Rondol Microlab Twin Screw Extruder Standard Operating Procedure

NOTE: Before reading this you MUST read the 'SOP - Energy and environmental impacts under normal, abnormal and emergency conditions' which is Mills group web site, https://www.profandrewmills.com/leaf-documents/. This addresses general energy and environmental impacts under normal, abnormal and emergency conditions considerations which you NEED to be cognisant of before conducting any experiment. If you identify anything in an SOP which can be improved, please contact the LO and PI to discuss the proposed change(s) before putting them into effect.

A photograph of the Rondol Microlab Twin Screw Extruder is shown below.

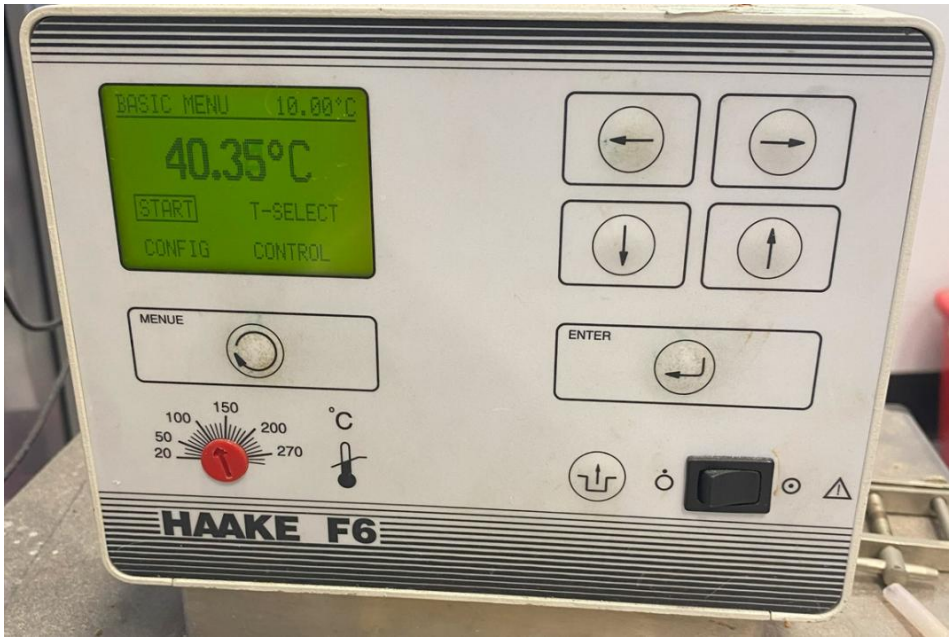
1. Turning the extruder on

Firstly, switch on the blue mains plug on, and the water bath plug at the wall as shown below.

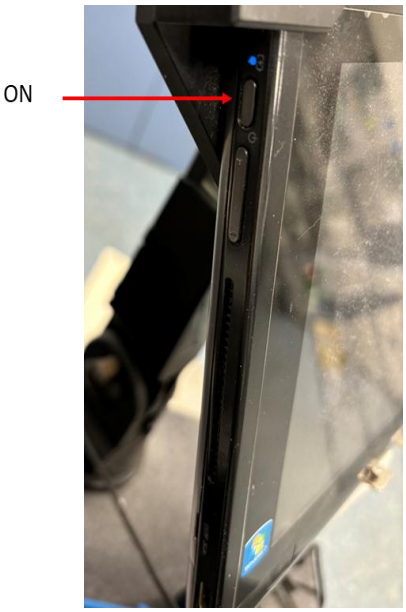
OFF

ON

Turn the water bath on (press menu, use the arrows to the right to ensure the box appears around start, then enter). Check the water inlet/outlet is flowing.

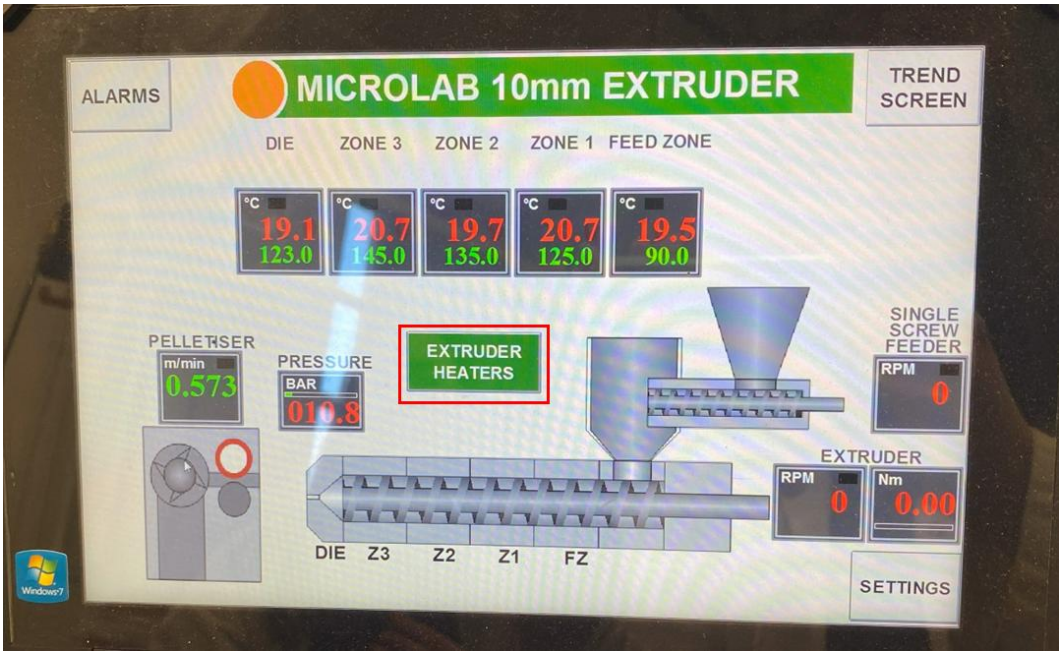


Then turn computer on using the switch on the left side of the screen.

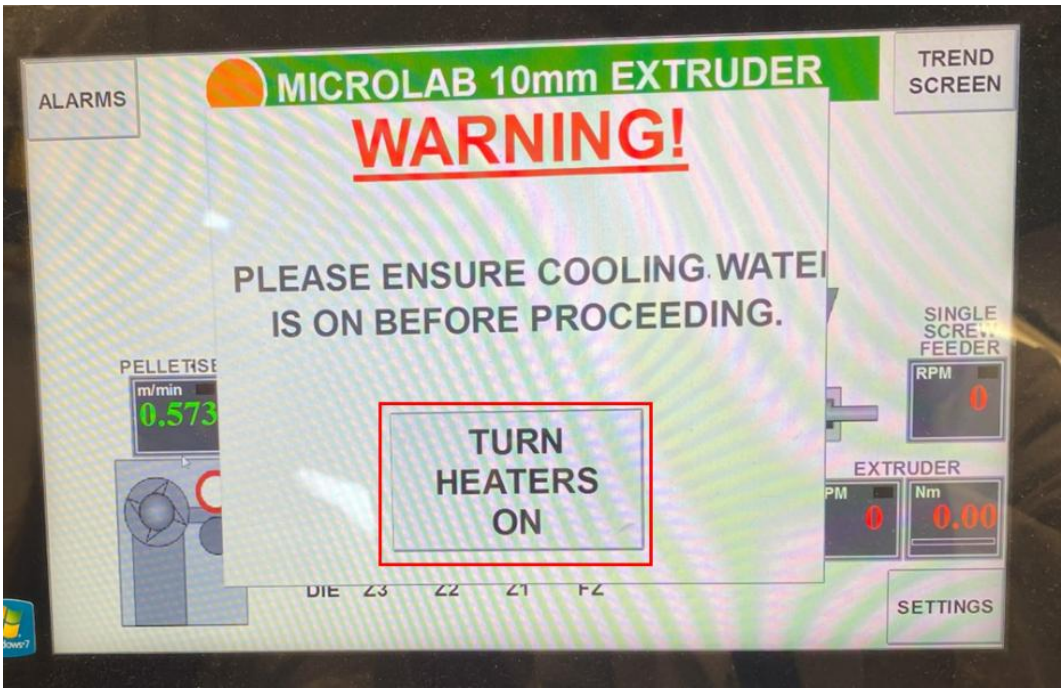


Next, tap on the 'CX-Supervisor-Runtime' application to open the extruder software.

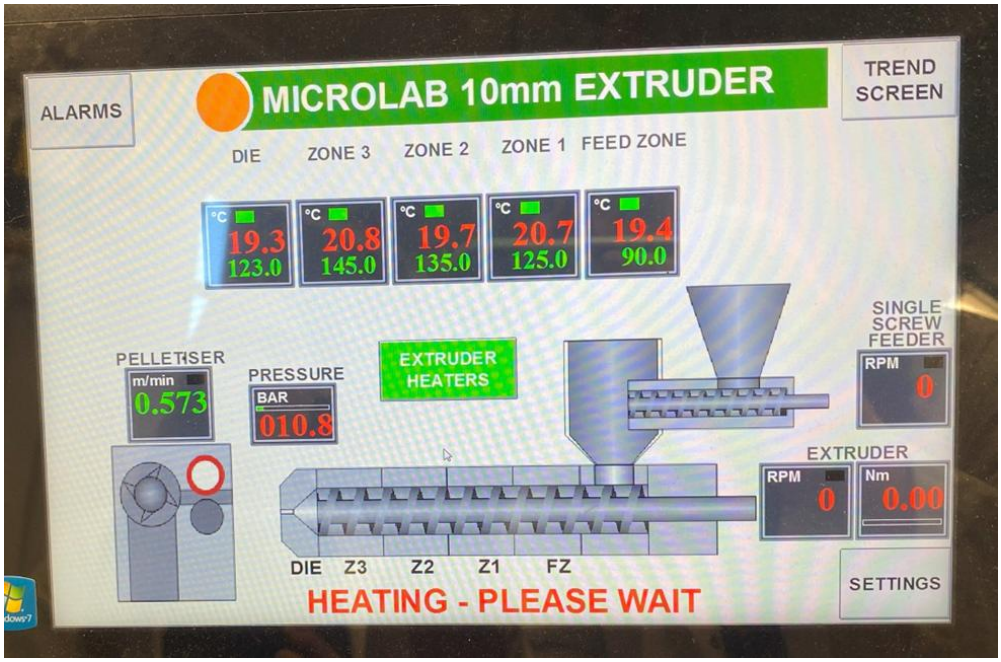
The software opens onto the below screen; firstly, turn the extruder heaters on by tapping on 'Extruder heaters'.



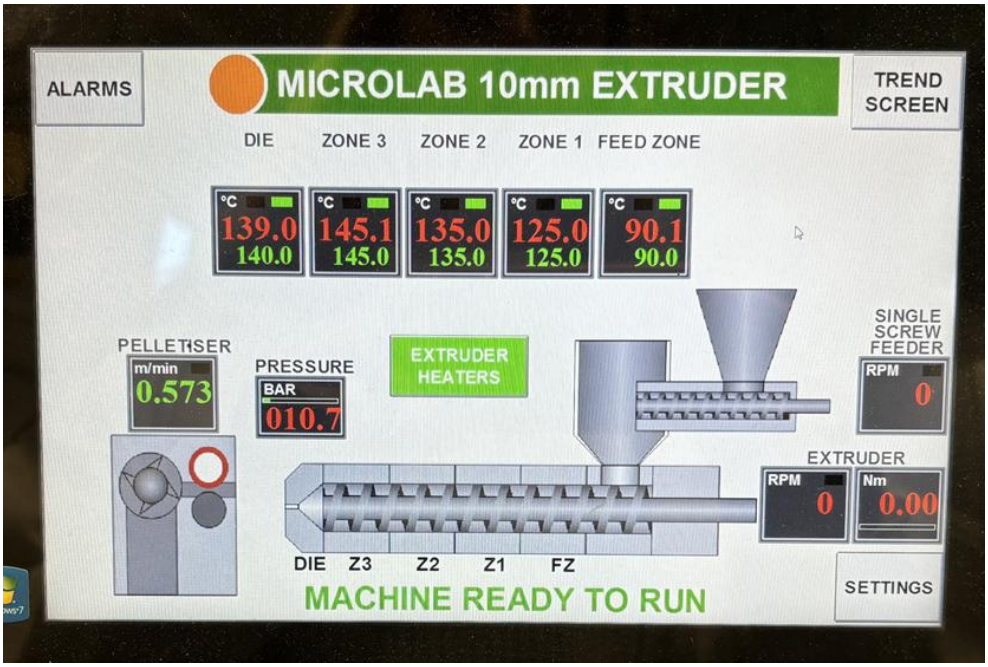
The following warning window appears; press ‘Turn Heaters On’.



When the extruder is heating up, the screen looks like:



Once the temperatures for the various zones across the extruder match up to their set temperature the machine is ready to run, and the screen looks like:



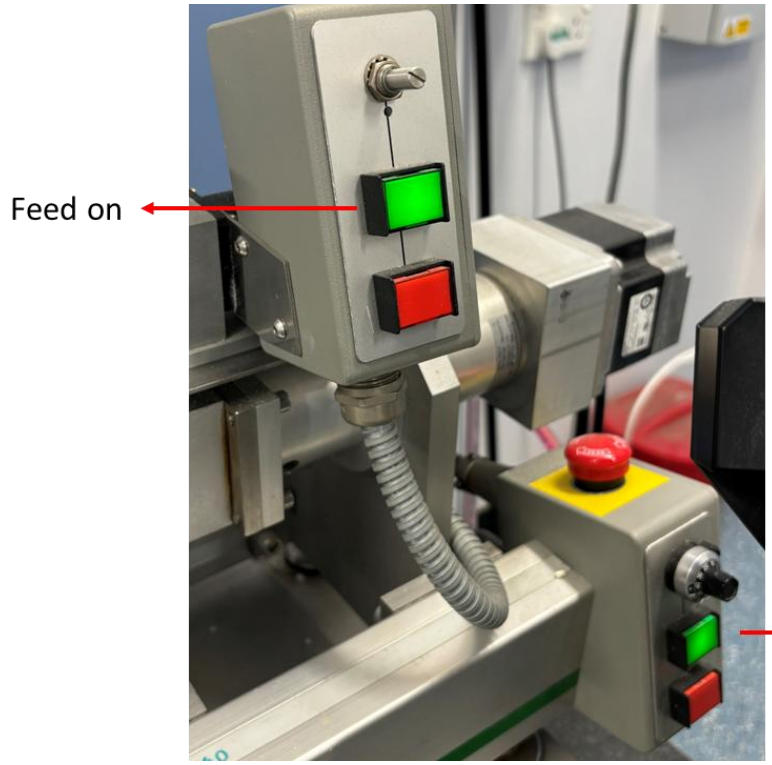
2. Loading the extruder

Pull extractor down above the feed.

Check the nozzle on the end of the extruder is clean. If not pull-out old filament with tweezers.

The green/red buttons behind the screen are for the extruder (see pictures below). Push this green one first to start it.

The green/red buttons beside the feed are for the feed. Turn this on second.

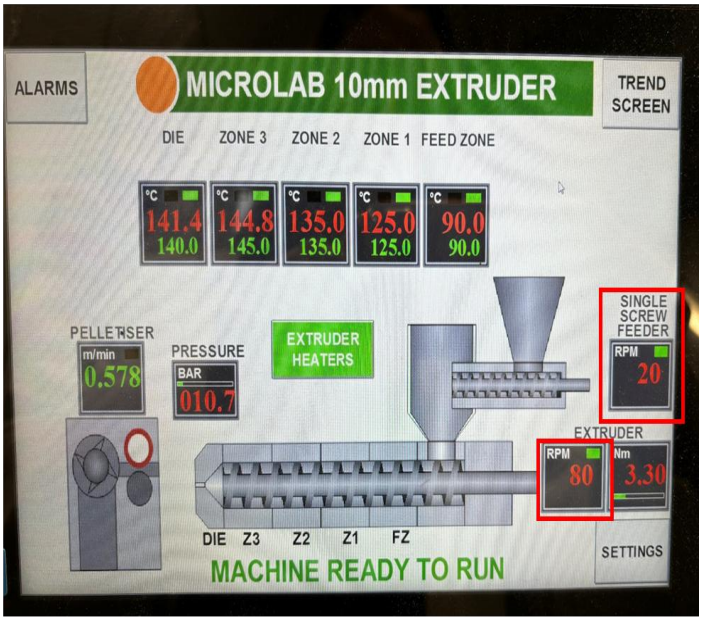


Using the dials as shown below ensure the speed for the extruder is set to 80 rpm as shown on the screen.

Single screw feeder speeds:

20 rpm= pellets

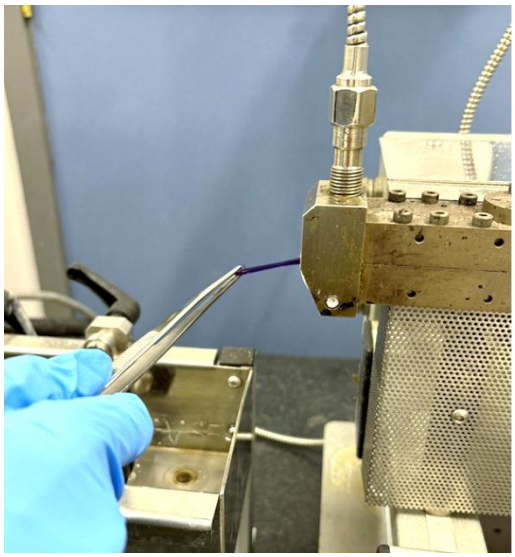
40 rpm= powder

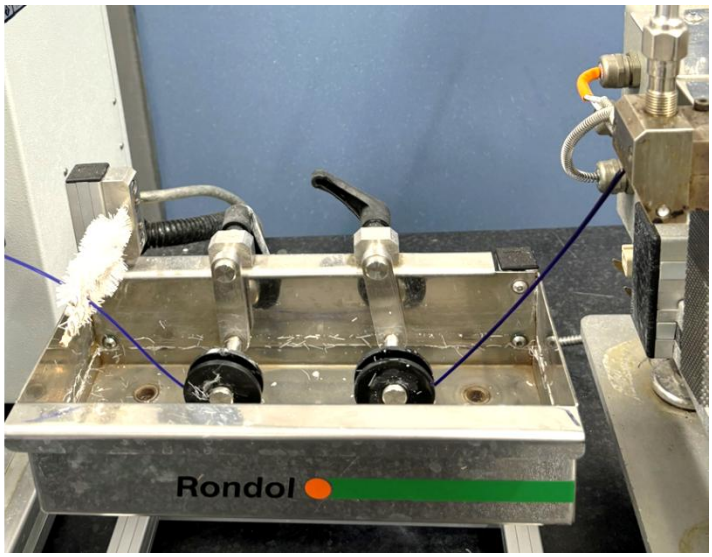


The powdered pigment or LDPE pellets (for cleaning) are then added into the feed hopper.

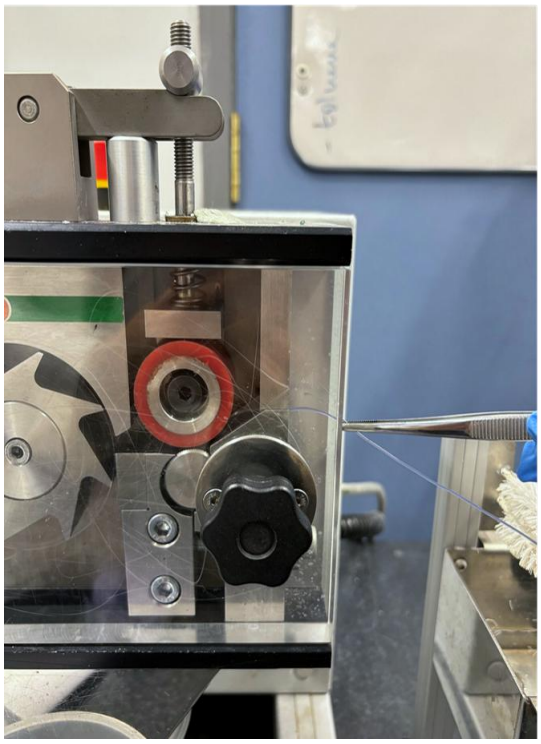
3. Using the pelletizer

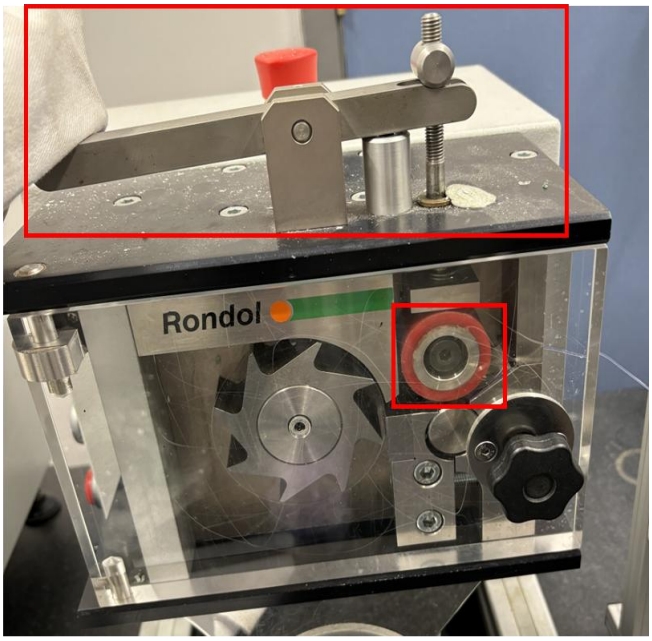
The extruded 2 mm diameter filament was withdrawn at a rate of 0.9 m min^{-1} from the extruder and fed into the water bath using tweezers to cool the filament down.



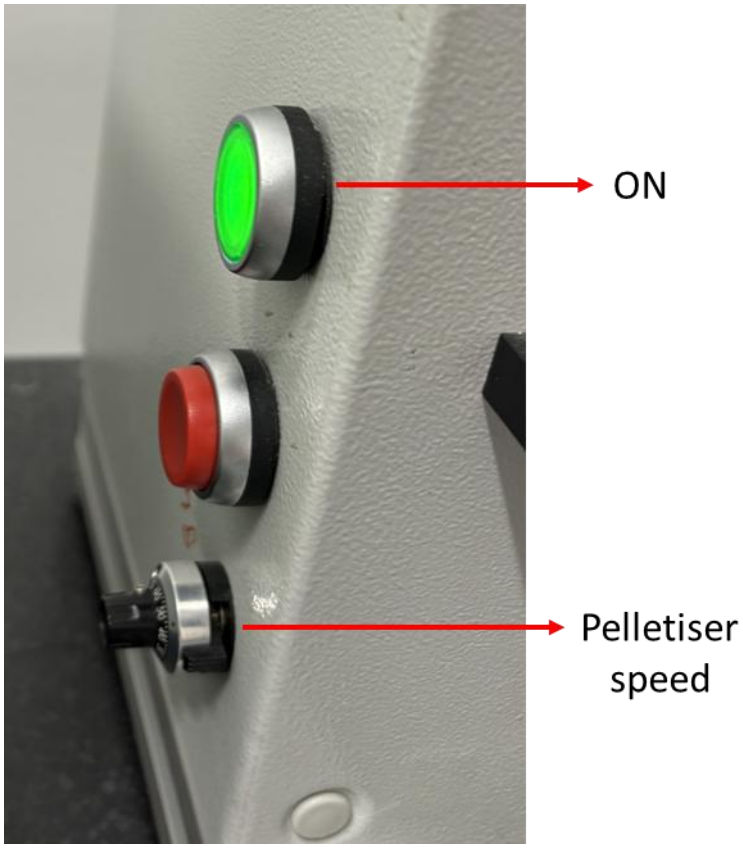


The cooled filament was then fed into the inline pelletiser and secured under the red barrel using the metal handle on top of the pelletiser.

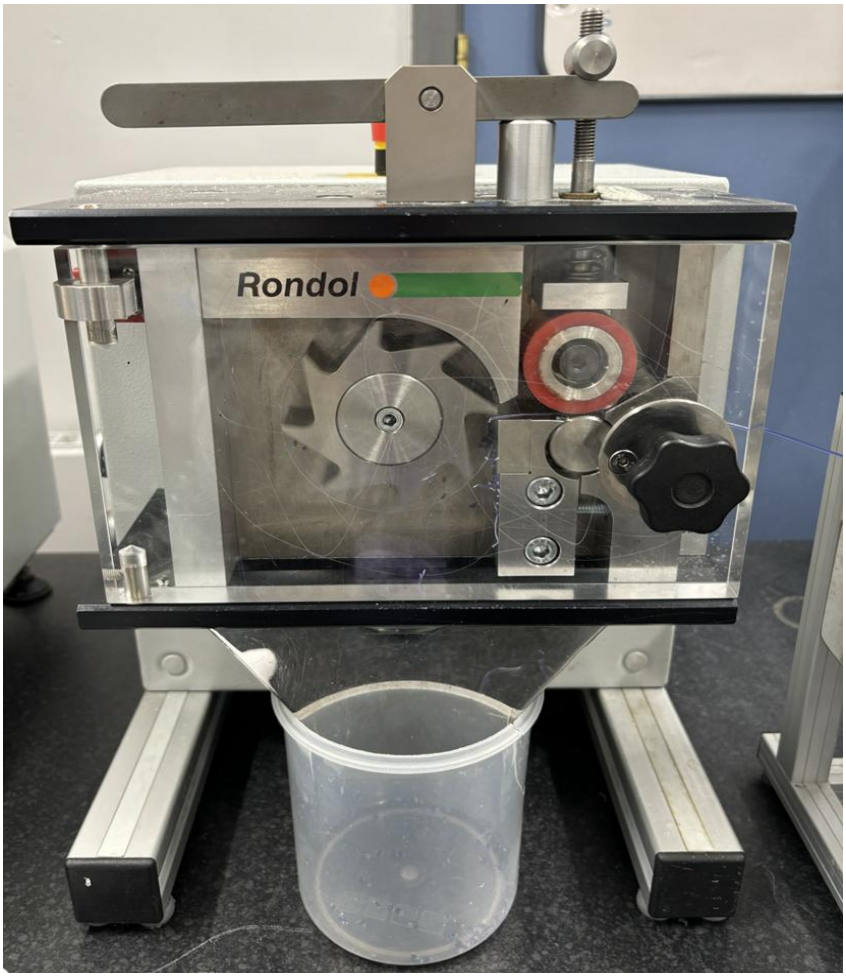




The pelletiser is switched on by the green button on the left-hand side of the machine and the speed adjusted using the dial.



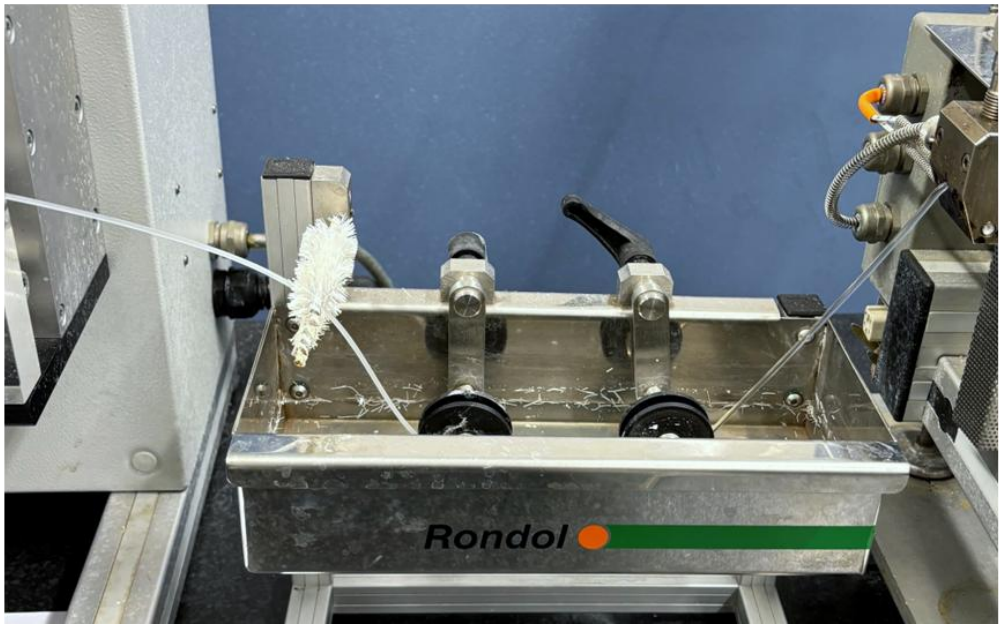
The filament is then chopped into 3 mm long pellets to create an initial masterbatch of pellets which are collected in a plastic container positioned below the pelletiser.



This pelleted masterbatch was then fed through the extruder 2 more times to ensure a homogeneous distribution of the pigment throughout each pellet.

4. Cleaning the extruder

For cleaning of the extruder after use the above process is repeated using LDPE pellets, LDPE powder and then LDPE pellets again.


Rondol