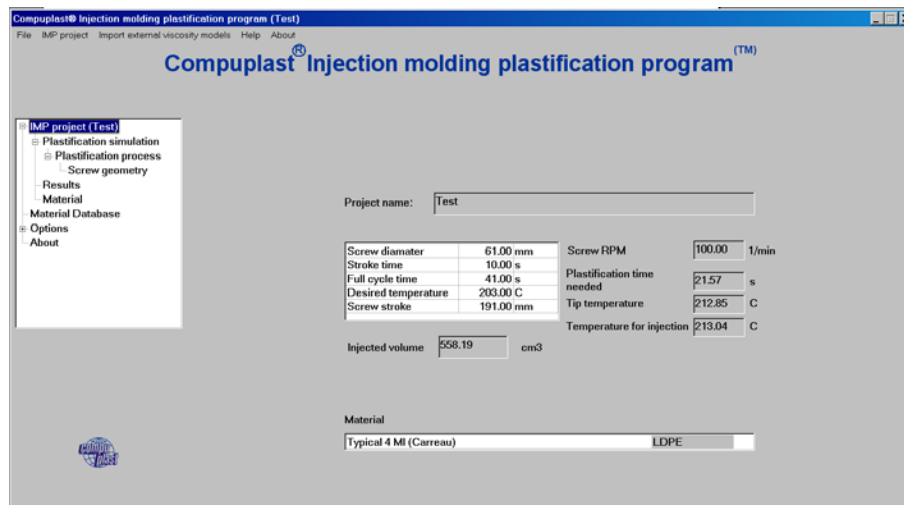




## Injection Molding Plastification™ program

This program has been developed to simulate the first part of the injection molding process where the material is prepared prior to injecting into the mold. The software can be used to predict melting performance, melt production rate, melt temperature and estimate overall melt quality.

When the program starts it shows the opening panel



On the left hand side there is a tree showing different program sections available in the program.

This is the main project definition (“**IMP project**”), the extruder (screw) simulation (“**Plastification simulation**”), the “**Material data base**”, the set-up “**Options**”.

The branch “**Plastification simulation**” has some other items for defining the process conditions and screw geometry and viewing the results.

The main project definition (“**IMP project**”) allows defining the basic condition for the injection molding process relevant to the extruder behavior. They are:

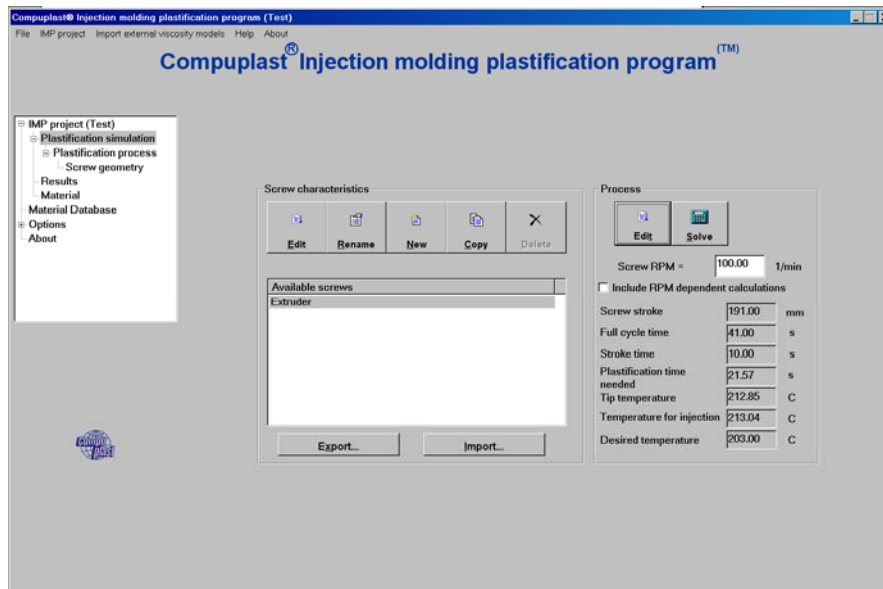
- Screw diameter
- Stroke time
- Full cycle time
- Desired temperature
- Screw stroke.

The difference between the “full cycle time” and the “stroke time” is the maximum time for the material plastification.

The “screw diameter” and the “screw stroke” define the required volume of the material; this means the mass flow rate of the material.

In this panel the user can also selected a material from the material data base.

The second item “**Plastification simulation**” is used to define the extruder geometry and the process conditions.

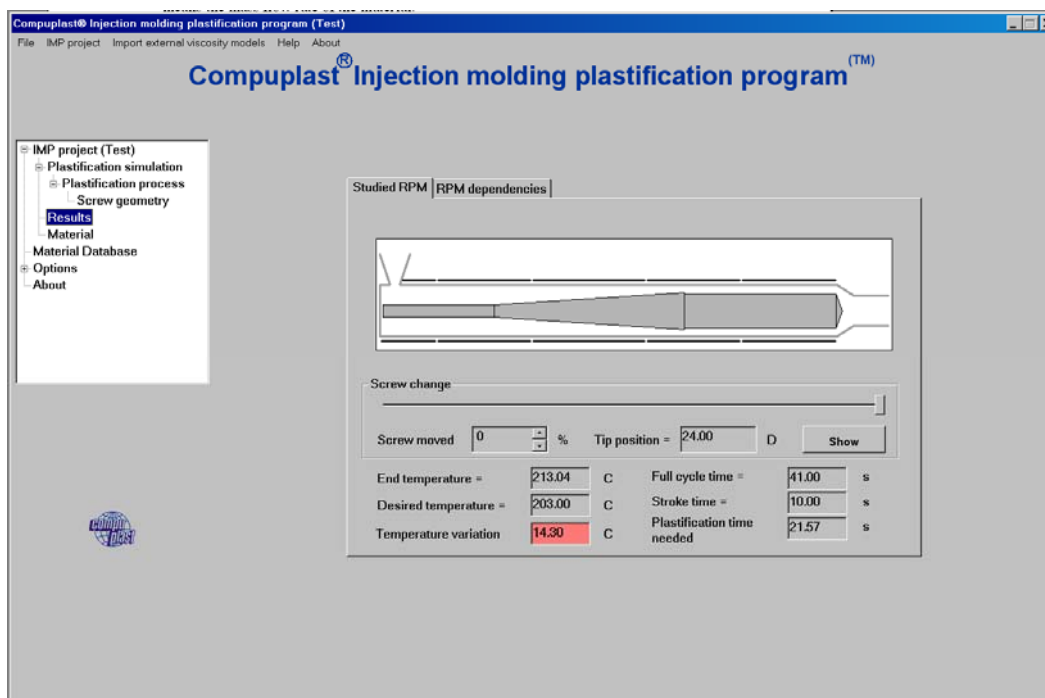


The user can define different extruder geometries and select one of them. This geometry is then linked to the process. It can also be edited in this panel or after clicking the “**Screw geometry**” item. The editing is identical to the Extruder module. Also the process editing is identical to the Extruder module project editing. It can be performed either here or in the “**Plastification process**”. Both in the editing of the extruder and in the process editing some variables are disabled. They were defined in the over all definition like the screw diameter and the material or in the process definition like the RPM. There is a check box “**Include RPM dependence calculations**”. When this check box is checked the program solves not only for the set RPM but also for the 50% and 150% of the RPMs and shows the dependencies. When the process was solved the program shows some results also in this panel. It shows the needed plastification time and the temperature for injection. If this temperature is different from the desired temperature by more than the specified value, the edit box has a red background as a warning.

The solution takes into account both the fact that the screw moves back and therefore becomes shorter during the plastification process and also the sitting (delay) time between cycles and its influence on the material melting.

The result panel shows the results of the simulation. It can have one or two tabs depending if the check box **"Include RPM dependence calculations"** was checked or not. If it was checked it shows two tabs, one shows the results for the given RPMs and the second one shows the output at different screw rpms.

The slide bar is used to select different stages of the plastification process and to see the detail results after pressing the button **"Show"**. The result viewing is identical to the Extruder module program.

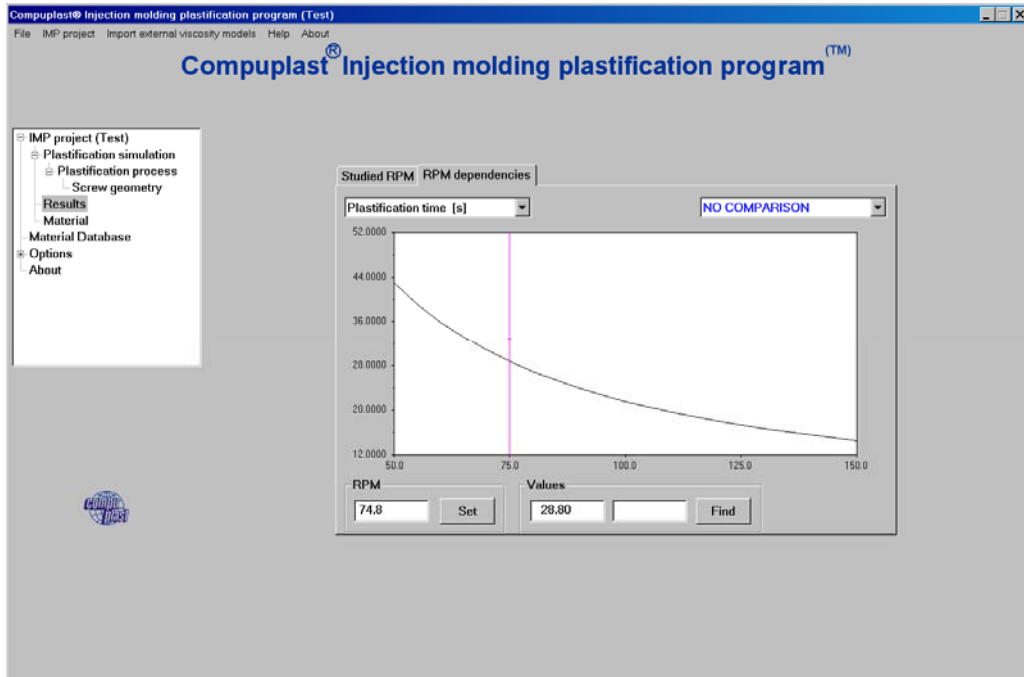


There can be seen overall information about the process. Here the temperature variation is higher than a predefined value and therefore the edit box is red to indicate a potential problem.

The second tab sheet shows the mass flow rate, the end bulk temperature and the plastification time as a function of the RPMs. It can be used for estimating the optimum RPM to eliminate a long sitting time and on the other hand to get a good melt quality (finish the melting, reaching the desired temperature and minimize the temperature variation).

The item **“Material”** allows editing the material properties of the material used for the simulation. The material editing is identical as in the VEL program. The item **“Material database”** allows entering and editing the materials as in the VEL program.

The item **“Options”** allows entering some data for the calculation and perform the steps for installation and registration.



The screenshot shows the 'Options' window in the Compuplast software. It displays 'New project values' and 'Temperature' settings.

New project values	
Screw diameter	63.50 mm
Stroke time	5.00 s
Full cycle time	40.00 s
Desired temperature	200.00 C
Screw stroke	100.00 mm

Temperature	
Allowed temperature difference	20.00 C
Allowed temperature variation	10.00 C

The first item "**Default values**" allows to define values, which are set when a new IMP project is created. It is also possible to define the allowed temperature difference and the allowed temperature variation. The program checks for these two characteristics in the result part and when the difference or the variation is higher it is indicated by a red background. There is also a tool-tip with an explanation for the red background.

The "**Set-up**" item is used to set the units and running the system diagnostic in case of problems with running or registering the program.

The "**HASP driver**" and "**Registration**" items are related to the program installation and registration and are identical to the VEL™ program.

There should be mentioned that the results of this program are slightly different from the Extruder module. The reason for this is that, in the plastification program, the screw moves back (influences the relative barrel velocities) and there is a sitting (delay) time that influences the melting. Usually, the melting is faster than in extrusion because the material is preheated and sometimes partially melted before the screw starts to move.

Since the target market for this program are mainly the producers of injection molding screws as well as users of Injection Molding simulation programs (such as Moldflow or Moldex3D) the program has the ability to import the most commonly used viscosity model in injection molding. The main menu contains an item "**Import external viscosity models**". As it is now, the program shows a panel in which data of the Cross-WLF viscosity model can be entered. After entering the data the program saves the material in Compuplast format. For now, there is only a converter for one model. It is easy to write converters for other material models as requested by customers.

External material model conversion

Cross-WLF viscosity model

Cross-WLF viscosity model

n	0.0000	
Tau*	0.0000	Pa
D1	0.000000e+000	Pa.s
D2	0.0000	K
D3	0.0000	K/Pa
A1	0.0000	
A2**	0.0000	K

Compuplast MDB data

Tref	200.00	C
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Save Cancel