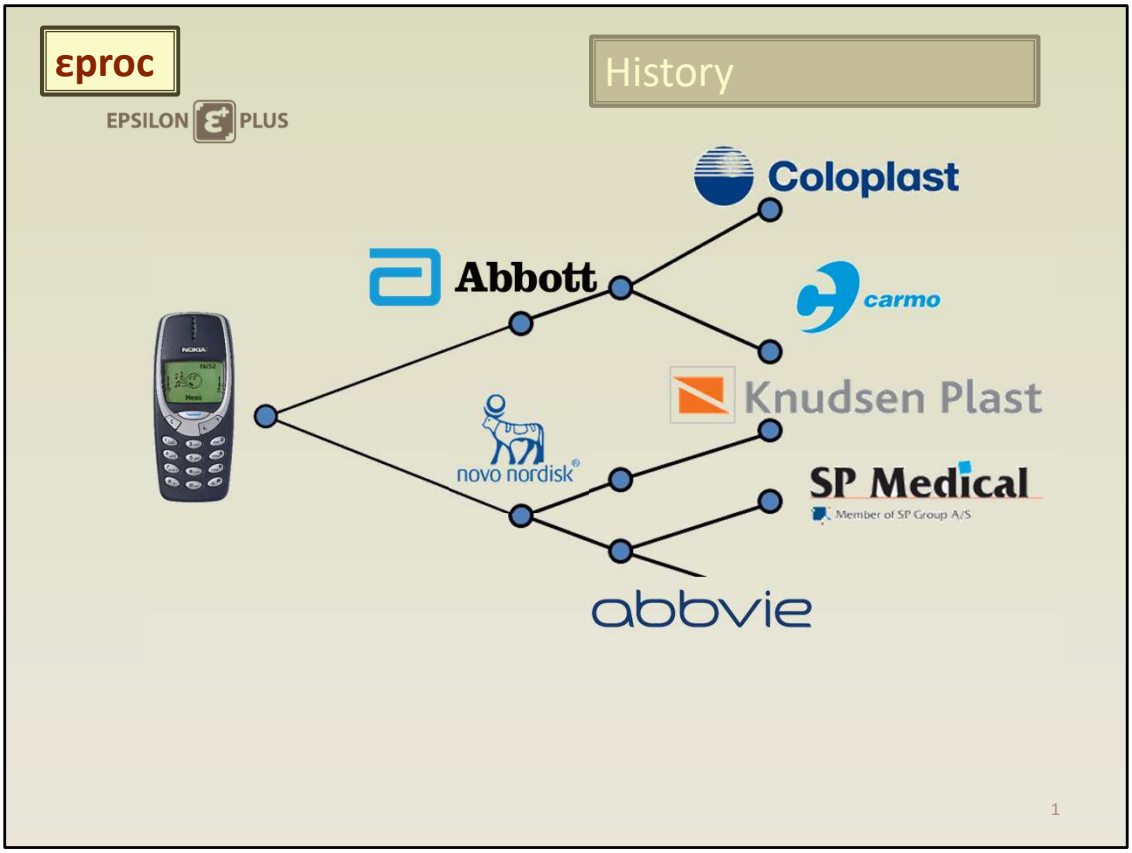
# EPROC

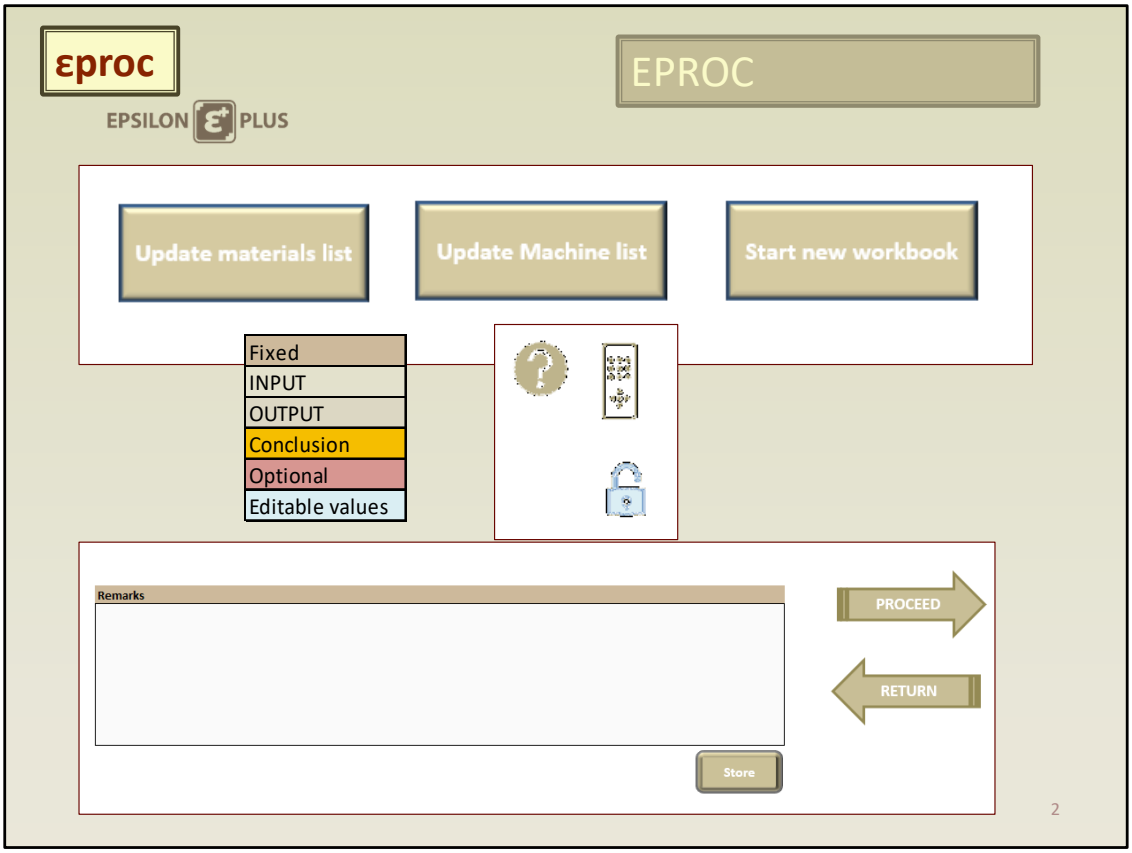
## Your tool for Scientific Moulding

## By EpsilonPlus

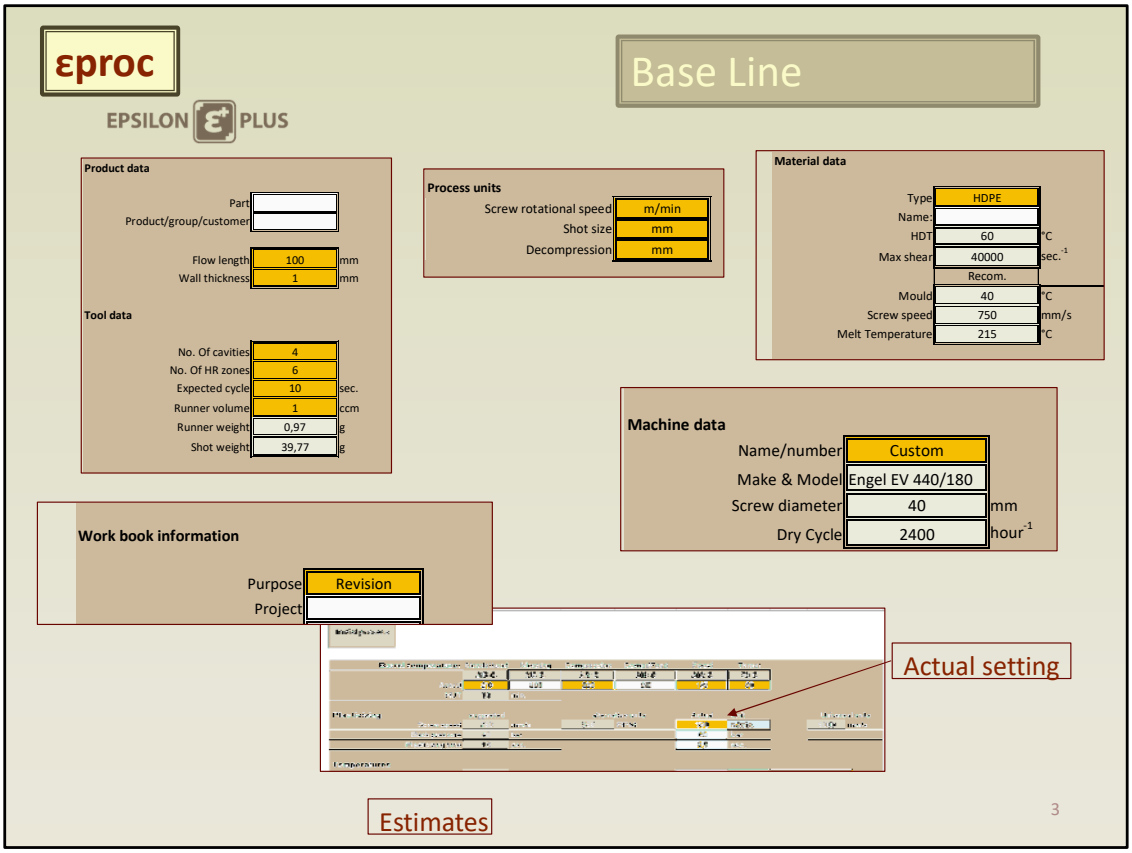



Today, several companies (probably inspired by Nokia), apply the method of Scientific Moulding, and use software like EPROC as a tool.
EpsilonPlus has developed several of these solutions.

Products from a robust process do not change quality if the process changes, that is why the primary focus with EPROC is to *obtain a robust process* using Scientific Moulding principles



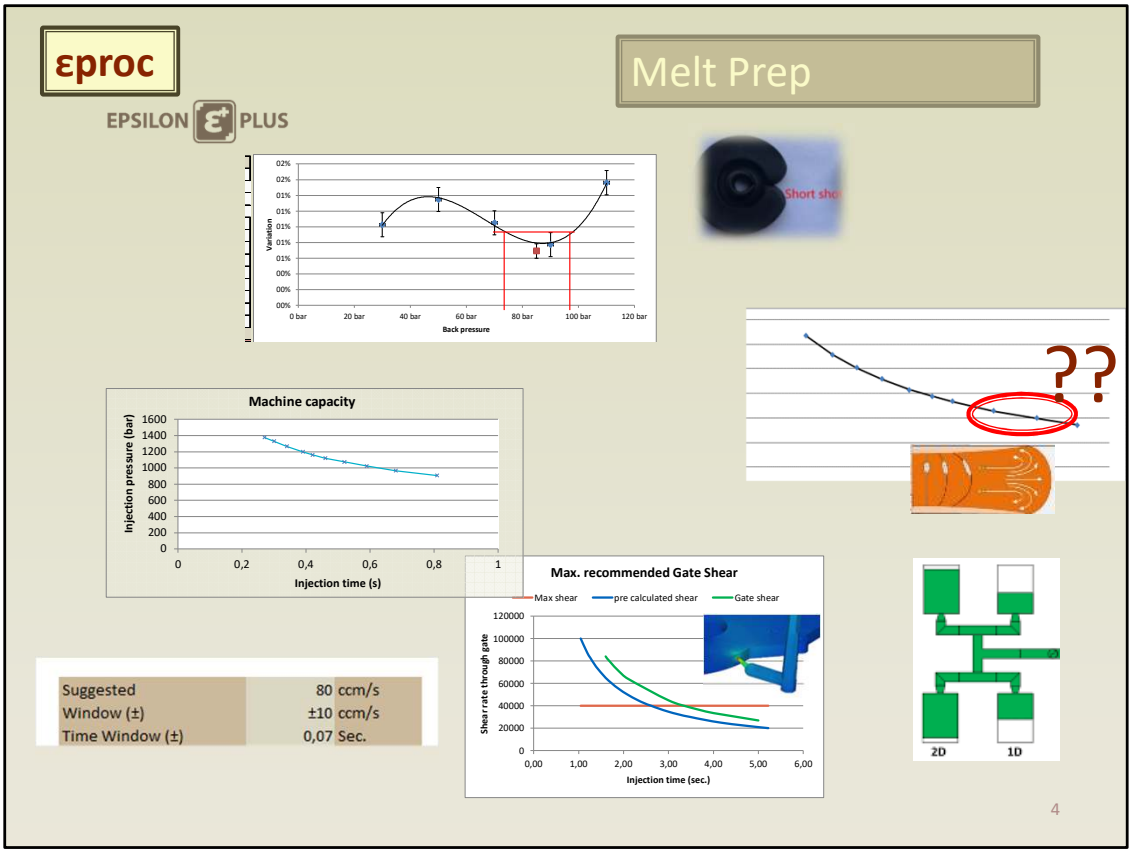

EPROC can be installed with your customized material-data and machine-list, which can easily be updated and maintained with new information.
EPROC is easy to use with navigation tools and built-in guides.



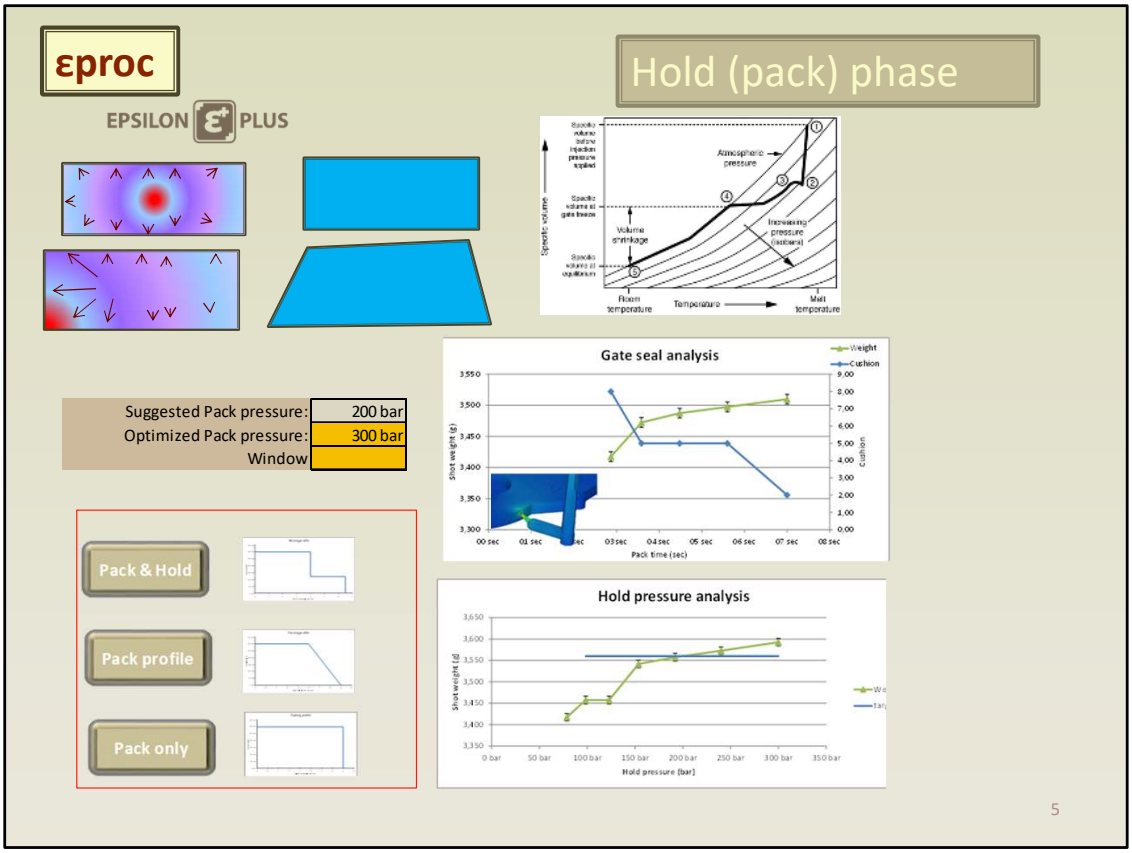

Scientific Moulding is based on knowledge about each material's thermal and viscous properties.
In EPROC you select your machine, your material and enter specification for your tool.

With different options for your process set up you can use EPROC for FOT, validation or as an improvement tool for existing processes.

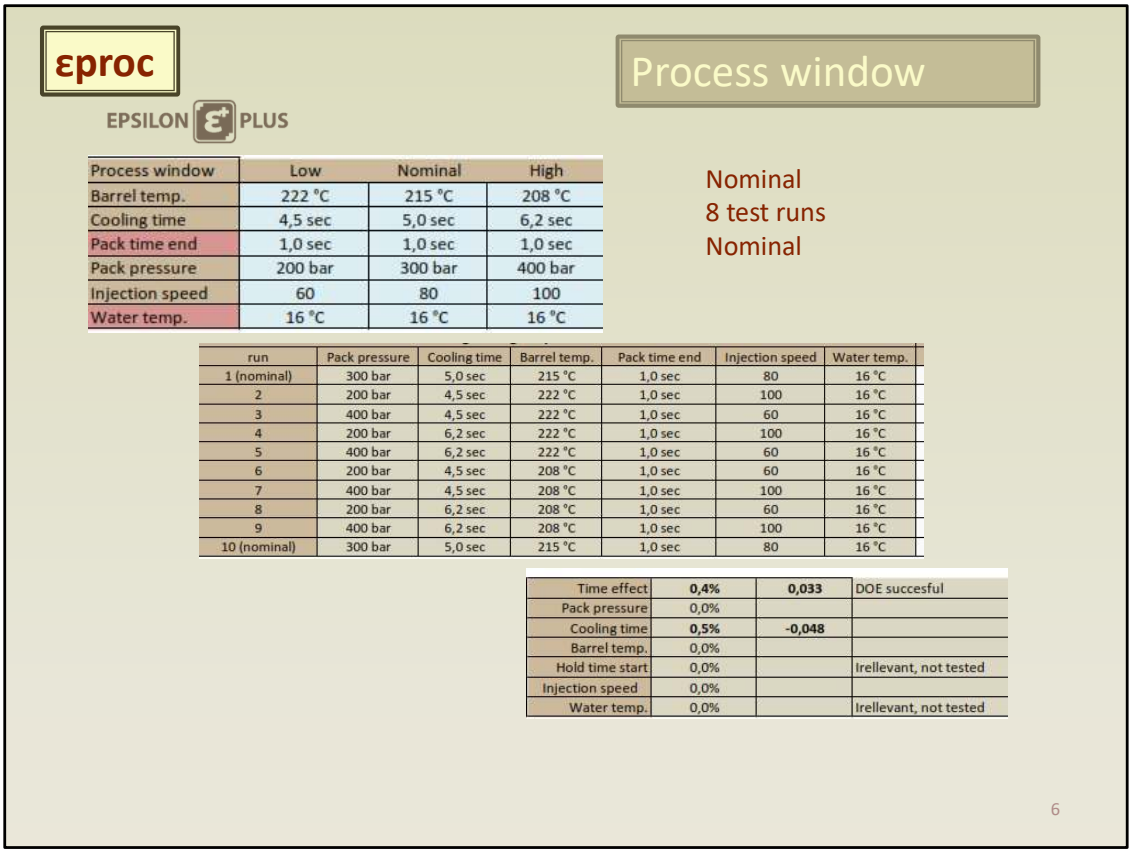
Estimates for an initial process setting are calculated from tool-, machine- and material data in base line
This will help set up process and it makes it possible to apply the same starting point for tools at multiple sites.




A repeatable homogenous melt is a prerequisite for product- and process stability
Optimization of the back pressure at the recommended temperatures and screw speed will provide the best possible starting point before filling the cavities
Injection speed optimization is guided through a viscosity analysis of the specific material.
Supplementary information about machine capacity and gate shear will help you make the right decision about the optimal speed.
A large cavity imbalance can be sign of tooling problems, EPROC helps you with the evaluation.




The correct packing is critical for dimensions and the shape (warpage) of the final part.
In EPROC you will get guidance towards selection of pressure and gate freeze time
Additionally, you have the options to apply either a Pack & Hold (useful for polyolefines) or a packing-profile (useful for side-gated parts).
Like the packing phase, EPROC will guide you through the optimization of either of these two options




| Process window | Low | Nominal | High |
|---|---|---|---|
| Barrel temp. | 222 °C | 215 °C | 208 °C |
| Cooling time | 4,5 sec | 5,0 sec | 6,2 sec |
| Pack time end | 1,0 sec | 1,0 sec | 1,0 sec |
| Pack pressure | 200 bar | 300 bar | 400 bar |
| Injection speed | 60 | 80 | 100 |
| Water temp. | 16 °C | 16 °C | 16 °C |

| run | Pack pressure | Cooling time | Barrel temp. | Pack time end | Injection speed | Water temp. |
|---|---|---|---|---|---|---|
| 1 (nominal) | 300 bar | 5,0 sec | 215 °C | 1,0 sec | 80 | 16 °C |
| 2 | 200 bar | 4,5 sec | 222 °C | 1,0 sec | 100 | 16 °C |
| 3 | 400 bar | 4,5 sec | 222 °C | 1,0 sec | 60 | 16 °C |
| 4 | 200 bar | 6,2 sec | 222 °C | 1,0 sec | 100 | 16 °C |
| 5 | 400 bar | 6,2 sec | 222 °C | 1,0 sec | 60 | 16 °C |
| 6 | 200 bar | 4,5 sec | 208 °C | 1,0 sec | 60 | 16 °C |
| 7 | 400 bar | 4,5 sec | 208 °C | 1,0 sec | 100 | 16 °C |
| 8 | 200 bar | 6,2 sec | 208 °C | 1,0 sec | 60 | 16 °C |
| 9 | 400 bar | 6,2 sec | 208 °C | 1,0 sec | 100 | 16 °C |
| 10 (nominal) | 300 bar | 5,0 sec | 215 °C | 1,0 sec | 80 | 16 °C |

| | | | |
|---|---|---|---|
| Time effect | **0,4%** | **0,033** | DOE succesful |
| Pack pressure | 0,0% | | |
| Cooling time | **0,5%** | **-0,048** | |
| Barrel temp. | 0,0% | | |
| Hold time start | 0,0% | | Irellevant, not tested |
| Injection speed | 0,0% | | |
| Water temp. | 0,0% | | Irellevant, not tested |

A predetermined DOE with potentially significant parameters will help you to determine a valid process window.