# Information needed before the Trial Plan

**Step 1: Select the pack and the type of extrusion desired**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pilot**  **Configuration** | **Fiber cross section** | **Capillaries**  Number/m] | **Throughput range PP**  [g/h/min] | **Selection** |
| **Mono Filament** | Round | 1 | 0.17-20 | □ |
| **Mono Filament** | Hollow | 1 | 0.17-20 | □ |
| **Filament** | Round | 36 | 0.1-0.6 | □ |
| **Filament** | Round | 69 | 0.1-1.2 | □ |
| **Filament** | Round | 72 | 0.1-1.2 | □ |
| **Filament** | Hollow | 69 | 0.1-1.2 | □ |
| **Filament** | Trilobal | 69 | 0.1-1.2 | □ |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pilot Line Configuration** | **Cassette** | **Capillary size** | **Die Tip Capillaries** | **Die Selected** |
| [Type] | [Microns] | [count] |  |
| **Brabender meltblowing** | Biax – Multi-row  4 Rows | 230 | 244 | □ |
| **Brabender meltblowing** | Biax – Multi-row  6 Rows | 380 | 366 | □ |
| **Brabender meltblowing** | Biax – Multi-row  10 Rows | 380 | 810 | □ |
| **Brabender meltblowing** | Biax – Multi-row  2 Rows | 510 | 122 | □ |
| **Biax meltblowing** | Biax – Multi-row  4 Rows | 230 | 736 | □ |
| **Biax meltblowing** | Biax – Multi-row  2 Rows | 510 | 368 | □ |

**Step 2: Specify the resin(s)**

An example is shown in the first row. You need to specify these for your polymer

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Polymer Grade/Type** | **Manufacturer** | **MFI**  **[g/10 mins]**  **@ 230 C/2.16 kg** | **Melting Temp**  **[C]** | **Degradation Temp**  **[C]** |
| **Metocene MF650X PP** | LyondellBasell | 1200 | 170 | 300 |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

If you are not sure what these properties are, NWI’s Analytical labs can determine these characteristics for our normal fees for such a service.

# If NWI is required to characterize the polymers, the materials must be received at least two weeks prior to the trial.

# The Trial Plan

**Start-up Procedure:**

* Start the process with PP as the base polymer
* Increase temperatures to the desired set points for the polymer to be used – See table below.
* Introduce the desired polymer

**Filament Extrusion:**

* Wait for the spinning to become stable with the following suggested settings
  + Extruder barrel Pressure: 700 psi, PET: >1000psi
  + Throughput: Pump RPM - 10rpm

**Meltblown Extrusion:**

* Wait for the spinning to become stable with the following suggested settings
  + Air: 90scfm
  + Suction: 40%
  + DCD: 40cm
  + Throughput: Adjust Kg/m/h with metering pump rate to above 250 psi

|  |  |
| --- | --- |
| Desired set points for the polymer | **Temperature [C]** |
| **Extruder zone 1** |  |
| **Extruder zone 2** |  |
| **Extruder zone 3** |  |
| **Extruder zone 4/Clamp Ring** |  |
| **Extruder zone SpinHead/Pump Block** |  |
| **Extruder Air Temp - (die tip) (**MB Only**)** |  |
| If you are not sure what temperatures to use, NWI’s staff can make recommendations based on DSC and TGA data | |

**Establish base lines:**

**Filament Extrusion:**

* **Determine the desired throughput** 
  + Adjust the throughput (kg/m/hr) at 500mpm feed roll speed, can be lower.
  + Increase throughput or feed roll speed until spinning is stable and no drips are generated.
* Adjust the quench if needed to further ensure you have no drips

**Meltblown Extrusion:**

* **Determine the lowest throughput and air volume**
  + Lower the throughput (kg/m/hr) at the highest air (m3/m/hr) until “fly” is generated – (Air limits: 90 to 160 scfm). **This is the Minimum throughput.**
  + Lower air until spinning is stable and no fly is generated. **This is the Minimum Air.** Increase throughput if fly is generated. **This is the Minimum throughput.**
* **Determine the highest throughput and air volume**
  + Increase the throughput (kg/m/hr) until the extruder pressure reaches the max – (Pressure limits: 1300psi). **This is the Maximum throughput.**
  + Increase air until fly is generated. **This is the Maximum Air.** If no fly is generated, the max is 160 scfm.

**Run the Trial Matrix:**

**Filament Extrusion:**

* This matrix uses 3 throughputs, 3 take-up speeds, and 3 draw.
* The numbers shown in red are simple examples – you need to provide numbers for your trial.
* The boxes marked with X are the samples collected. You can choose other desired samples.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Take-Up**  **mpm** | **Draw**  **mpm** | **Throughput**  **Kg/hr/m Min** | **Throughput**  **Kg/hr/m Middle** | **Throughput**  **Kg/hr/m Max** |
| **500** | **1000** | **X** | **X** | **X** |
| **1500** | **X** | **X** | **X** |
| **2000** | **X** | **X** | **X** |
| **1000** | **1000** |  | **X** |  |
| **1500** |  | **X** |  |
| **2000** |  | **X** |  |
| **1500** | **1000** | **NA** | **NA** | **NA** |
| **1500** | **X** |  | **X** |
| **2000** | **X** |  | **X** |

**Meltblown Extrusion:**

* This matrix uses 3 basis weights, 3 air, and 3 DCDs at 3 different throughputs.
* The numbers shown in red are simple examples – you need to provide numbers for your trial.
* The boxes marked with X are the samples collected. You can choose other desired samples.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Weight**  **(g/m2)** | **Air**  **(m3/h/m)** | **Min (Kg/h/m)** | | | **Middle** | | | **Max** | | |
| **15cm** | **20** | **25** | **15** | **20** | **25** | **15** | **20** | **25** |
| **50** | **Min Air** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |  |
| **Mid-Point** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| **Max Air** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| **75** | **Min Air** |  |  |  | **X** | **X** | **X** |  |  |  |
| **Mid-Point** |  |  |  | **X** | **X** | **X** |  |  |  |
| **Max Air** |  |  |  | **X** | **X** | **X** |  |  |  |
| **100** | **Min Air** | **X** | **X** | **X** |  |  |  | **X** | **X** | **X** |
| **Mid-Point** | **X** | **X** | **X** |  |  |  | **X** | **X** | **X** |
| **Max Air** | **X** | **X** | **X** |  |  |  | **X** | **X** | **X** |