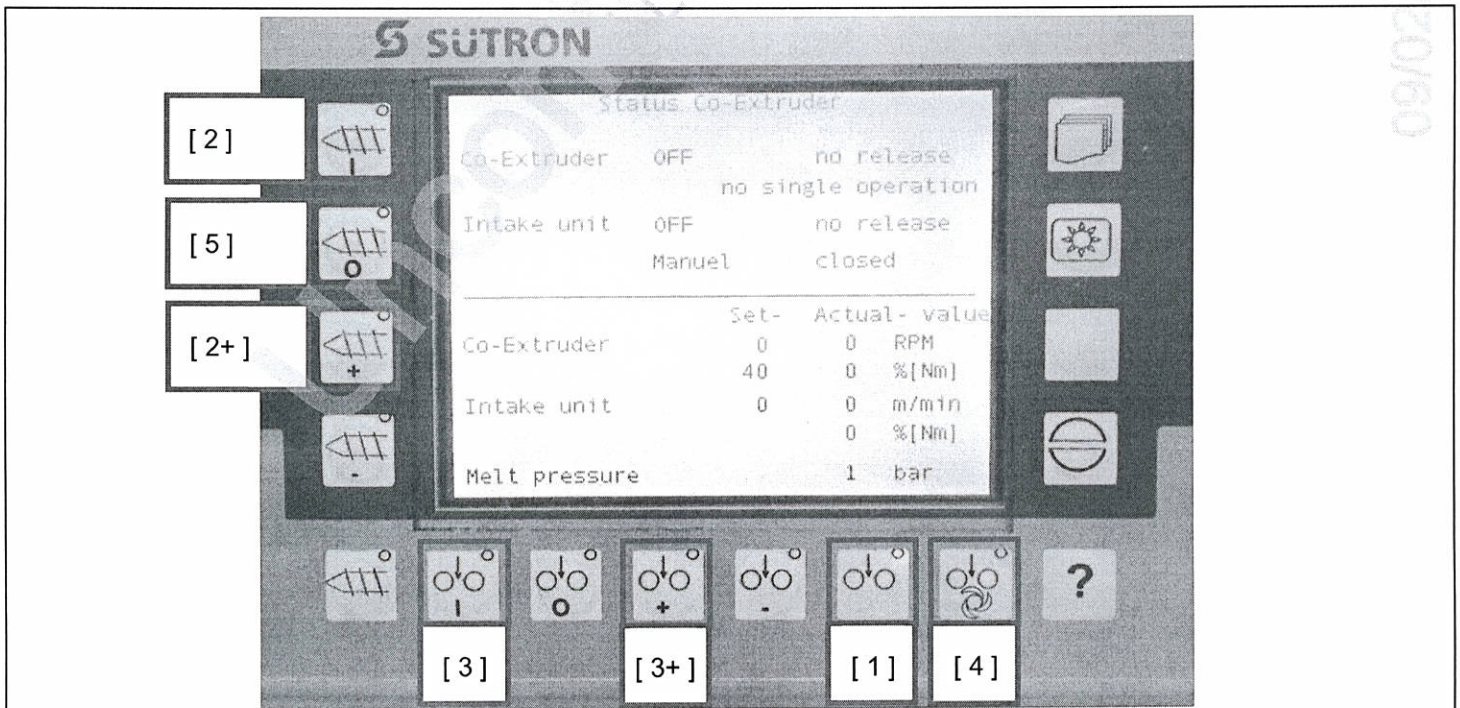
13.3. STARTING UP CO-EXTRUDERS AND INTAKE UNITS SC1-SC2-SC3 (Pic. 13.3.2. – Pic. 13.3.3.).

- 13.3.1.** Go to co-extruder HMI on 3rd floor.
- 13.3.2.** Press/Touch [1] to set the co-extruder and intake unit in manual mode.
- 13.3.3.** Press/Touch [2] to start up the co-extruder and then press [2+] to set to **4 RPM (SC1) 4 rpm (SC2-SC3)** check co-extruder drive is rotating by observing the drive belt pulley through the guard (if it is not rotating this is an indication that the co-extruder has a melt-down, Press/touch [5] to shut the co-extruder down and call the maintenance department to investigate). If the drive belt pulley is rotating proceed next to press/touch [2+] to set to **155 RPM (SC1) rpm (SC1-SC2-SC3)**.
- 13.3.4.** Press/Touch [3] to start up the intake unit and then press [3+] to set to **5 m/min (SC1). 12 rpm (SC2-SC3)**. SC2 and SC3 minimum intake unit speed is set at **12 rpm** and cannot be set any lower.
- 13.3.5.** Make sure that the intake unit infeed nip roller air valve is turned to the **on** position (Pic. 13.3.1.).



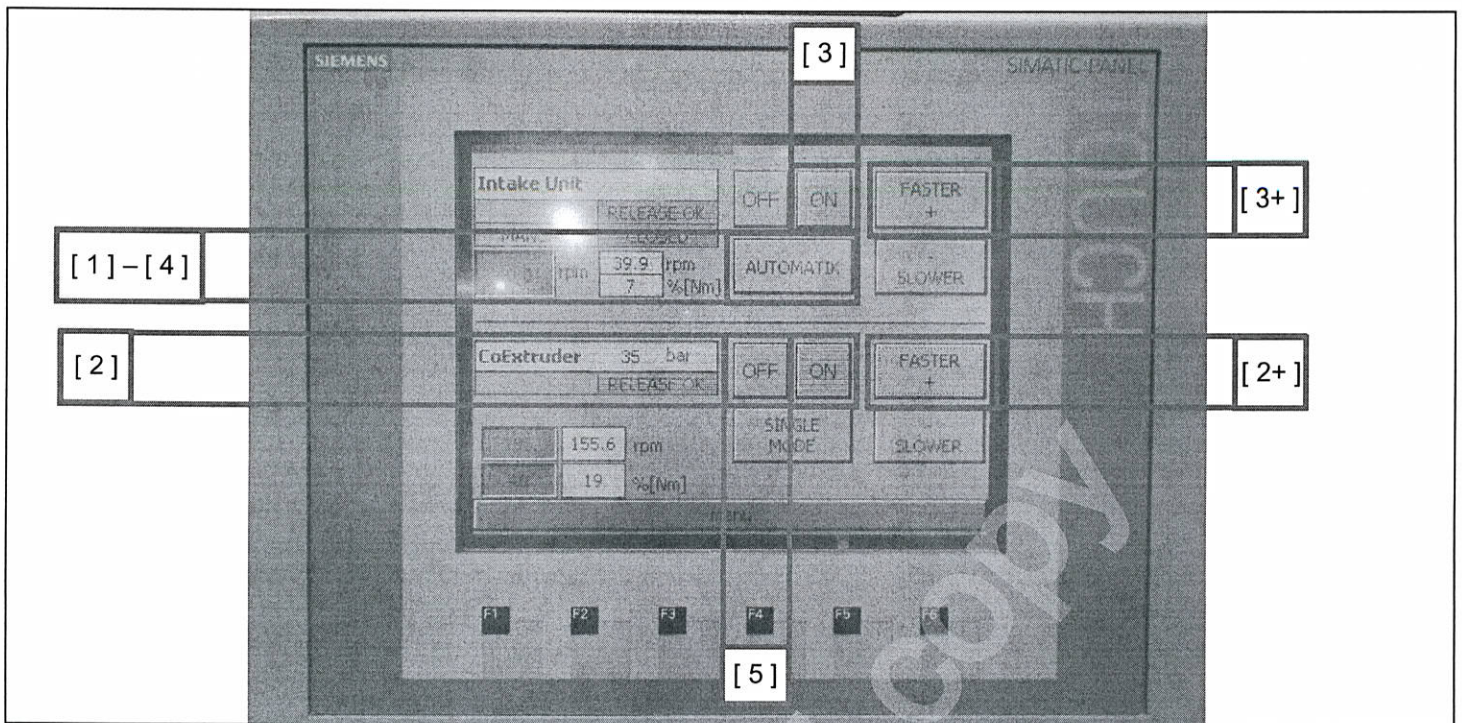
Pic. 13.3.1.

- 13.3.6. If there is no existing roll material fed into the intake unit cut the roll material from the ploy rope and use the poly rod tool to push roll material into the intake unit funnel until the infeed nip rollers catches the roll material and it starts pulling it in - **DO NOT PUT YOUR HANDS INSIDE THE FUNNEL**
 - 13.3.6.1. **DO NOT** push the poly feed tool down past the **RED** line marked on its length end and the lip of the funnel. Doing so can cause the poly feed tool to become feed into the co-extruder.
- 13.3.7. Maintain this operation to build **Melt pressure (SC1) CoExtruder (SC2-SC3)** pressure until it reaches **25 bar**.
- 13.3.8. Press/Touch [3+] to speed up the intake unit to **10 m/min (SC1) 12 rpm (SC2-SC3)**. SC2 and SC3 minimum intake unit speed is set at **12 rpm** and cannot be set any lower.
- 13.3.9. Maintain this operation until **Melt pressure (SC1) CoExtruder (SC2-SC3)** reaches **40 bar**.
- 13.3.10. Maintain this operation for 3 minutes - this time is necessary to completely fill the co-extruder barrel screw with material.
- 13.3.11. Press/Touch [4] to set co-extruder and intake unit in automatic mode.



Pic. 13.3.2.

SC1 HMI (membrane push button operated)



Pic. 13.3.3.
SC2 –SC3 HMI (touch screen operated)

13.4. GOOD MANUFACTURING PRACTICES TO ENSURE THE OPTIMIZED OPERATIONAL PERFORMANCE AND MAINTENANCE LEVELS OF THE CO-EXTRUDERS AND INTAKE UNITS. (Improper care and attention in the operation of the co-extruders by not adhering to centerlines and not closely monitoring running conditions will result in co-extruder intake unit melt-downs and equipment breakdowns). Monitoring of the co-extruder intake units is done by going to the Reicofil operator HMI counsel or tablet remote control.

13.4.1. MONITORING THE CO-EXTRUDERS AND INTAKE UNITS.

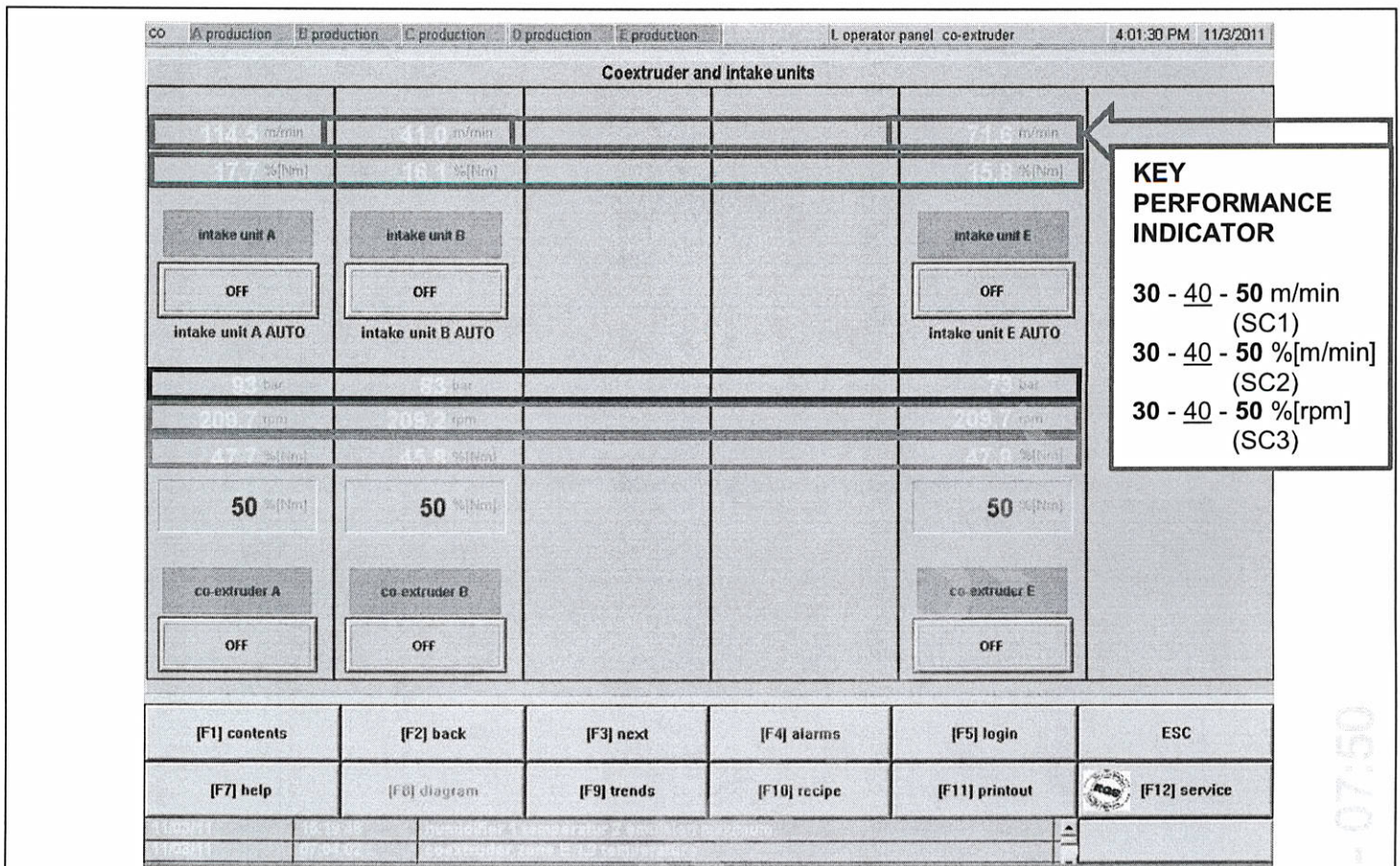
13.4.1.1. Maintain the same amount of material throughout the shift. If you see cores laying on the floor, pick them up, throw them away and replace them with the same width and basis weight rolls.

13.4.2. MAINTAINING OPTIMUM PERFORMANCE OF THE CO-EXTRUDERS AND INTAKE UNITS.

13.4.2.1. Monitoring of the **m/min** (SC1) or **%[m/min]** (SC2) or **%[rpm]** (SC3) is the **KEY PERFORMANCE INDICATOR** to ensuring capacity operation and reliability performance of the co-extruder and intake unit.


The speed the roll materials are fed to the co-extruders must be controlled to prevent damage to the intake units. Too much roll material will put a strain on the infeed nip rollers gears and drives leading to equipment failure and breakdowns. On the other hand, not enough roll material being fed into the intake unit will make the intake unit infeed nip rollers turn at the maximum speed of 125 m/min which also puts a strain on the drive chains, gears and bearing also leading to equipment failure and breakdowns. Follow the instructions in this work instruction to maintain optimum performance and reliability by frequent viewing of the **Co-extruder and Intake Units** supervisory pages (Pic. 13.4.1.).

13.4.2.2. Access the co-extruder and Intake unit supervisory pages by going to the Reicofil operator HMI console keyboard and type the short key A+9. This will open the **Co-extruder and Intake Units** supervisory page.



Pic. 13.4.1.
SC1-SC2-SC3 Reicofil Operator HMI Console

- 13.4.2.3.** Look at the values of **m/min** (SC1) or **%[m/min]** (SC2) or **%[rpm]** (SC3) for each of the co-extruder intake units. If the value is above **50 m/min** (SC1) or above **50 %[m/min]** (SC2) or **50 %[rpm]** (SC3) you do not have enough roll material being fed into the intake unit. The corrective action is to add more roll material according to the GSM and roll material width. Conversely, if the value is below **30 m/min** (SC1) or below **30 %[m/min]** (SC2) or below **30 %[rpm]** (SC3) you have too much roll material being fed into the intake unit and the corrective action is to remove roll material.
- 13.4.2.4.** The working range is between **30 to 50 m/min** (SC1) or **30 to 50 %[m/min]** (SC2) or **30 to 50 %[rpm]** (SC3) with **40 m/min** (SC1) or **40 %[m/min]** (SC2) or **40 %[rpm]** (SC3) being the optimum. Maintaining this feed rate into the co-extruders will greatly increase the service life of the intake units.

	NOTE:	Running the co-extruder intake units higher than 50 m/min (SC1) or 50 %[m/min] (SC2) or 50 %[rpm] (SC3) will cause the intake units to speed up too fast to try and satisfy the torque and melt pressure requirements resulting in 'stuffing' the intake unit with roll material resulting in clogging the throat of the intermediary cylinder part of the co-extruder screw barrel and causing a melt-down, failure and equipment breakdown.
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- 13.4.2.5.** For detailed information about the optimum parameters and their working ranges refer to Table 13.4.2.

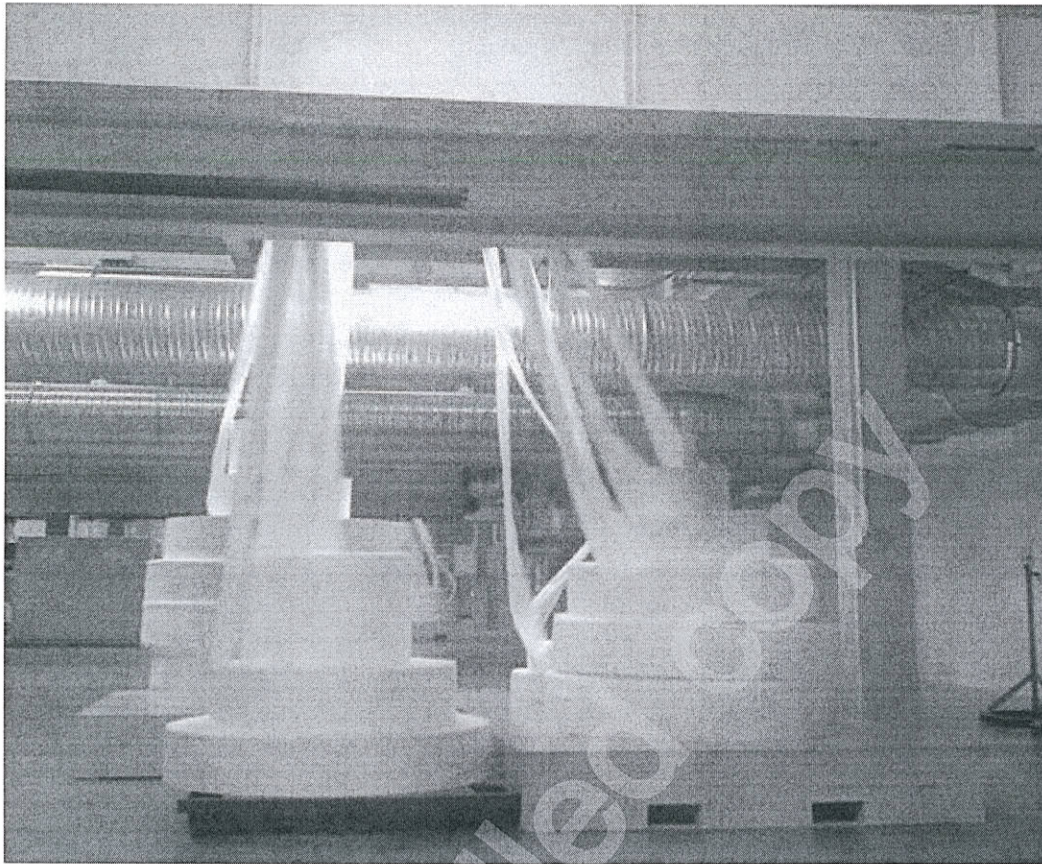
PARAMETER	OPTIMUM WORK RANGE	COMMENTS
<u>Speed Intake Unit</u> Will self-adjust to reach the set torque for co-extruder.	30 m/min (rpm) – 50 m/min(rpm)	The maximum speed for intake rollers is 125 m/min (rpm). Values higher than 50 m/min (SC1) or 50 %[m/min] (SC2) or 50 %[rpm] (SC3) indicates there is not enough material being fed and the intake rollers are spinning too fast to keep up with the torque set on co-extruder. In this case the co-extruder will be under-recycling.
<u>Torque Intake Unit</u> The will vary according to the amount of roll material and speed of intake rollers.	10%[Nm] – 30%[Nm]	Attention if torque is higher than 40% [Nm]. It indicates there may be a wrap or some other type of restriction on the spinning of the intake rollers (i.e. damaged part)
<u>Pressure co-extruder</u> This will vary according to the amount of material on the barrel of the co-extruder.	Higher than 70 bar	If pressure is lower there is not enough material feeding in the co-extruder and it is under-recycling. A low pressure is followed by high speed on intake rollers and low torque on co-extruder.
<u>Speed co-extruder</u> Value set on HMI panel by the co-extruders on the top floor.	155-180 rpm	Control parameter
<u>Torque co-extruder</u> Value set on HMI panel or supervisory screen.	30%[Nm] – 50%[Nm]	The actual torque on the co-extruder must be around the set point this indicates intake unit are conveying enough roll material to the co-extruder.

Table 13.4.2.

13.4.3. MAINTAINING A GOOD MIX OF DIFFERENT BASIS WEIGHTS AND DIFFERENT CUT SIZES Q2 AND EDGE TRIM ROLL MATERIALS.

13.4.3.1. Maintain a good mixture of different basis weights and cut sizes to feed into the intake units. Make sure pallets with stacked rolls are properly organized and also placed under the feed guide ducting in a way that the roll materials are pulled continuously and do not get stuck or entangled on poles or machine structures. If roll material get stuck, they will stress the intake unit of the co-extruder that may lead to equipment failure (Pic. 13.4.3.).

	WARNING:	WHEN WALKING THROUGH THE CO-EXTRUDER AREAS USE CAUTION WHEN WORKING DIRECTLY UNDER THE INTAKE DUCTING. BEWARE OF FALLING CORES THAT CAN BE PICKED UP BY THE ROLL MATERIALS AND FALL TO THE FLOOR.
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Pic. 13.4.3.

13.4.4. WALKING THE FIRST FLOOR AROUND THE PALLETS AS OFTEN AS POSSIBLE TO ENSURE THAT THE CO-EXTRUDERS ARE NOT RUNNING LOW OR OUT OF MATERIAL.

13.4.4.1. Keep a routine of walking through the co-extruder areas as often as possible so that you will be able to spot potential problems before they happen.

13.4.5. ALWAYS CHECK ON 3RD FLOOR FOR ANY PROBLEMS AND NOTICE FROM THE INTAKE UNIT.

13.4.5.1. If any of the intake units sound very noisy call the maintenance department to investigate. As you become experienced at operating the co-extruders you will develop an eye for seeing from a distance if the roll materials are being fed at a rate consistent with the range as described in Table 13.4.1. This 'by-eye' observation is not a substitute for frequent monitoring of the co-extruders and intake units as mentioned earlier in this work instruction.

13.4.6. JOINING OF ROLL MATERIALS TOGETHER TO FEED TO INTAKE UNIT.

13.4.6.1. When you have to join additional roll material to the existing roll materials being fed up into the intake units you do this by taking the end of the roll material to be added and interlace that roll material end through and around many other existing roll materials until it is caught and pulled up by the those existing roll materials (Diagram 13.4.1) this is also a safer method to prevent 'rope burn'.

13.4.6.2. DO NOT TIE THE ROLL MATERIALS TOGETHER IN A KNOT. Tying the roll materials together in a knot can cause the intake unit infeed nip roller to jam and cause a melt-down resulting in failure and equipment breakdown.

13.4.6.3. If you see 'run-a-way' rolls on the floor pick them up and place back on pallet stack or remove material and discard core. This is to prevent strain on the intake unit and is a contamination risk.

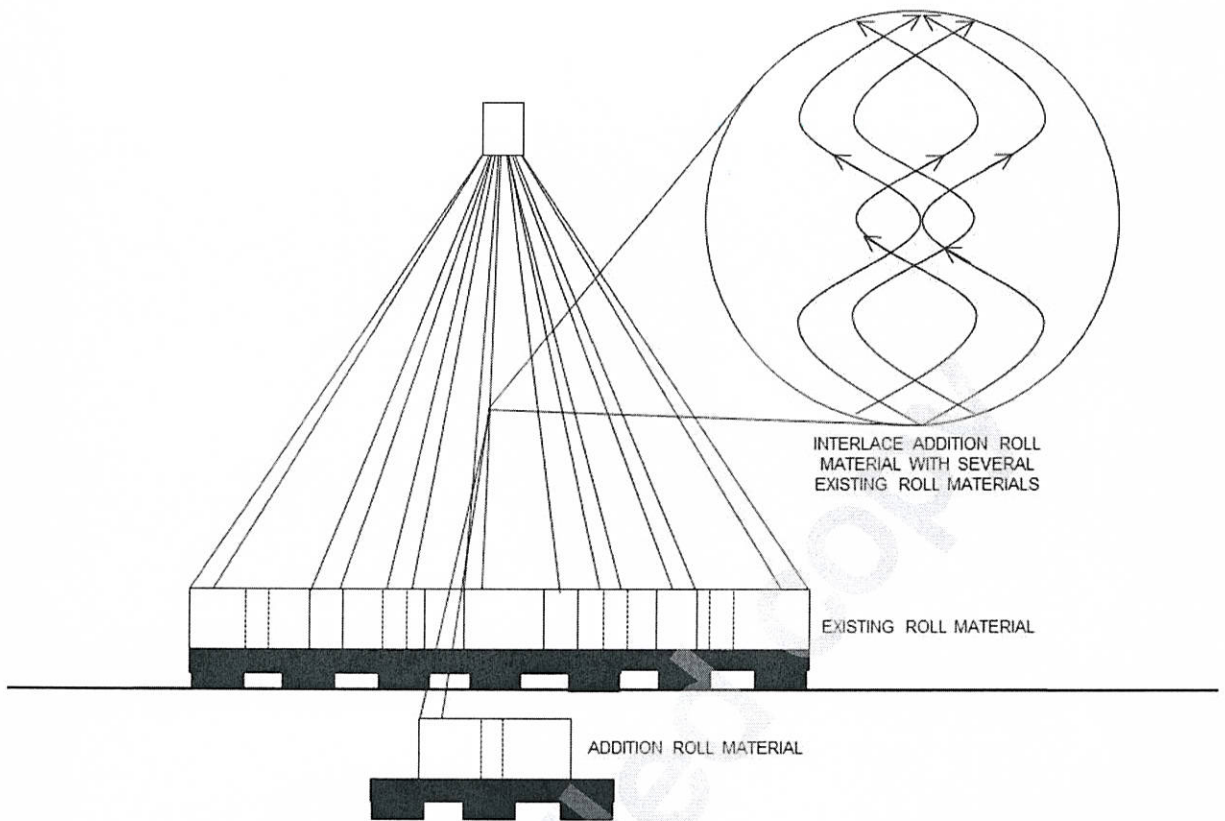


Diagram. 13.4.1.

13.5. PRODUCTIVITY OF THE CO-EXTRUDERS.

13.5.1.1. Co-extruder attendants must ensure the co-extruders are operational and recycling reclaimed material continuously and at proper throughput. The max throughput for co-extruders is established as 120 kg/h (SC1-SC2) and 180 kg/h (SC3) by contract. The co-extruder throughput depends basically upon the amount of material in the barrel and the speed of the co-extruder screw. These two variables are controlled, respectively, by TORQUE % [Nm] and SPEED rpm of extruder screw. The following chart shows how the THROUGHPUT (kg/hour) varies as a function of TORQUE and SPEED (Graph 13.5.1.).

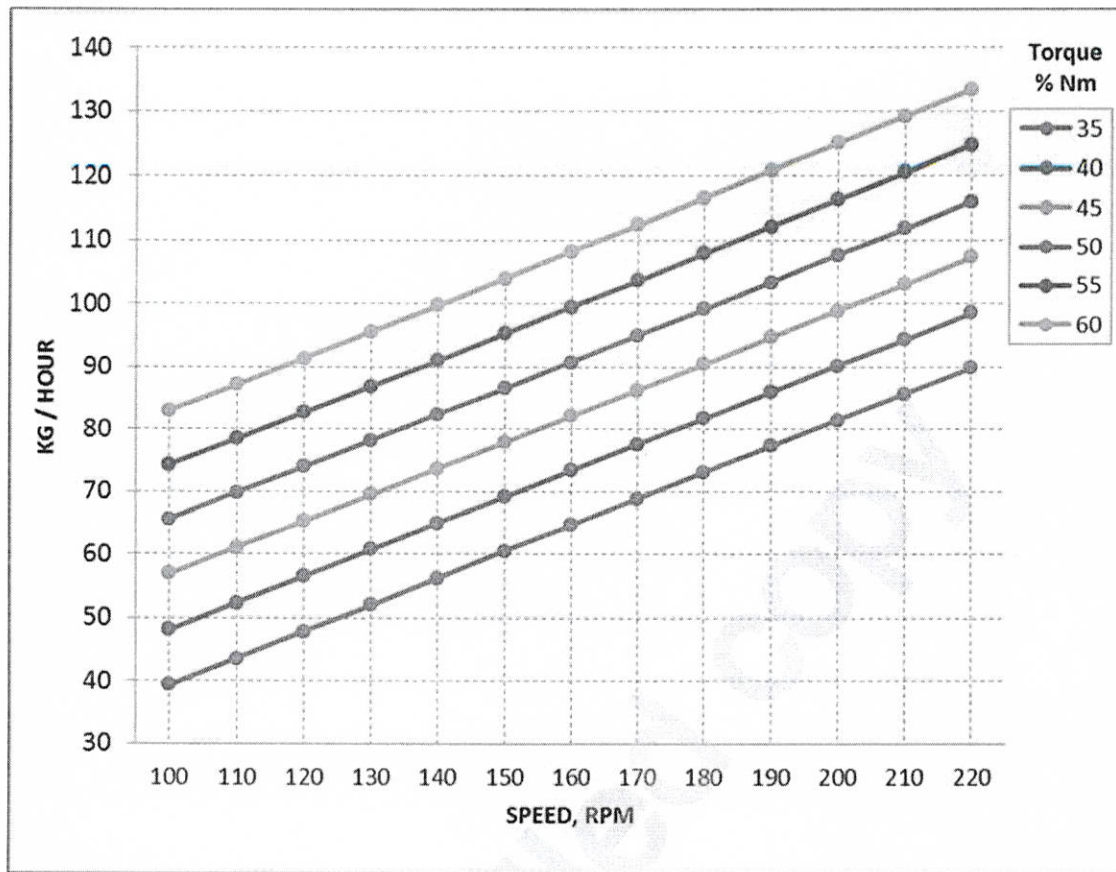
$$\text{Throughput (kg/h)} = 0.85 \times (-74.9 + 2.05 \times \text{Torque} + 0.495 \times \text{Speed})$$

13.5.1.2. As a rule, the co-extruders should be set up to maximize throughput. However, it is critical to balance out the throughput with the capacity to maintain the co-extruders fed with enough roll material. The minimum recommended set-up for co-extruders is:

TORQUE: 40 % [Nm]
SPEED: 155 rpm

THROUGHPUT: 120 kg/hour (SC1-SC2) and 180 kg/hour (SC3)

13.5.1.3. Failing to feed the co-extruders properly will end up in a lower torque on the co-extruder screw and consequently a lower throughput. In this case intake unit rollers speed will be around its maximum capacity (125 RPM) which will cause a melt-down of the intake unit. Refer to Graph 13.5.1. to see the relationships between the input of the speed of the co-extruder and the torque setting to Kgs per hours output.



Graph 13.5.1.

13.5.2. ADJUSTMENT OF THE INTAKE UNIT INFEED NIP ROLLERS AIR PRESSURE FORCE.

13.5.2.1. Rotation of the intake unit infeed nip rollers will be high for 'thick' roll material and low for 'thin' roll material. The pressure force of the infeed nip rollers should be lower for 'thin' roll material and higher for 'thick' roll material. The recommended air pressure settings are as follows:-

THIN ROLL MATERIAL = 3 – 4 BAR.

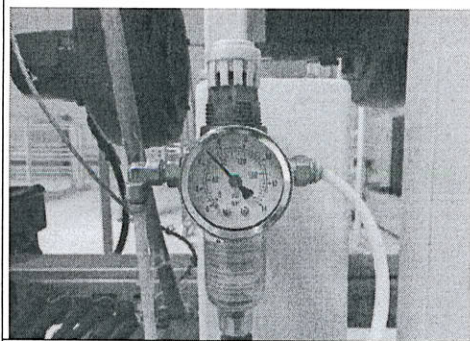
THICK ROLL MATERIAL = 5 – 6 BAR.

13.5.2.2. Refer to Table 13.5.1. as a reference for setting of the appropriate air pressure force for the infeed nip rollers to the GSM of roll materials being used. If the pressing force of the infeed nip rollers is too high or too low single or all roll material will not feed orderly.

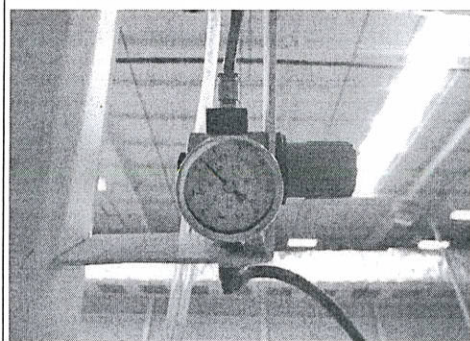
THIN (GSM)	THICK (GSM)
8 – 8.5 – 10.5 – 12 – 13.5 – 15 – 16 – 17 – 18 – 20	21 – 23 – 25 – 30 – 35 – 40 – 42 – 65 – 68 – 72
3 – 4 BAR	5 – 6 BAR

Table 13.5.1.

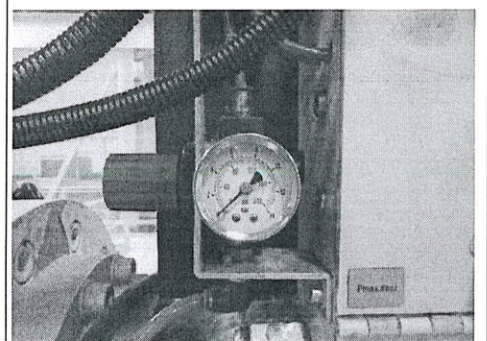
13.5.2.3. Adjust the air pressure regulator to the correct air pressure setting by pulling the adjusting knob up to unlock the knob and turn clock-wise to increase the air pressure or turn counter clock-wise to reduce the air pressure. Push the adjusting knob back down to lock (Pic. 13.5.1. SC1). (Pic. 13.5.2. SC2). (Pic. 13.5.3 SC3).



Pic. 13.5.1.
(SC1)



Pic. 13.5.2.
(SC2)



Pic. 13.5.3.
(SC3)

13.5.2.4. Check and make sure that the chilled water line valves for the intermediate cylinder (co-extruder screw throat) are **open**. If these valves are closed it will cause the intermediate cylinder to overheat causing a melt-down. Refer to **APPENDIX 2. TROUBLE SHOOTING GUIDE & CHILLED WATER BALL VALVES ON/OFF POSITIONS** for correct valve open position.

13.6. RECYCLING PROCESS – (YIELD 2).

13.6.1. Roll material and downgraded rolls must be recycled unless they are contaminated with metal particles or something else that prevents feeding them back to the line (i.e. wet rolls, optical brightener contamination). The option to reclaim roll materials is **1st** reclaiming them in the co-extruders and **2nd** reclaiming them in the Erema to be re-pelletized.

Slitter and packaging operators must stack trim rolls on the pallets and stored them in the designated areas. If the designated area is full, the roll materials must be wrapped and stored in the warehouse.

Co-extruder attendant must check the area under the beam as often as possible. When a pallet is empty immediately bring one full pallet to keep feeding the co-extruders at the same feeding rate.



NOTE:

For a planned shutdown allow 15 minutes prior to the line stopping to begin the shutdown procedure as detailed in 13.7.

13.7. SHUTTING DOWN CO-EXTRUDERS AND INTAKE UNITS SC1-SC2-SC3. (Pic. 13.7.2. - Pic. 13.7.3.).

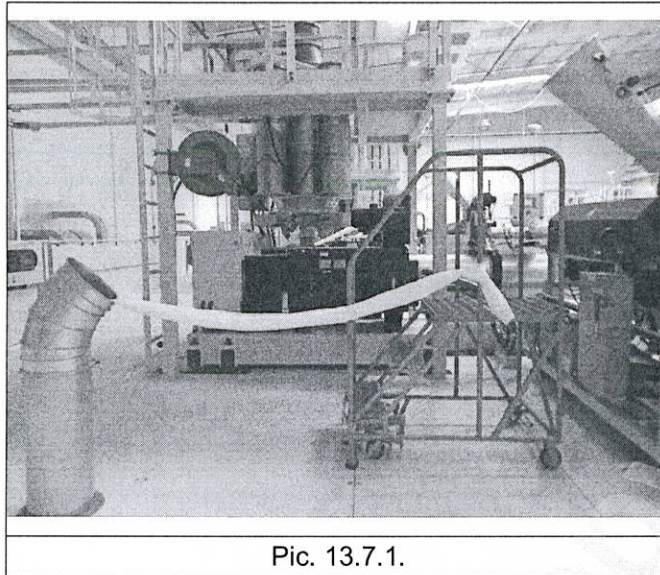
13.7.1. Go to co-extruder HMI on 3rd floor.

13.7.2. Press/Touch [1] to set the co-extruder and intake unit in manual mode (SC1-SC2-SC3).

13.7.3. Press/Touch [2-] to reduce the intake unit speed to the minimum speed **5 m/min (SC1) 12 rpm.** (SC2-SC3). SC2 and SC3 minimum intake unit speed is set at **12 rpm** and cannot be set any lower.

13.7.4. Using the pair of scissors, cut the roll materials being fed into the intake unit and tie off.

13.7.5. Let the cut off roll material feed into the intake unit (Pic. 13.7.1).



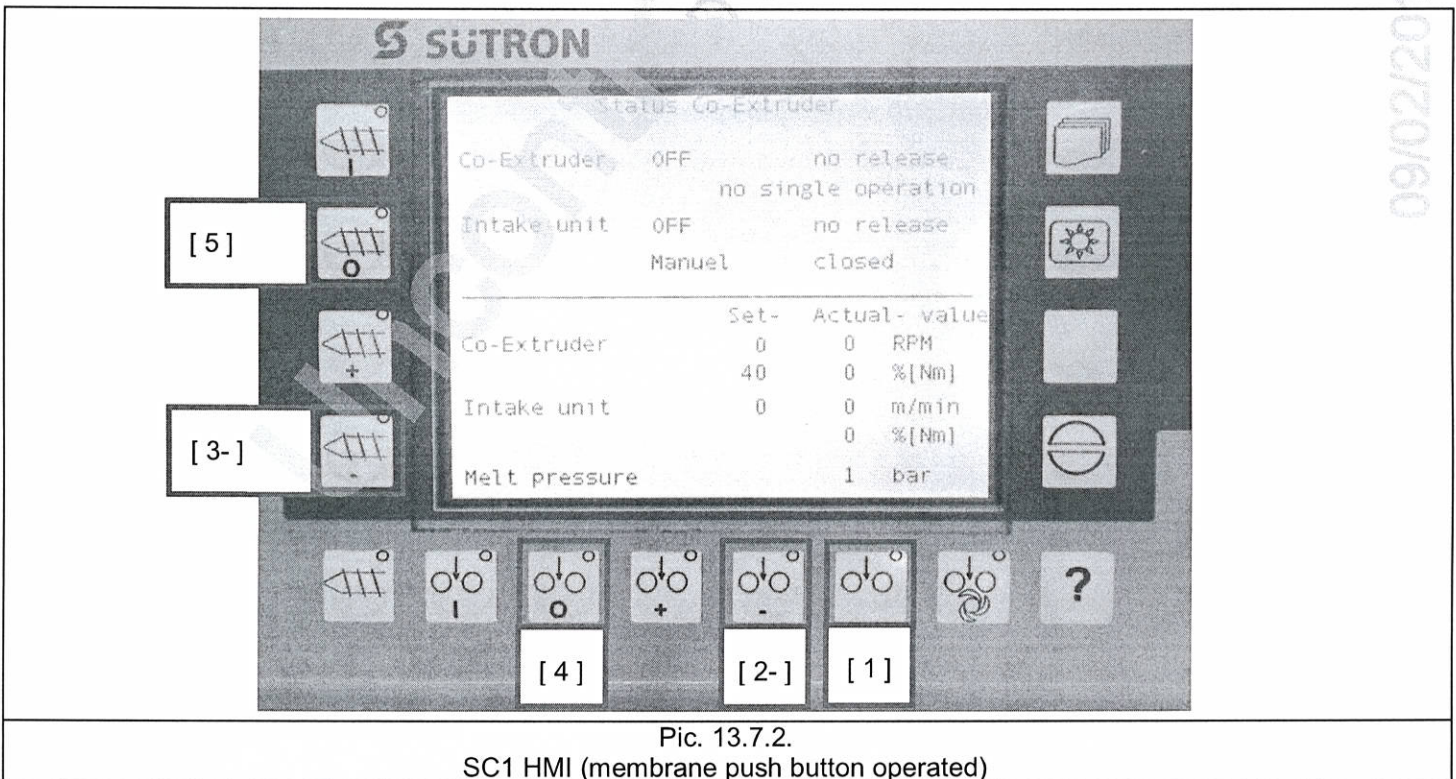
Pic. 13.7.1.

13.7.6. Press/Touch [4] to shut down the intake unit.

13.7.1. Maintain this operation until the co-extruder **Melt pressure** (SC1) **CoExtruder** (SC2-SC3) reduces to below **50 bar**.

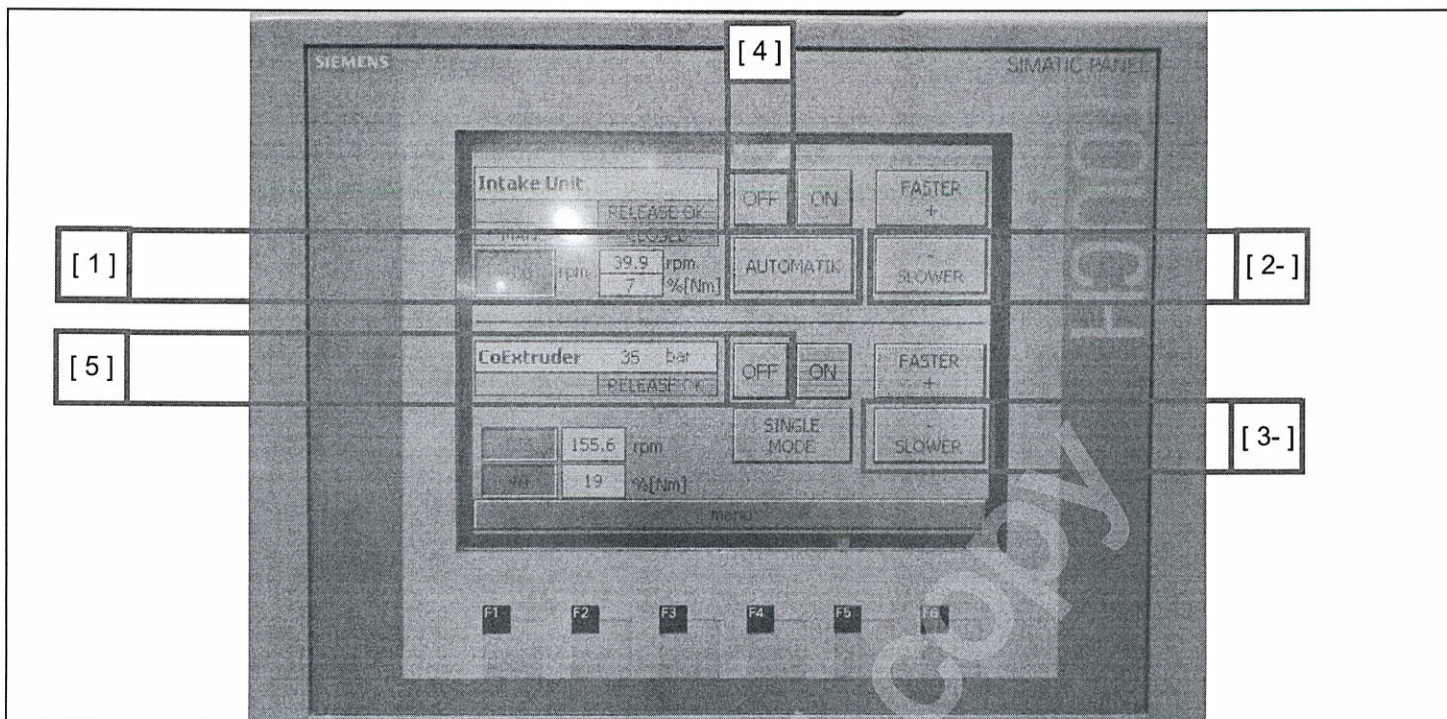
13.7.2. After **Melt pressure** (SC1) or **CoExtruder** (SC2-SC3) falls below **50 bar** maintain this operation for 1 minute.

13.7.3. Press/Touch [5] to shut down the co-extruder (SC1-SC2-SC3).



Pic. 13.7.2.

SC1 HMI (membrane push button operated)



Pic. 13.7.3.)
SC2 –SC3 HMI (touch screen operated)

APPENDIX 1: USE OF THE TABLET REMOTE CONTROL TO ACCESS EXTRUDER AND CO-EXTRUDER HEATER PAGES AND CO-EXTRUDER SUPERVISORY PAGES.

13.7.4. PROCEDURE – DELL LATITUDE RUGGED TABLET 7202 (SC1).

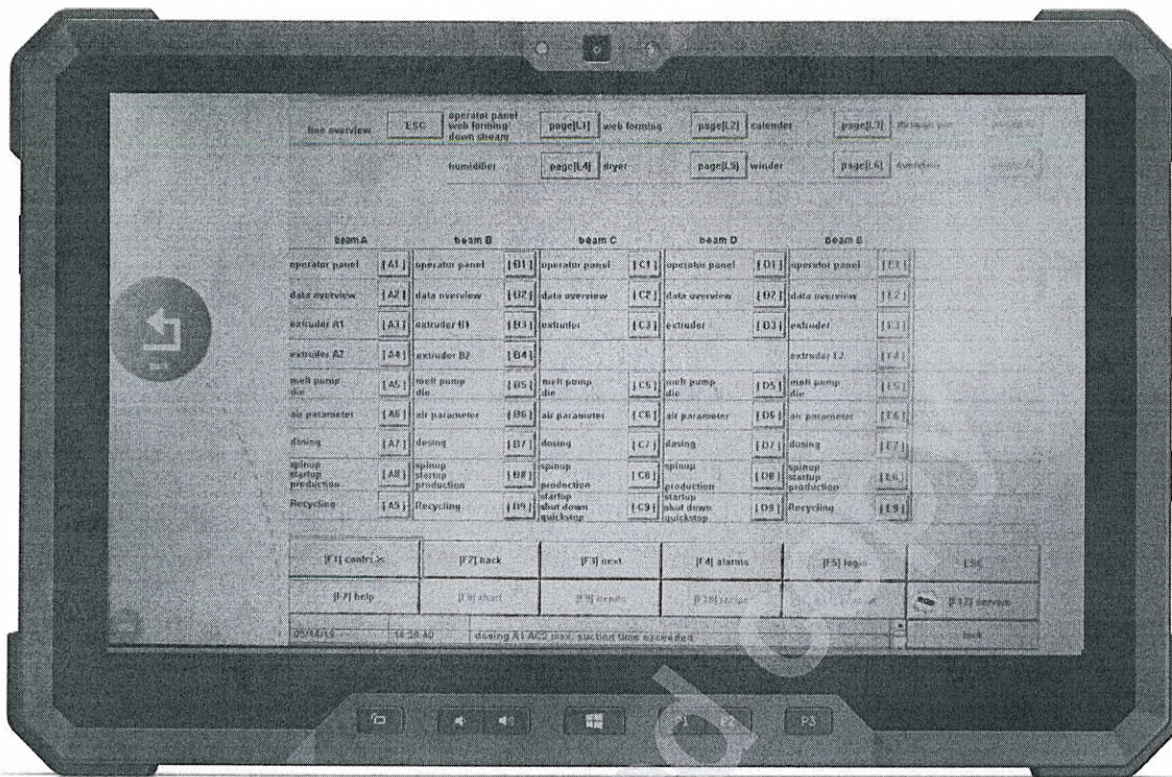
13.7.4.1. Using the tablet remote control to access the extruder/co-extruder heater pages and co-extruder supervisory pages is similar to using the keyboard short keys at the Reicofil HMI console. There are some differences in that you will be interacting with the tablet remote control using a stylus pen to tap on menu and command buttons and there is some differences in the identification and the names of the extruders and co-extruders between SC1, SC2 and SC3. You can use the tablet for convenience to save you from having to walk back and forth to the Reicofil HMI console to monitor the co-extruders and infeed units.

	<p>NOTE:</p>	<p>PRIORITY USE OF THE TABLET REMOTE CONTROL IS ALWAYS GIVEN TO THE REICOFIL OPERATOR FIRST IN ALL SITUATIONS IN ALL CASES.</p>
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13.7.4.2. SC1. Remove stylus pen from tablet. Tap on **[F1] contents**. Tap on **extruder A1 [A3]** to access extruder/co-extruder for A beam. Tap on **extruder B1 [B3]** to access extruder/co-extruder for B beam. Tap on **extruder [E3]** to access extruder/co-extruder for E beam heater pages. Tap on **[F1] contents**. Tap on **Recycling [A9]** to access A beam co-extruder. Tap on **Recycling [B9]** to access B beam co-extruder. Tap on **Recycling [E9]** to access E beam co-extruder and intake unit supervisory pages (Pic. 13.8.1.).

DO NOT ATTEMPT TO ACCESS ANY OTHER FUNCTIONS ON THE TABLET. If you become lost using the tablet ask the Reicofil operator for assistance.

13.7.4.3. Tap on **page[L8]** to return the tablet to overview page and return tablet to docking station or plug back in power cord and return to storage location.



Pic. 13.8.1.

13.7.1. PROCEDURE – PANASONIC TOUGH BOOK CF-H2 (SC2).



NOTE:

PRIORITY USE OF THE TABLET REMOTE CONTROL IS ALWAYS GIVEN TO THE REICOFIL OPERATOR FIRST IN ALL SITUATIONS AND IN ALL CASES.

13.7.1.1. SC2. Remove stylist pen from tablet. Tap on **[F1] contents**. Tap on **extruder A1 [A3]** to access extruder/co-extruder for A beam. Tap on **extruder B1 [B3]** to access extruder/co-extruder for B beam. Tap on **extruder [E3]** to access extruder/co-extruder for E beam. Tap on **extruder F1 [F3]** to access extruder/co-extruder for F beam heater pages. Tap on **[F1] contents**. Tap on **co-extruder [A9]** to access A beam co-extruder. Tap on **co-extruder [B9]** to access B beam co-extruder. Tap on **co-extruder [E9]** to access E beam co-extruder. Tap on **co-extruder [F9]** to access F beam co-extruder and intake unit supervisory pages (Pic. 13.8.2.).

DO NOT ATTEMPT TO ACCESS ANY OTHER FUNCTIONS ON THE TABLET. If you become lost using the tablet ask the Reicofil operator for assistance.

13.7.1.2. Tap on **page[L8]** to return the tablet to overview page and return tablet to docking station or plug back in power cord and return to storage location.



Pic. 13.8.2.

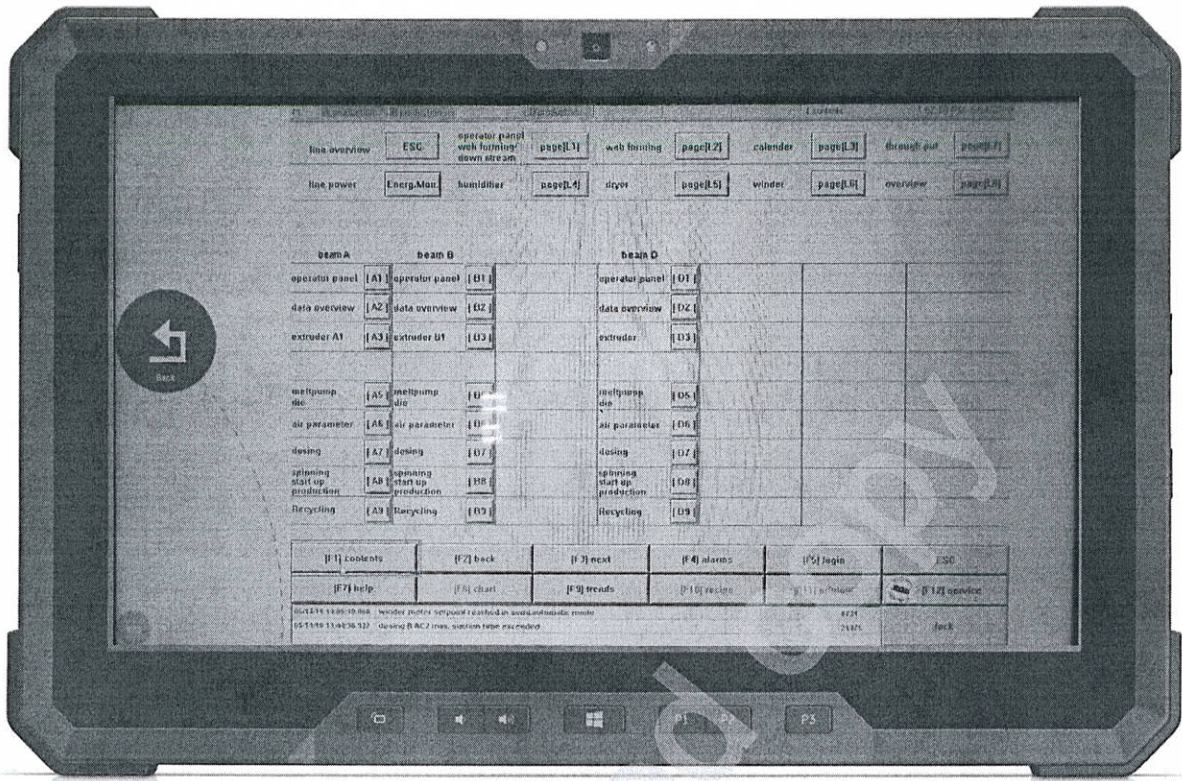
13.8. PROCEDURE – DELL LATITUDE RUGGED TABLET 7202 (SC3).

	NOTE:	PRIORITY USE OF THE TABLET REMOTE CONTROL IS ALWAYS GIVEN TO THE REICOFIL OPERATOR FIRST IN ALL SITUATIONS AND IN ALL CASES.
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13.8.1.1. Remove stylist pen from tablet. Tap on **[F1] contents**. Tap on **extruder A1 [A3]** to access extruder/co-extruder for A beam. Tap on **extruder B1 [B3]** to access extruder/co-extruder for B beam. Tap on **extruder [D3]** to access extruder/co-extruder for E beam heater pages. Tap on **[F1] contents**. Tap on **Recycling [A9]** to access A beam co-extruder. Tap on **Recycling [B9]** to access B beam co-extruder. Tap on **Recycling [D9]** to access E beam co-extruder and intake unit supervisory pages (Pic. 13.8.3).

DO NOT ATTEMPT TO ACCESS ANY OTHER FUNCTIONS ON THE TABLET. If you become lost using the tablet ask the Reicofil operator for assistance.



13.8.1.1. Tap on **page[L8]** to return the tablet to overview page and return tablet to docking station or plug back in power cord and return to storage location.



Pic. 13.8.3.

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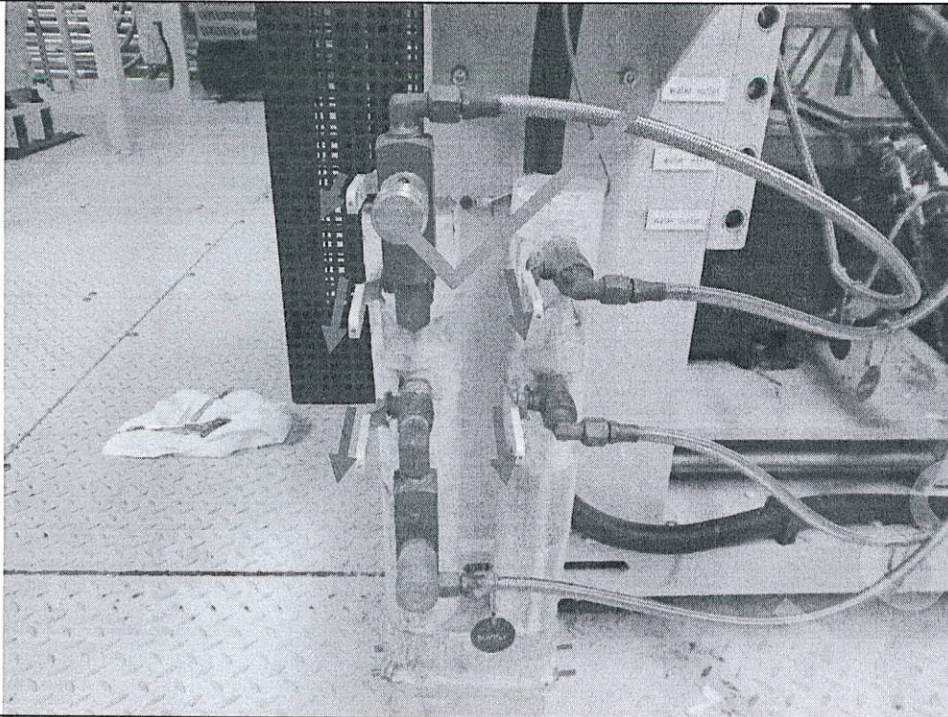
14. APPENDIX 2: TROUBLE SHOOTING GUIDE & CHILLED WATER BALL VALVES ON/OFF POSITIONS.

PROBLEM		CAUSE	CORRECTIVE ACTION
Intake unit will not start.		Roll material is jammed in infeed nip rollers.	Remove M4 bolts to front and back inspection covers and open front and back inspection covers. Pull out jammed material – Wear leather gloves. Try re-start.
		Melt-down.	Remove M8 bolts to intake unit. Tilt intake unit backwards and inspect. If you can pull out jammed roll material from throat of co-extruder and intake unit do so. If the intake unit has melted down call the maintenance department to investigate.
	NOTE:	IF YOU HAVE TO OPEN THE INTAKE UNIT INSPECTION COVERS OR TILT THE INTAKE UNIT BACK. This will open the safety inter-locks and will require re-setting before you can start up the co-extruder and intake unit. Ask the Reicofil operator to re-set this for you.	
	NOTE:	DO NOT FORGET TO TURN THE CHILLED WATER VALVES BACK ON INTERMEDIATE CYLINDER. Forgetting to turn the chilled water valve back on will result in a melt-down. In the event of a melt-down the intermediate cylinder chilled water valve can be turned off to build up temperature in the intermediate cylinder (screw throat) to melt harden plastic in the intermediate cylinder.	
Co-extruder needs to be shut down for a short time (maximum of 4 hours).		Machine breakdown.	Set temperatures of all co-extruders to 145°C to prevent polymer degradation in the screw.
		Planned preventive maintenance.	
		Forming belt change.	
		Die pack change.	
		Changeover Transition.	
Co-extruder needs to be shut down for a long time (more than 4 hours).		Major machine breakdown.	For a long line stop (more than 4 hours), i.e. preventive maintenance, major breakdown or pack change set temperatures of all co-extruders to 30°C.
		Planned preventive maintenance.	
Extruder drive cannot be turned on.		Upstream or downstream equipment is not in operation.	Switch on subsequent aggregate check electric power is on.
		Temperature setting of heaters have not been reached.	Wait until set temperature has been reached.
		Limit value (minimum point) of heaters is higher than the set point	Set limit value (minimum point) barely below the set temperatures.
Throughput is low.		Lack of roll material	Feed more material.
Main drive exceeds the maximum current		Temperatures too low.	Increase temperatures of intermediate cylinder zone 1 and zone 2
		Filling ratio of screw is too high.	Decrease the feeding rate.
Temperature remain below set point		Heater band defective.	Check heating band and replace if necessary
Temperatures rise above set point		Counter pressure too high.	Increase temperatures in the section connection.
		Filling ratio of screw is too low.	Decrease screw speed and increase filling ratio of screw.
Extruder drive stops running		Drive is over-stressed.	Increase temperatures in intermediate cylinders zone 1 and zone 2.
		Second lime value of pressure indicator pressure is exceeded.	Increase temperature in the section of connection. Check the heating zines whether set temperature is reach. Decrease output.

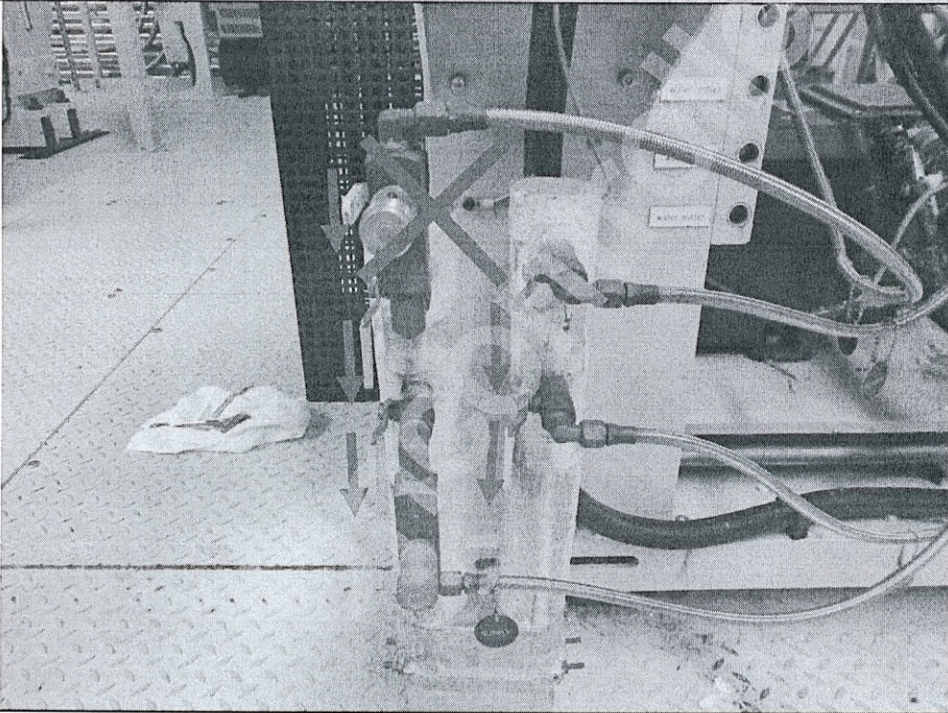
Electrically defective.

Call the maintenance department to investigate.

CHILLED WATER BALL VALVES ON/OFF POSITIONS

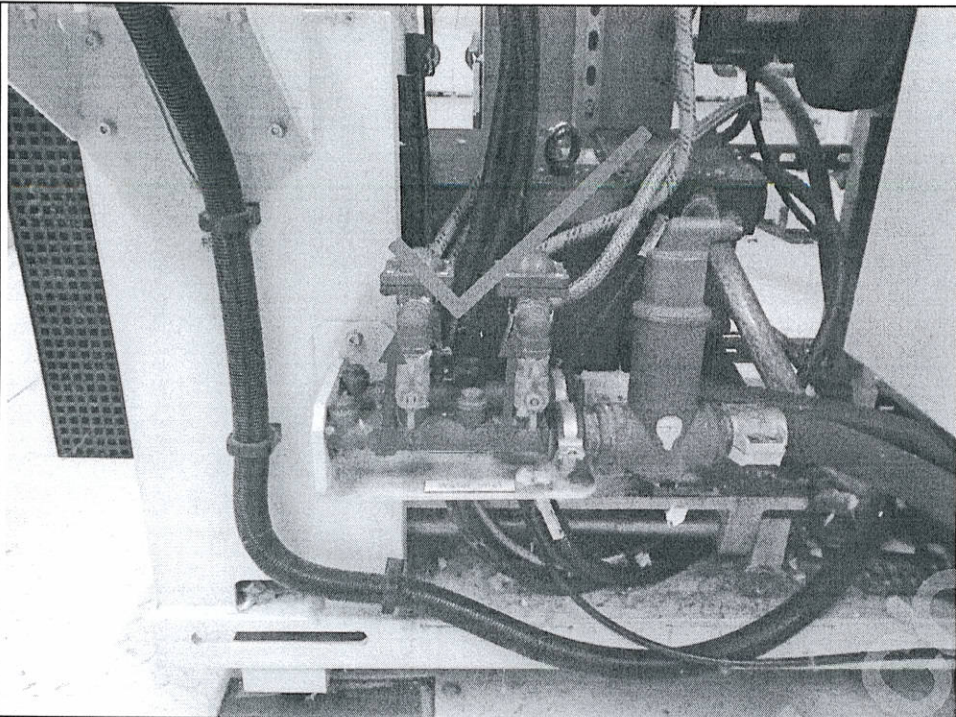


SC1 Vales **OPEN** position

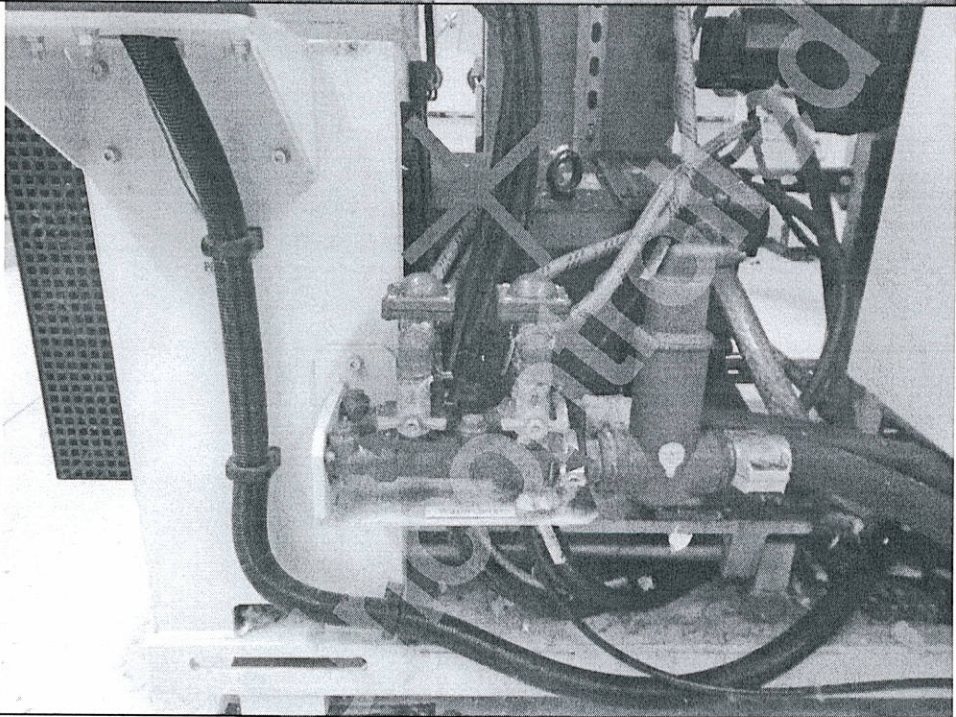


SC1 Vales **CLOSED** position

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SC2-SC3 Vales in **OPEN** position



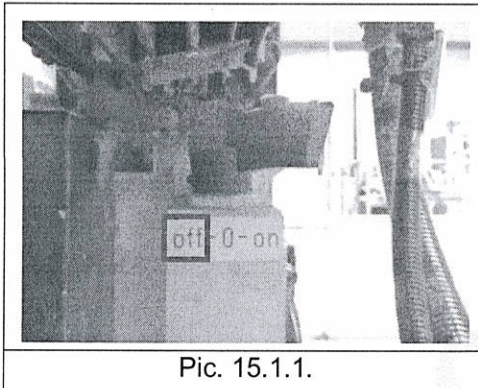
SC2-SC3 Valves in **CLOSED** position

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15. APPENDIX 3. REACTION PLAN TO POLY FEED TOOL ACCIDENTLY PULLED INTO INTAKE UNIT.

15.1. During the startup (13.3.1 – 13.3.11) procedure when using the poly feed tool to feed roll material into the intake if the poly feed tool accidentally becomes caught in the infeed nip rollers and is being feed into the co-extruder following this reaction plan

15.1.1. **IMMEDIATELY** open the nip feed rollers by turning of the nip feed rollers air valve to the **off** position (Pic. 15.1.1.). This will stop the poly feed tool from being drawn into the infeed unit.



Pic. 15.1.1.

15.1.2. **IMMEDIATELY** afterwards shut down the intake unit.

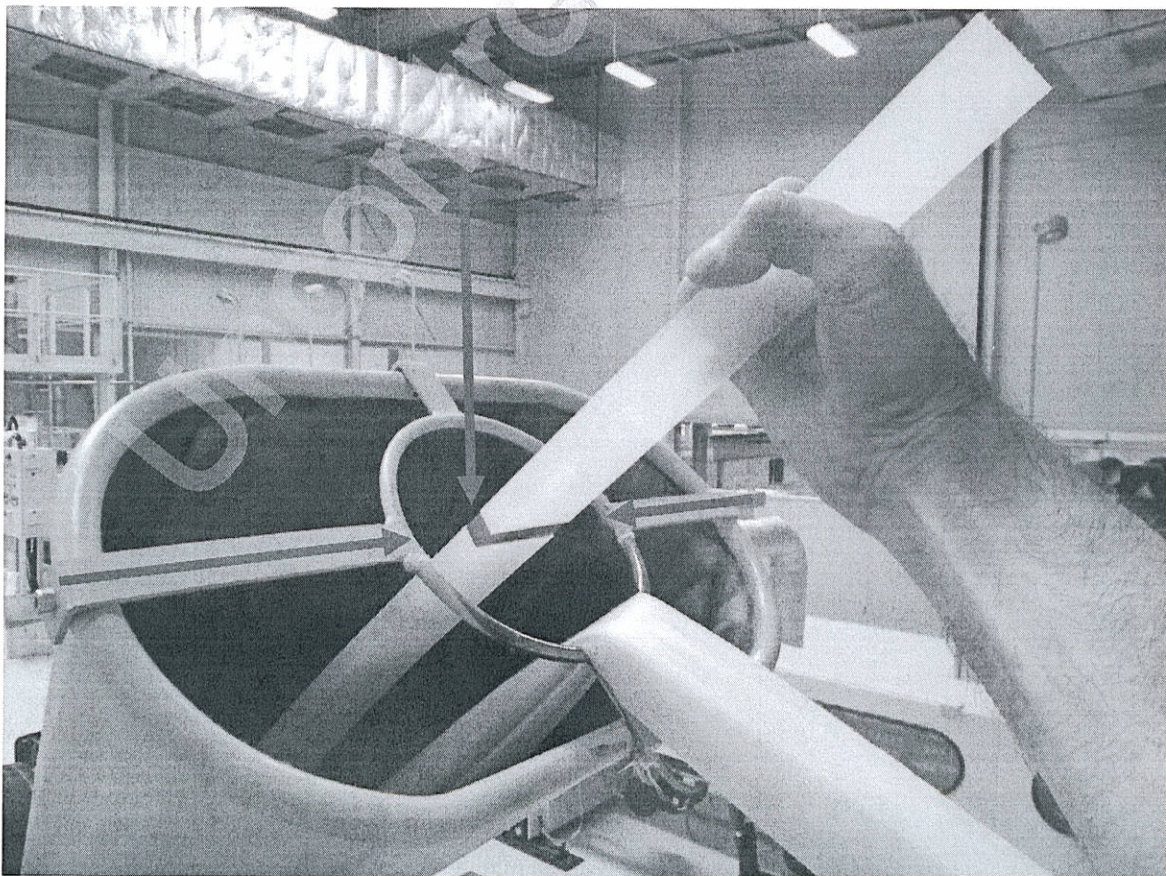
15.1.3. **IMMEDIATELY** afterwards shut down the co-extruder.

15.1.4. Pull out the poly feed tool from the funnel and intake unit.

15.1.5. Turn the nip feed rollers air valve to the **on** position.

15.1.6. Restart the co-extruder in accordance with this work instruction.

15.2. **DO NOT** push the poly feed tool down past the **RED** line marked on its length end and the lip of the funnel. Doing so can cause the poly feed tool to become feed into the co-extruder (Pic. 15.2.2.).



Pic. 15.2.2.

Review number	Reason and nature of the revision	Date	
09	Write reaction plan for poly feed tool becoming caught in intake unit	07/08/19	
08	Complete revision and update to include SC2 and SC3	05/21/19	
07	Torque, RPM of extruders, and throughput updated.		
06	RPM of extruders and throughput updated.		
05	Correction of co-extruders through-put based on weight assessment – item 3.5		
04	Updated items 3.5 and 3.7 (through-put of co-extruders)		
03	Feeding control to prevent excessive amount of edge trims - item 3.7		
02	Updated target for recycling – 180 kg/h per beam		
01	Original		
Signatory	Document Writer	Document Validation	Document Authorization
Name	Fred Webberking	Arturo Velez	Eduardo Pritsch
Job Title	FMS (Lead)	Reicofil Trainer	Production Manager
Department	Operations	Operations	Operations
Date	05/21/19	05/21/19	05/21/19
Signature			