

PolPartDesign

Tools for development and design of plastic molded parts

User Manual

Snap-fits · Gear calculations · Plastic tanks

Based on PolPartDesign 3.2.3.1 · October 2026

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1 Introduction

PolPartDesign helps you design typical plastic design elements. The software contains three calculation modules, which you reach via the tabs on the left edge of the window:

- **Snap-fits:** elongation, joining and loosening force of bending springs, torsion springs, ball and cylindrical snap-fits (chapter 3).
- **Gear calculations:** load capacity of plastic spur gears based on DIN 3990 (chapter 4).
- **Calculation of cylindrical plastic tanks:** minimum wall thickness and proof of strength of upright tanks with liquid filling (chapter 5).

In addition, the “**Calculation modules**” menu contains three stand-alone auxiliary calculations for the modulus of elasticity, permissible elongation and heat penetration coefficient (chapter 6).

Each module works with its own **projects**. A project contains all inputs of a calculation; it can be saved, loaded again and printed as a report. The results are recalculated immediately after every change.

Note: The “**Commercial products**” tab is not described in this manual. There is a separate manual for the commercial products.

2 User interface

The main window has the same structure in all modules. The figure shows the **Snap-fits** module with **Project management** open.

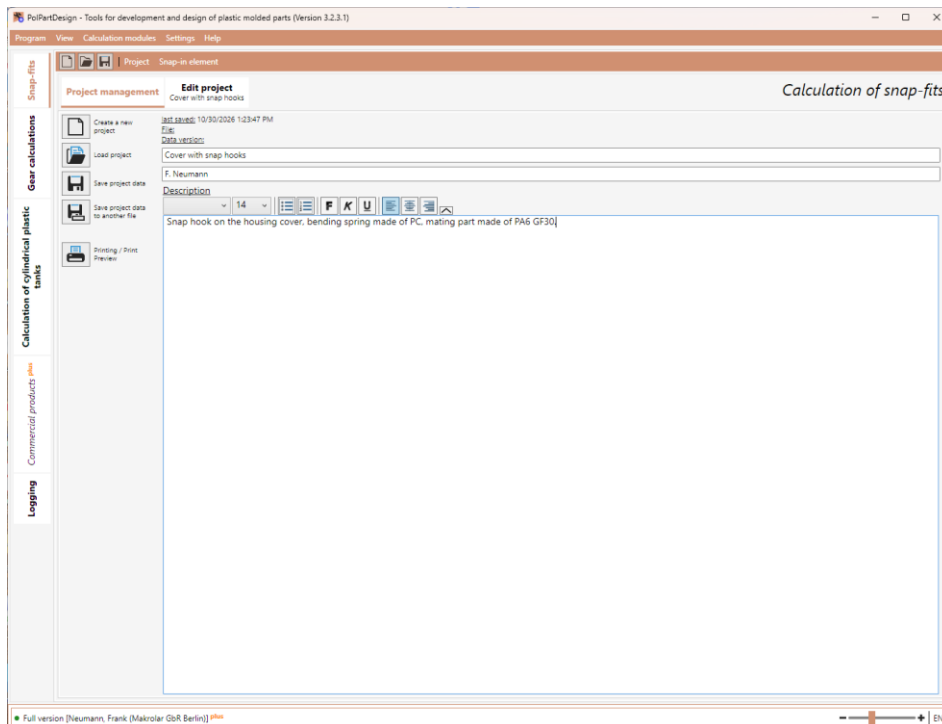


Figure 1: Main window with project management (Snap-fits module)

Element	Meaning
Menu bar	“Program”, “View”, “Calculation modules”, “Settings” and “Help” (chapter 7).

Element	Meaning
Tabs on the left edge	Switch between the modules Snap-fits , Gear calculations and Calculation of cylindrical plastic tanks .
Module bar (top)	Icons New , Open and Save as well as the module menus (e.g. "Project" , "Snap-in element" or "Data management").
Project management	Create a new project, load, save, save under a new name and print a project. To the right you find the time of saving, the file, Project name , Processor and a formatted Description .
Edit project	Inputs and results of the open project; the project name is shown below the tab.
Status bar	License status, zoom slider and language of the user interface ("EN").

Tip: Project name, processor and description appear in the header of the printout. Fill them in under **Project management** before printing.

3 Snap-fits

This module calculates the maximum elongation of the spring element as well as the joining and loosening force of a snap-fit. The example used throughout is a **cover with snap hooks**: bending spring made of PC with a rectangular cross-section of 8×1.6 mm, trapezoidal catch, mating part made of PA6 GF30.

3.1 Creating a new project

Under **Project management**, click **"Create a new project"** and confirm the prompt. The wizard guides you through the basic settings in three steps.

1. **Connection type / principle:** select the spring element, in the example **"Bending spring (constant cross-sectional dimensions)"**. Other options include double- and single-sided torsion springs, bending springs with decreasing height or width, with steps, angled or curved, as well as ball and slotted cylindrical snap-fits.
2. **Type of snap-in element:** **Trapezoidal catch**, **Triangular catch**, **Snap-in hook** or **Bulge catch**.
3. **Material combination and project details:** **Plastic/metal**, **same plastics** or **different plastics**; plus **Project name** and **Processor**.
4. Click **"Next"** and, in the last step, **"Finish"**.

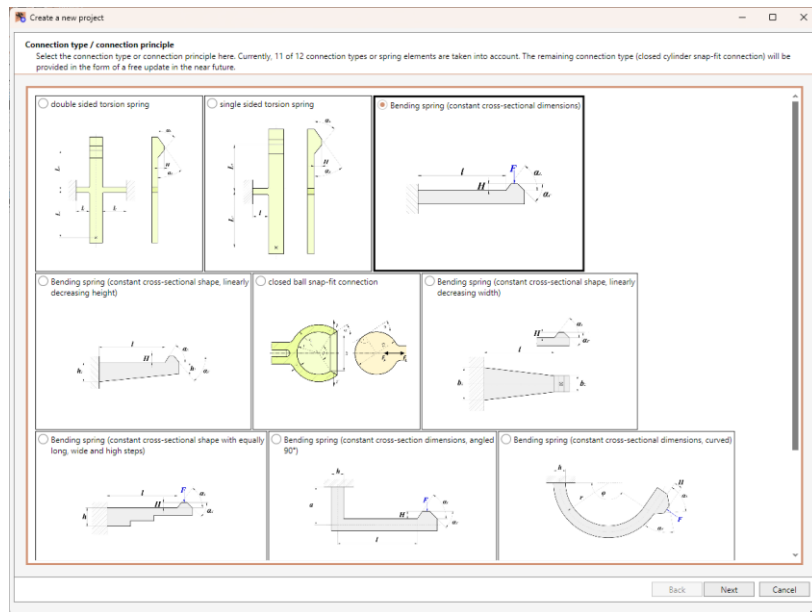


Figure 2: Wizard: selecting the connection type

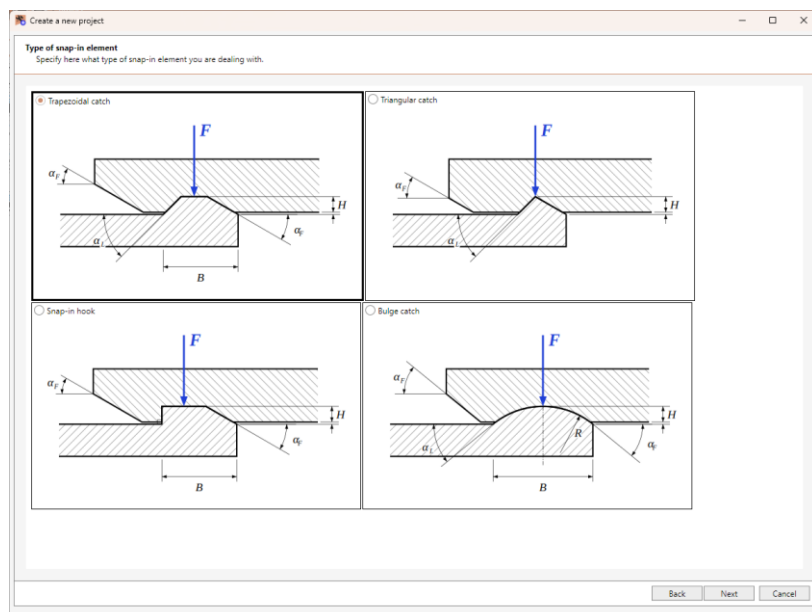


Figure 3: Wizard: type of snap-in element

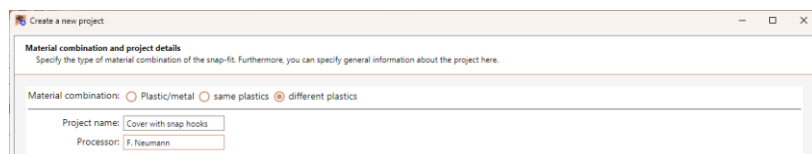


Figure 4: Wizard: material combination and project details

3.2 Entering geometry data

After the wizard, “**Edit project**” opens. The inputs are on the left in four collapsible sections; on the right you find **Notes**, **Results** and **Progression charts**. As long as data is missing, the “**Notes**” area tells you what still needs to be entered.

In the “**Geometry data (spring element / connection type)**” section, enter the dimensions directly into the fields of the principle sketch (all lengths in mm, angles in degrees):

Quantity	Example
Spring length l	20 mm
Undercut or snap height H	1.5 mm
Joining angle α_F	30°
Loosening angle α_L	60°

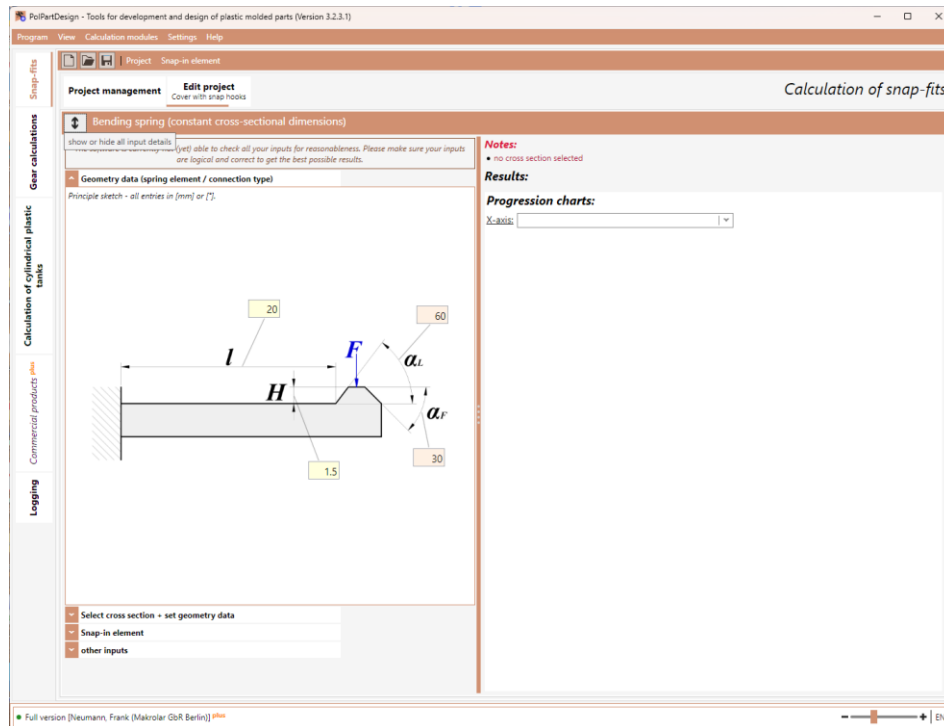


Figure 5: Geometry data in the principle sketch

3.3 Selecting the cross-section

Expand “**Select cross section + set geometry data**” and double-click the required cross-section shape (e.g. rectangle, trapezoid, circle segment). Enter the cross-section dimensions in the window that appears and confirm with the Enter key. In the example: rectangle with width $a = 8$ mm and height $h = 1.6$ mm.

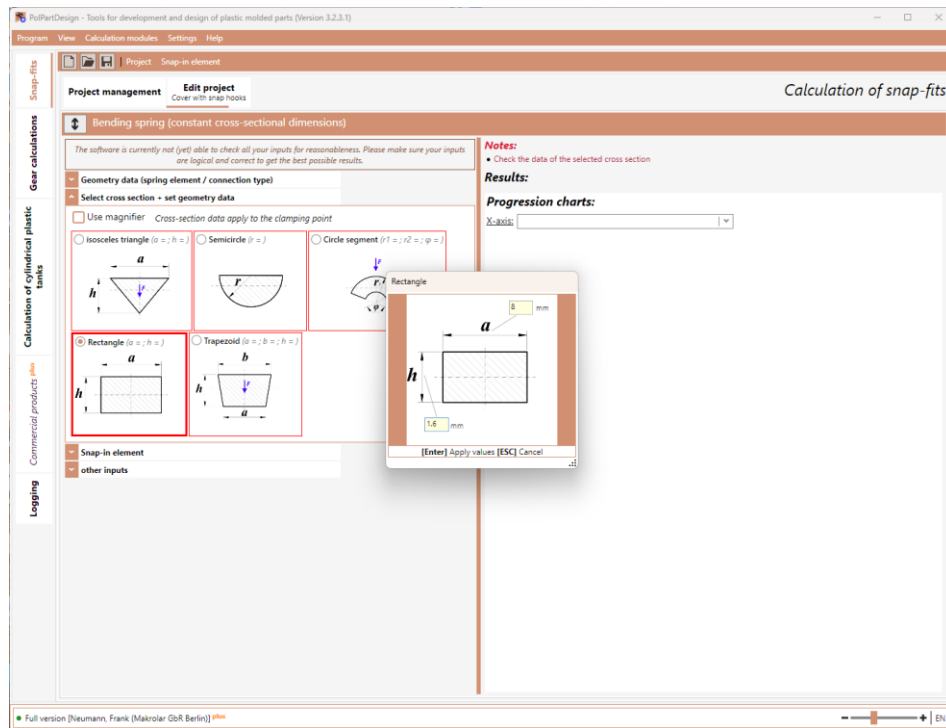


Figure 6: Setting the cross-section dimensions

3.4 Snap-in element

The “**Snap-in element**” section shows the selected snap-in element with the usual joining and loosening angles. Use the “...” button or the “**Snap-in element**” menu to change the snap-in element later.

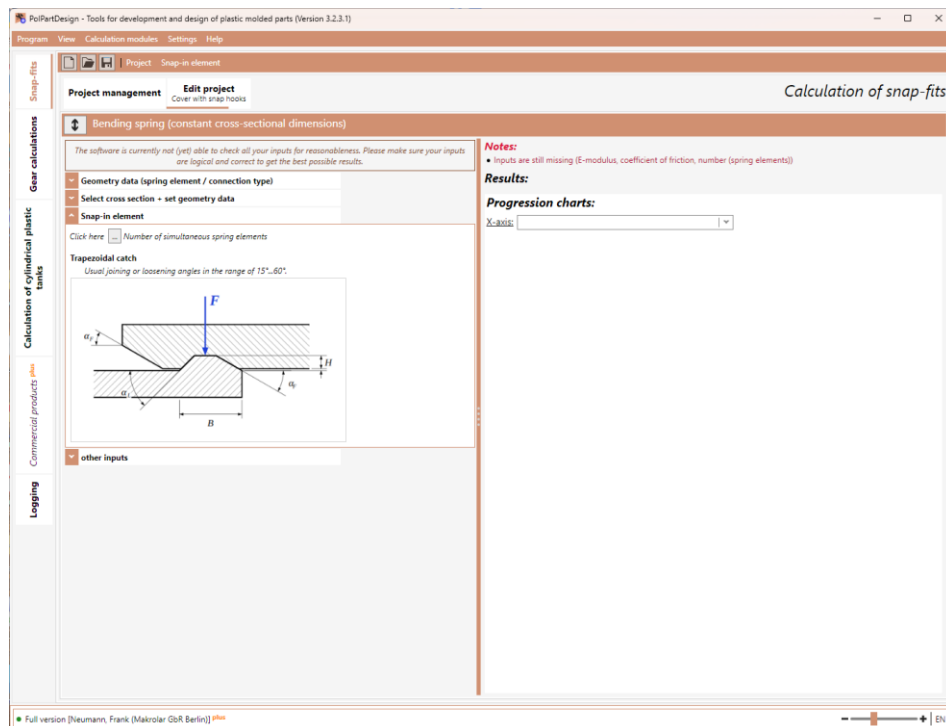


Figure 7: “Snap-in element” section

3.5 Other inputs and material data

In the “**other inputs**” section you define the material combination and the material properties:

Field	Meaning
Material combination	Plastic/metal, same plastics or different plastics; for plastics the designations of both partners (example: 1st PC, 2nd PA6 GF30).
Secant E-modulus of the Bending Spring [N/mm ²]	Modulus of elasticity at the occurring elongation. The “...” button opens an auxiliary calculation (section 3.6).
Coefficient of friction	Friction value between spring and mating part, with auxiliary calculation “...”.
Number of simultaneous spring elements	Number of snap hooks acting at the same time; the forces are multiplied accordingly.
Permissible elongation of the bending spring [%]	Limit value for the edge fiber elongation, with auxiliary calculation “...”.

3.6 Auxiliary calculations

PolPartDesign provides approximate auxiliary calculations for three material properties. “**Apply**” enters the result in the input field.

Note: The auxiliary windows show the most recently used data. This data is **not** saved in the project; only the applied result is.

Secant E-modulus: enter the **E0 modulus** (original modulus), the **Heat deflection temperature** and the **Joining/application temperature**. PolPartDesign calculates the modulus at the current maximum elongation (example: E0 = 2400 N/mm², HDT 130 °C, 23 °C → 2248 N/mm²). If you only know the Shore hardness, the “...” button next to the E0 modulus opens an approximate conversion from **Shore-D** or **Shore-A** to the original modulus.

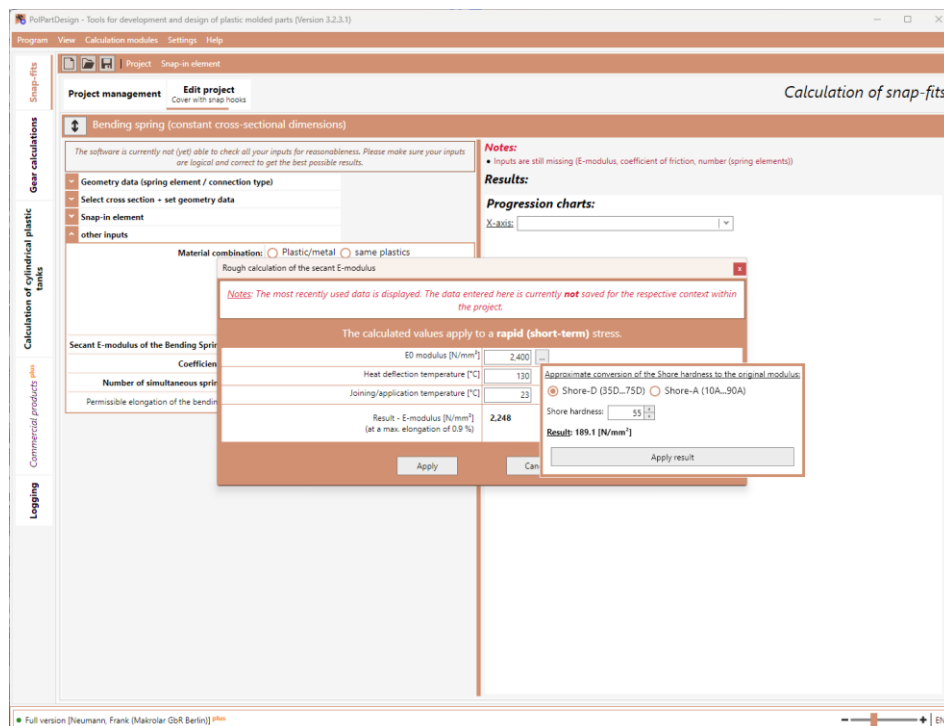


Figure 8: Secant E-modulus with Shore hardness conversion

Coefficient of friction: for each of the two plastics select the material assignment (e.g. amorphous or semi-crystalline thermoplastics, each by Shore hardness), the application condition and a friction value. The program derives the friction value of the pairing (example: 0.5 and 0.3 → 0.4).

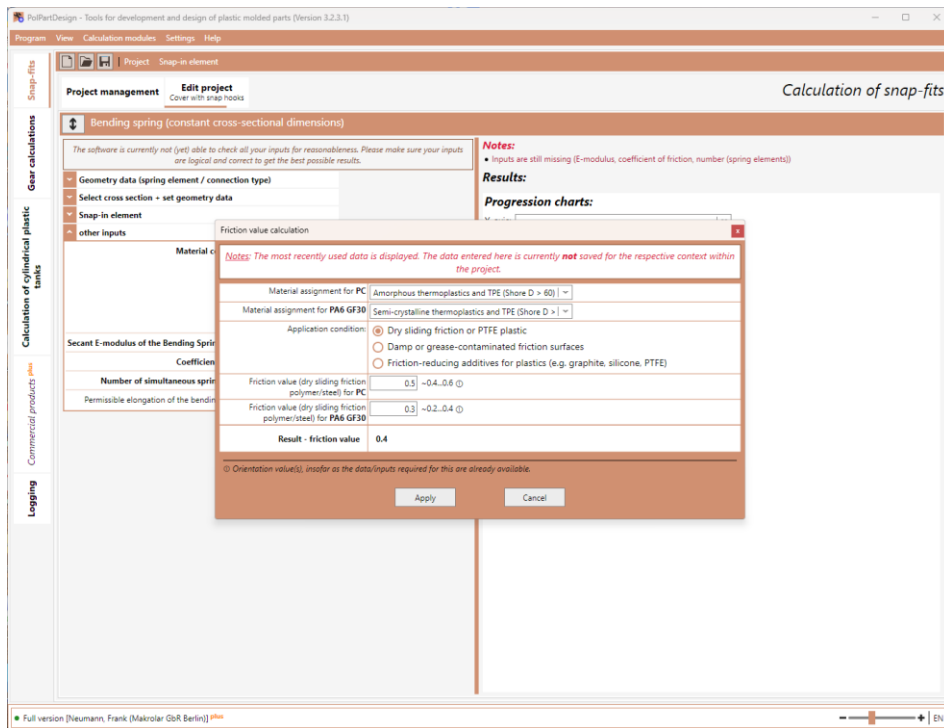


Figure 9: Auxiliary calculation of the coefficient of friction

Permissible elongation: select the **Material deformation characteristics** (brittle plastics, tough hard plastics with limited deformability, tough hard plastics with pronounced stretchability, or flexible plastics) and enter **Fracture/stretch limit elongation**, **Heat deflection temperature** and the **Assembly/disassembly number**. The values apply to a rapid (short-term) stress. In the example the result is 3.81 %.

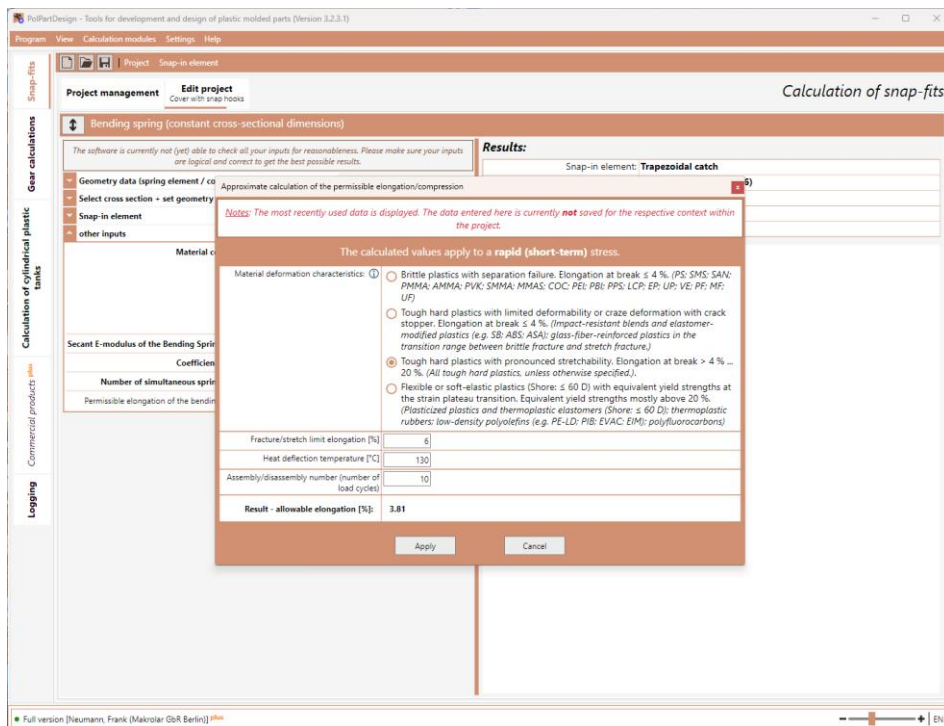


Figure 10: Auxiliary calculation of the permissible elongation

3.7 Results and progression charts

As soon as all data is complete, the “Results” area shows snap-in element, cross-section, **maximum edge fiber elongation**, **Joining power** and **Loosening power**. In the example: 0.90 % elongation (permissible 3.81 %), joining force 5.6 N, loosening force 13.2 N.

Under “Progression charts” select a quantity for the X-axis, e.g. **Snap height**, **Joining angle**, **Loosening angle**, **Coefficient of friction** or **Secant E-module**. The “Value range” slider sets the range; the check boxes show or hide **Joining power**, **Loosening power** and **maximum edge fiber elongation**. This shows you immediately how a change in geometry affects the result.

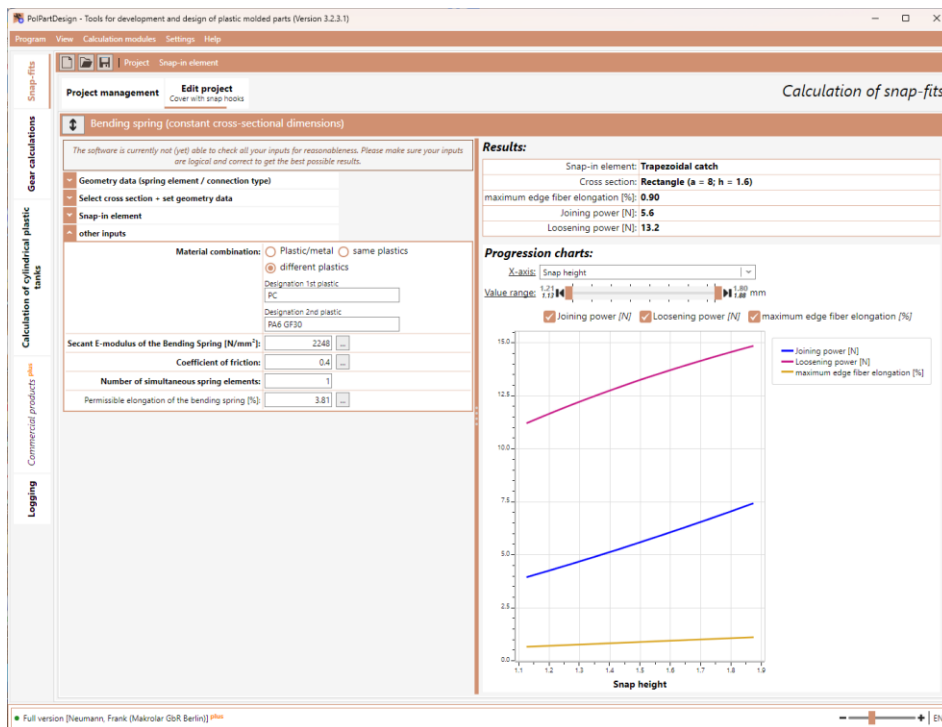


Figure 11: Results and progression chart over the snap height

Tip: The double arrow to the left of the spring element title shows or hides the input area. The divider between inputs and results can be moved with the mouse.

3.8 Saving and printing

The “Project” menu in the module bar contains **Create a new project...**, **Load project...**, **Save project**, **Save project as...** and **Printing / Print Preview...**. By default, projects are saved in the folder **Documents\PolPartDesign Files**.

The print preview contains the project header, results, the principle sketch with all dimensions, snap-in element, cross-section and material data. Use the printer icon to print the report and the zoom slider at the bottom to change the view.

4.1 Creating a new project

Click “Create a new project...”. The wizard asks for the data in six steps.

1. **General project information:** project name, processor and description.
2. **Gear stage / normal module:** **Outer wheel stage**, **Inner gear stage** or **Planetary gear stage**. Enter the **Standard module** directly or select it via “...” from preferred series I and II according to DIN 780.
3. **Materials / material pairing:** select the wheel material on the left and the pinion material on the right. The list contains the database materials (each dry and wet) and your own materials (section 4.4).
4. **Toothing / Number of teeth / Tooth width / Shielding:** straight or helical gearing, number of teeth and tooth width for wheel and pinion (the pitch circle diameter is calculated) and the **Gearbox shield**: open, partially closed or closed gearbox. For a closed gearbox, enter the surface of the gearbox housing without bottom surface in m².
5. **Mode of operation / speed / power:** operation of the gearbox with application factor (consistent 1.0; light to moderate impacts 1.35; moderate to medium impacts 1.75; strong impacts 2.25 or own factor). Then specify either the **torque** or the **gearbox nominal power**; speed and torque of the other gear are calculated.
6. **Lubrication / friction coefficient / temperature / running time:** dry operation, single grease lubrication, oil mist or splash oil lubrication; friction value of the material combination or own friction value; gearbox ambient temperature; continuous or intermittent operation and total running time in hours.
7. Click “Finish”. You can answer the subsequent question about saving with “No” and save later.

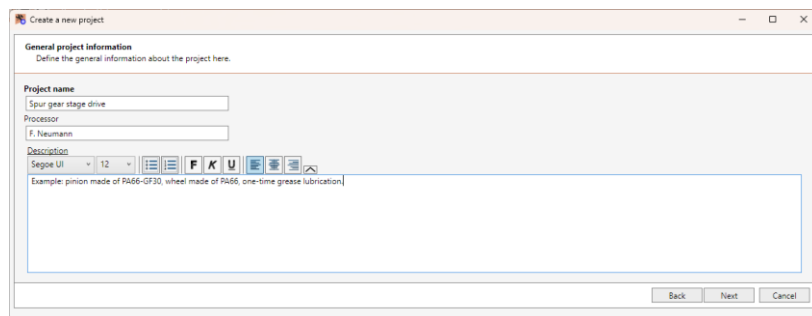
The screenshot shows a software window titled "Create a new project" with a sub-header "General project information" and the instruction "Define the general information about the project here." The form contains three main sections: "Project name" with a text input field containing "Spur gear stage drive"; "Processor" with a text input field containing "F. Neumann"; and "Description" which includes a rich text editor toolbar and a text area containing the example text "Example: pinion made of PA66-GF30, wheel made of PA66, one-time grease lubrication". At the bottom right of the window are three buttons: "Back", "Next", and "Cancel".

Figure 14: Wizard: general project information

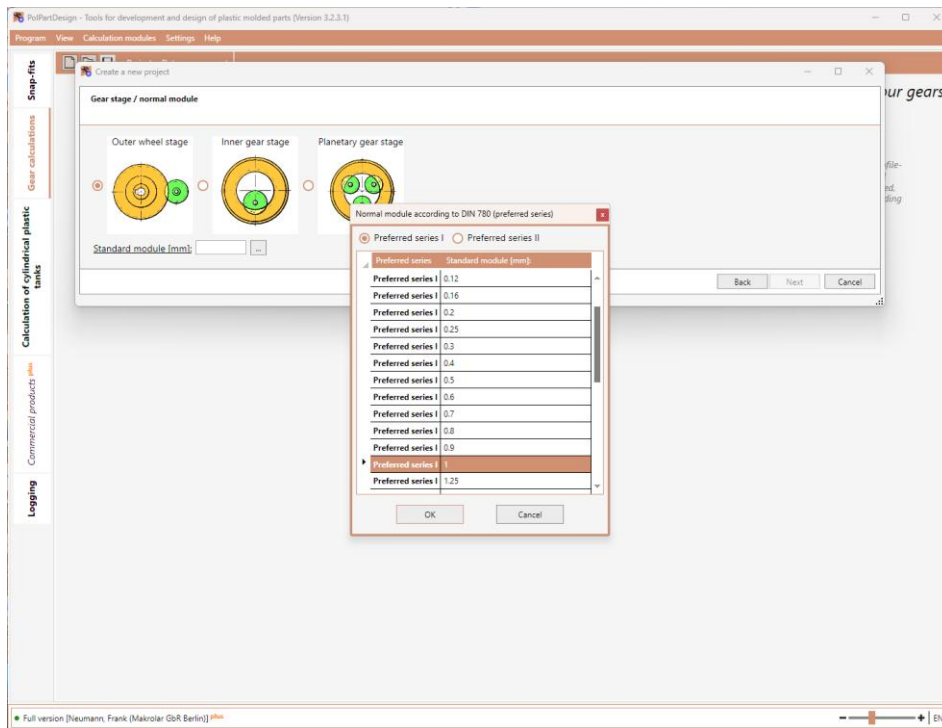


Figure 15: Selecting the normal module according to DIN 780 from the preferred series

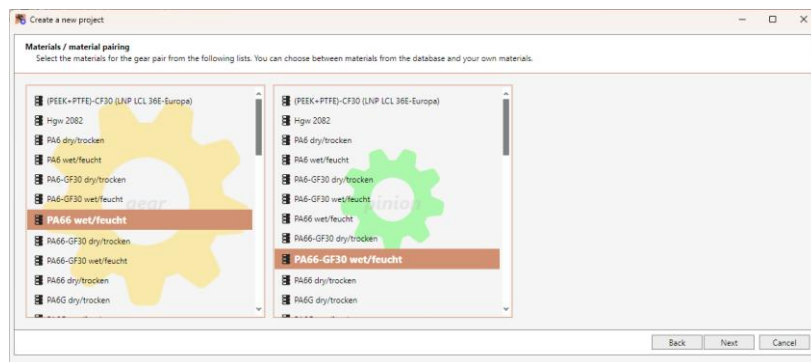


Figure 16: Wizard: material pairing (left wheel, right pinion)



Figure 17: Wizard: toothings, number of teeth, tooth width and shielding

Mode of operation / speed / power

Operation of the gearbox: ☐ consistent (Application factor=1.0) ☒ light to moderate impacts (Application factor=1.35) ☐ moderate to medium impacts (Application factor=1.75) ☐ strong impacts (Application factor=2.25) ☐ own application factor

☐ Torque is known ☒ Gearbox nominal power is known

Speed [U/min]: 500 Torque [Nm]: 0.38

Speed [U/min]: 1500 Torque [Nm]: 0.13

Gearbox nominal power [W]: 20

Back Next Cancel

Figure 18: Wizard: mode of operation, speed and power

Lubrication / friction coefficient / temperature / running time

Lubrication: ☐ Dry operation ☒ Single grease lubrication ☐ Oil mist lubrication ☐ Splash oil lubrication

Friction coefficient: ☒ use the friction value 0.09 (of the selected gear-material combination) ☐ Use own friction value

Gearbox ambient temperature [°C]: 40

Gearbox runtime: ☒ Continuous gear running time over 80 min (continuous operation) ☐ Interrupted gearbox running time up to 80 min (intermittent operation)

Total running time of the gearbox [h]: 2000

Back Next Cancel

Figure 19: Wizard: lubrication, friction coefficient, temperature and running time

4.2 Results and notes

After the wizard, the inputs are shown on the left in collapsible sections and the “Results and notes” area on the right. Every change on the left is recalculated immediately.

Result	Example / meaning
Tooth mass temperature	42 °C
Tooth flank temperature	44 °C (permissible 128.3 °C)
Safety – tooth root strength (pinion)	27.7 (permissible 81.4 / existing 2.9 N/mm ²)
Safety – tooth root strength (gear)	13.7 (permissible 37.5 / existing 2.7 N/mm ²)
Safety – tooth flank pressure	9.4 (permissible 78.8 / existing 8.4 N/mm ²)
Tooth deformation / permissible tooth deformation	0.03 mm / 0.1 mm
Number of load cycles pinion / gear / determining	180,000,000 / 60,000,000 / 180,000,000
Center distance, friction and damping losses	40 mm; 0.31 W; 0.21 W

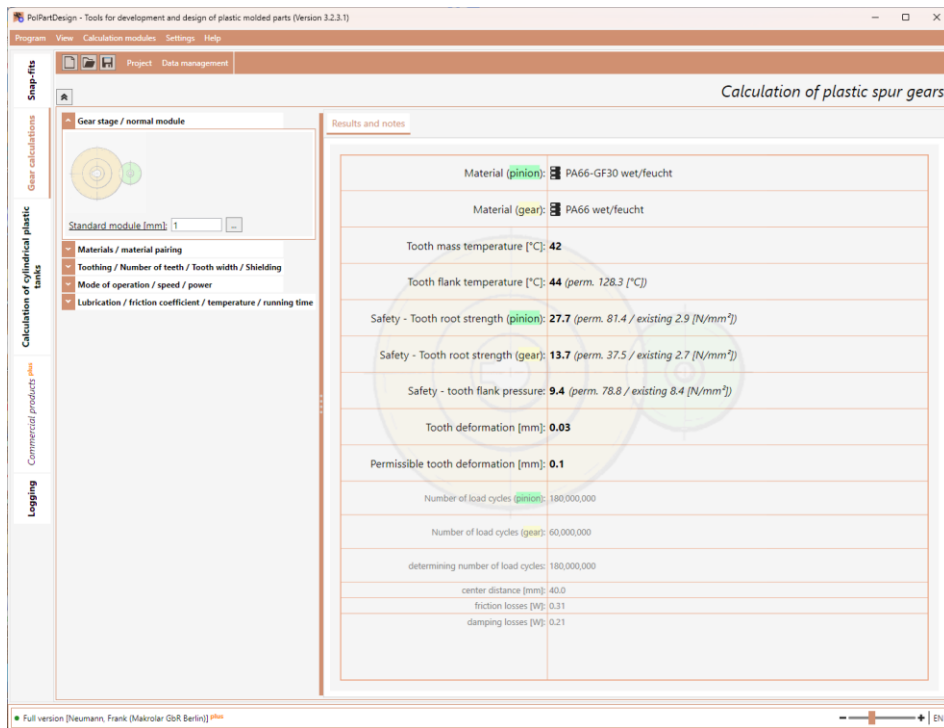


Figure 20: Results and notes of the gear calculation

To change an input, expand the corresponding section, e.g. **“Materials / material pairing”**, and select a different material.

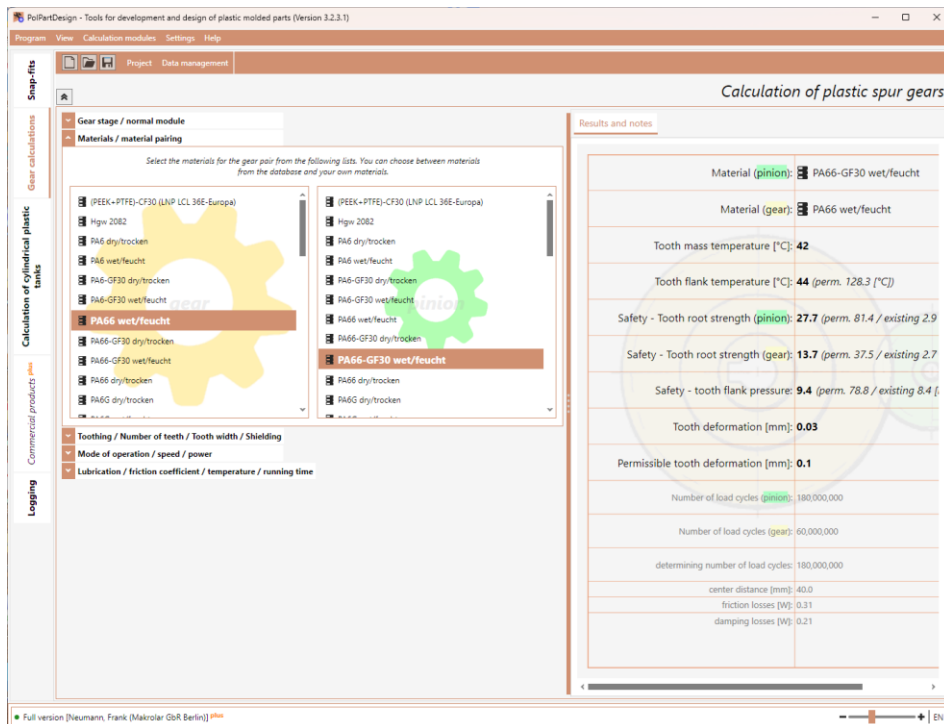


Figure 21: Changing the material pairing afterwards

4.3 Project menu and project details

The **“Project”** menu contains **New project...**, **Load project...**, **Save project**, **Save project as...**, **Close project**, **General project information...** and **Printing / Print Preview...**. Gear projects have the file extension **.polpd**. Use **“General project information...”** to change project name, processor and description.

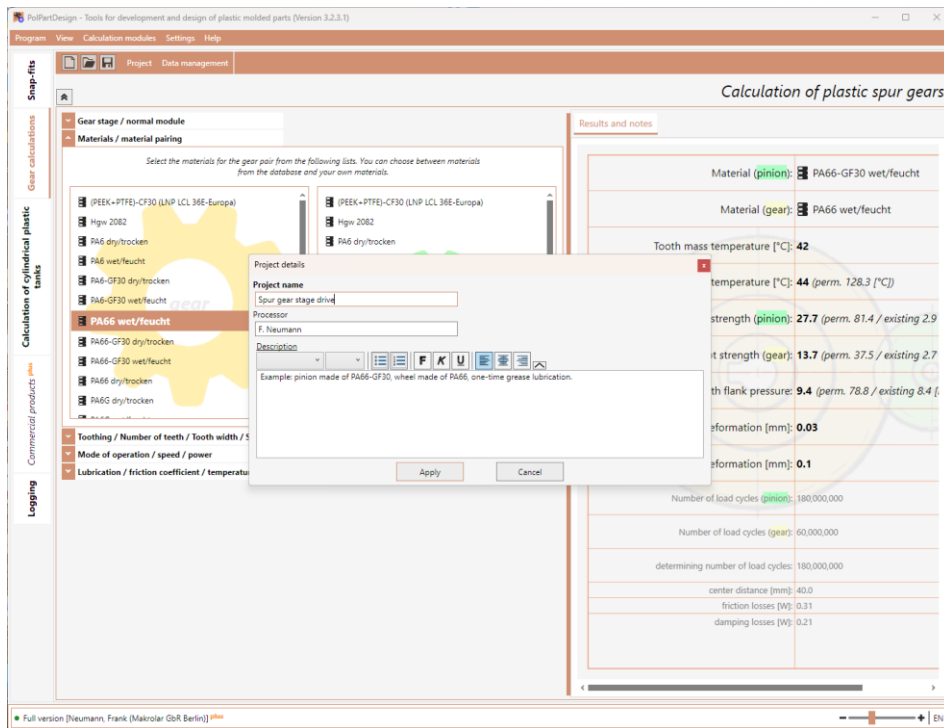


Figure 22: Changing the general project information

The print preview summarizes the project header, results and all inputs and intermediate results with sketches of wheel and pinion on one page.

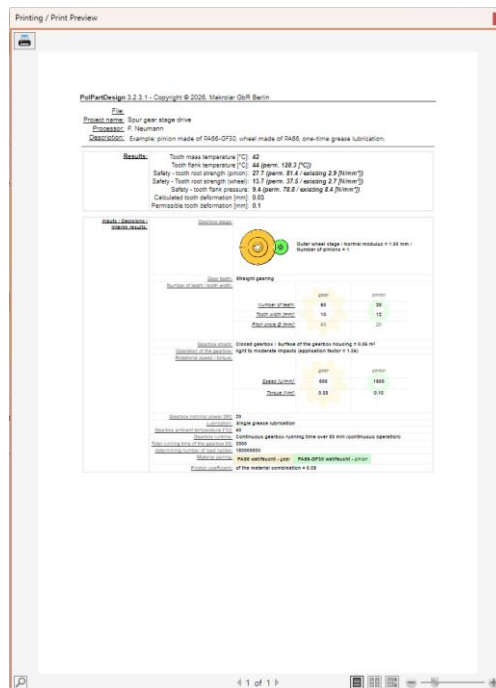


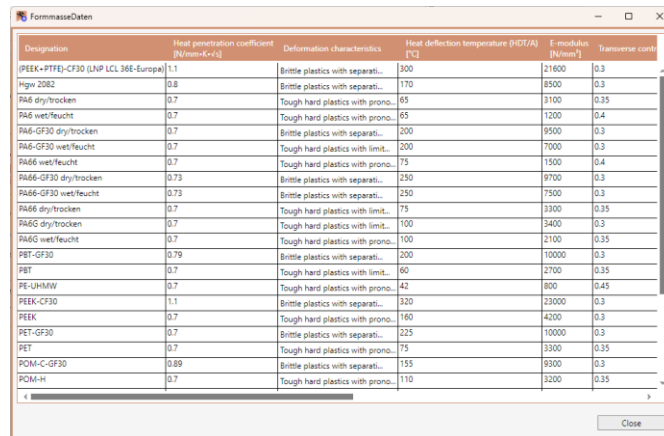
Figure 23: Print preview of the gear calculation

4.4 Data management and own plastics

The “Data management” menu contains:

- **File management...** (also via “File management (own plastics)…” on the start page): create and maintain your own materials.

- **Molding compound data from the database...:** table of the supplied plastics with heat penetration coefficient, deformation characteristics, heat deflection temperature, modulus of elasticity, transverse contraction coefficient and other properties (read only).
- **Metal data from the database...:** properties of metals for plastic/metal pairings.

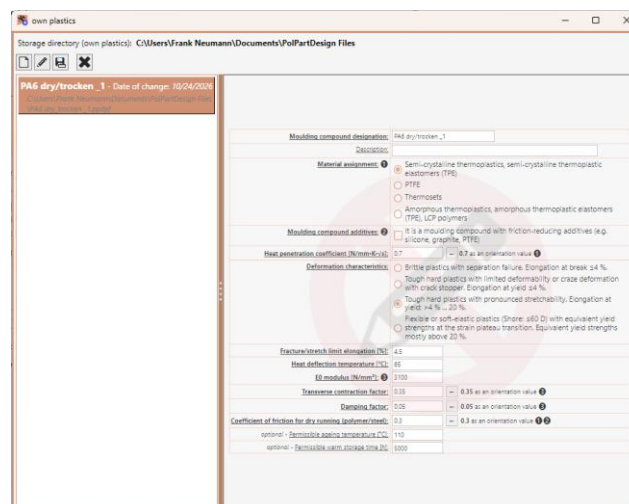


Designation	Heat penetration coefficient [N/mm²·s]	Deformation characteristics	Heat deflection temperature (HDT/A) [°C]	E-modulus [N/mm²]	Transverse contraction coefficient
(PEEK+PTFE)-CF30 (LNP LCL 366-Europe)	1.1	Brittle plastics with separati...	300	21600	0.3
Hgw 2082	0.8	Brittle plastics with separati...	170	8500	0.3
PA6 dry/trocken	0.7	Tough hard plastics with pron...	65	3100	0.35
PA6 wet/feucht	0.7	Tough hard plastics with pron...	65	1200	0.4
PA6-GF30 dry/trocken	0.7	Brittle plastics with separati...	200	9500	0.3
PA6-GF30 wet/feucht	0.7	Tough hard plastics with limit...	200	7000	0.3
PA66 wet/feucht	0.7	Tough hard plastics with pron...	75	1500	0.4
PA66-GF30 dry/trocken	0.73	Brittle plastics with separati...	250	9700	0.3
PA66-GF30 wet/feucht	0.73	Brittle plastics with separati...	250	7500	0.3
PA66 dry/trocken	0.7	Tough hard plastics with limit...	75	3300	0.35
PA6G dry/trocken	0.7	Tough hard plastics with limit...	100	3400	0.3
PA6G wet/feucht	0.7	Tough hard plastics with pron...	100	2100	0.35
PBT-GF30	0.79	Brittle plastics with separati...	200	10000	0.3
PBT	0.7	Tough hard plastics with limit...	60	2700	0.35
PE-UHMW	0.7	Tough hard plastics with pron...	42	800	0.45
PEEK-CF30	1.1	Brittle plastics with separati...	320	23000	0.3
PEEK	0.7	Tough hard plastics with pron...	160	4200	0.3
PET-GF30	0.7	Brittle plastics with separati...	225	10000	0.3
PET	0.7	Tough hard plastics with pron...	75	3300	0.35
PCM-C-GF30	0.69	Brittle plastics with separati...	155	9500	0.3
PCM-M	0.7	Tough hard plastics with pron...	110	3200	0.35

Figure 24: Molding compound data from the database

At the top of the “own plastics” window you see the storage directory (by default **Documents\PolPartDesign Files**). Your materials are listed on the left, the properties of the selected entry on the right. Use the toolbar icons to create a **new** entry, **edit**, **save** or **delete** it.

An own plastic includes, among others, molding compound designation, material assignment (semi-crystalline or amorphous thermoplastics, PTFE, thermosets, LCP), friction-reducing additives, heat penetration coefficient, deformation characteristics, fracture/stretch limit elongation, heat deflection temperature, E0 modulus, transverse contraction coefficient, damping factor and coefficient of friction for dry running; optionally permissible temperature and number of load cycles. Next to many fields the program shows orientation values.



Storage directory (own plastics): C:\Users\Frank Neumann\Documents\PolPartDesign Files

PA6 dry/trocken_1 - Date of change: 10/04/2020

Molding compound designation: PA6 dry/trocken_1

Description:

Material assignment:

- ☒ Semi-crystalline thermoplastics, semi-crystalline thermoplastic elastomers (TPE)
- ☐ PTFE
- ☐ Thermosets
- ☐ Amorphous thermoplastics, amorphous thermoplastic elastomers (TPE, LCP polymers)
- ☐ It is a moulding compound with friction-reducing additives (e.g. silicone, graphite, PTFE)

Moulding compound additives:

Heat penetration coefficient [N/mm²·s]: 0.7

Deformation characteristics:

- ☐ Brittle plastics with separation failure. Elongation at break ≥ 4 %
- ☐ Tough hard plastics with limited deformability or cross deformation with crack stopper. Elongation at yield ≥ 4 %
- ☒ Tough hard plastics with pronounced stretchability. Elongation at yield ≥ 10 %
- ☐ Flexible or soft-elastic plastics (Shore: ≤ 60 D) with equivalent yield strengths at the strain-plateau transition. Equivalent yield strengths mostly above 20 %

Fracture/stretch limit elongation [%]: 4.5

Heat deflection temperature [°C]: 65

E0 modulus [N/mm²]: 3100

Transverse contraction factor: 0.35

Damping factor: 0.05

Coefficient of friction for dry running (approximate): 0.3

optional - Permissible ambient temperature [°C]: 110

optional - Permissible warm storage time [s]: 5000

Figure 25: Managing own plastics

Note: Own plastics are saved as files with the extension **.ppdpf** and then appear in the material lists of the wizard and the project view.

5 Calculation of cylindrical plastic tanks

This module calculates the **minimum wall thickness** of upright cylindrical tanks with liquid filling and performs a **proof of strength** with the selected wall thickness. Example: welded **storage tank** made of PP-H for water, diameter 1200 mm, fill level 2000 mm.

5.1 Creating a new project

Under **Project management**, click “**Create a new project**”. The wizard asks for the basic decisions:

- **Type of load:** static or intermittent load.
- **Plastic material:** isotropic or orthotropic plastic.
- **Welded or glued construction:** tick the check box if the tank is welded or glued.
- **Project name** and **Processor**.

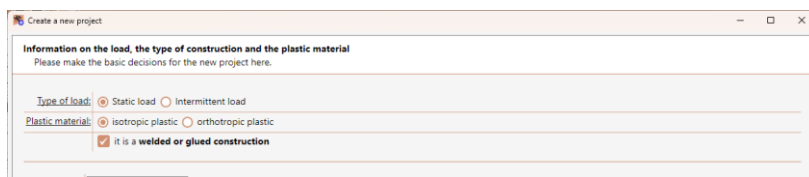


Figure 26: Wizard: load, type of construction and material

Important: For welded or glued constructions you must take a corresponding reduction in strength into account. Reduce the permissible elongation accordingly (section 5.3).

5.2 Basic data and temperature/load scheme

Under “**Basic data**”, enter the **Designation of the liquid** and its **Density** in g/cm^3 . Under “**Temperature and load scheme**” follow the **Diameter** d in mm and the scheme itself.

Click “**Edit scheme...**”. In the window, set the **Fill level** and enter time periods with **Start**, **Duration** (in hours) and **Liquid temperature** in the table. This lets you model operating phases with different temperatures at the same fill level. The chart on the right shows fill level and temperature over the application time. In the example: 1000 h at 23 °C, then 1000 h at 40 °C.

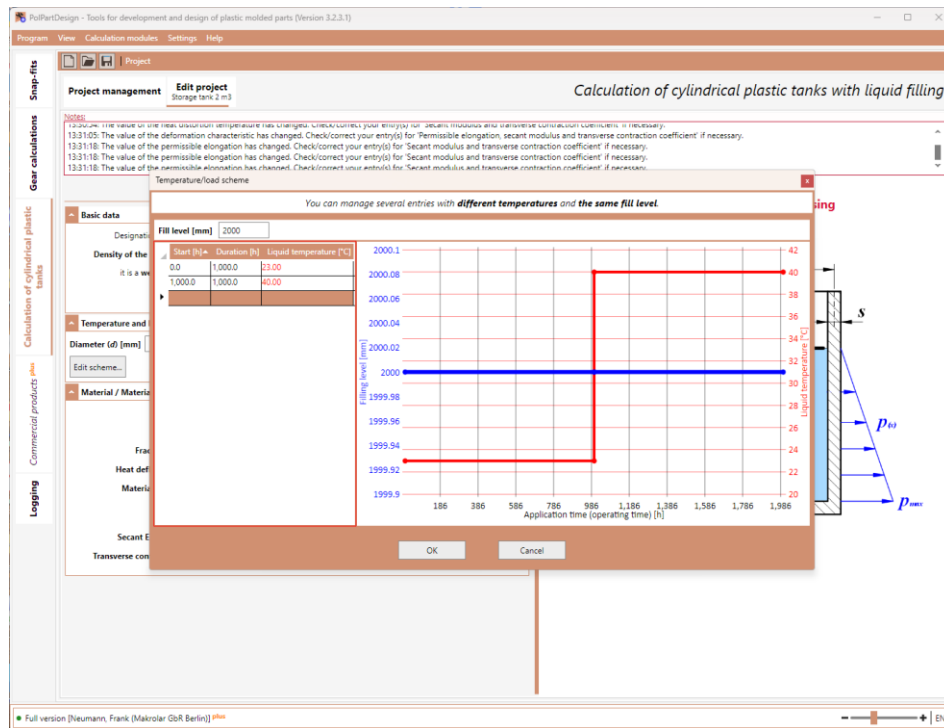


Figure 27: Editing the temperature/load scheme

5.3 Material data

In the “**Material / Material data (isotropic plastic)**” section, enter:

Field	Example / note
Moulding compound designation	PP-H
E0 modulus [N/mm ²]	1300
Fracture/stretch limit elongation [%]	10
Heat deflection temperature (HDT/A) [°C]	100
Material deformation characteristics	Tough hard plastics with pronounced stretchability
Permissible elongation [%]	1.5 (deliberately below the suggested 3.8 because of the welds)
Secant E-module (tensile stress) [N/mm ²]	527
Transverse contraction number (secant module)	0.45

To the right of **Permissible elongation**, **Secant E-module** and **Transverse contraction number**, a button shows the value PolPartDesign calculates from your other inputs. Clicking it applies that value. As long as data is missing (e.g. the load scheme), the button shows “--”.

Note: If you change a value that others depend on, the notes list above the inputs tells you which entries to check (e.g. “The value of the E0 module has changed...”).

5.4 Results

Under “**Calculations / Results**” on the right you find the **Minimum wall thickness** and the ordinate of the maximum stress. Enter the intended wall thickness in “**Selected wall thickness**”; the **proof of strength** (maximum/permissible stress) and the **safety factor** then appear.

Result	Example
Minimum wall thickness	1.49 mm
Ordinate of the maximum stress (minimum wall thickness)	72 mm
Selected wall thickness	3 mm
Ordinate of the maximum stress (selected wall thickness)	101 mm
Proof of strength (max./permissible tension)	3.92 / 7.91 N/mm ²
Proof of strength (safety factor)	2.01
Resulting application or liquid temperature	31.5 °C
Maximum wall pressure	0.020 N/mm ²

PolPartDesign - Tools for development and design of plastic molded parts (Version 3.2.3.1)

Program View Calculation modules Settings Help

Project management Edit project Storage tank 2 m3

Notes

13.3.102: The value of the deformation characteristics has changed. Check/correct your entry(s) for 'permissible elongation', 'secant modulus' and 'transverse contraction coefficient' if necessary.
13.3.118: The value of the permissible elongation has changed. Check/correct your entry(s) for 'Secant modulus and transverse contraction coefficient' if necessary.
13.3.118: The value of the permissible elongation has changed. Check/correct your entry(s) for 'Secant modulus and transverse contraction coefficient' if necessary.
13.3.118: The value of the permissible elongation has changed. Check/correct your entry(s) for 'Secant modulus and transverse contraction coefficient' if necessary.
13.3.151: The value of the secant E-module has changed. Check/correct your entry(s) for 'Transverse contraction factor' if necessary.

Static load

Basic data

Temperature and load scheme

Material / Material data (isotropic plastic)

Moulding compound designation: PP-H

E0 modulus [N/mm²]: 1300

Fracture/stretch limit elongation [%]: 10

Heat deflection temperature (HDT/A) [°C]: 100

Material deformation characteristics: Tough hard plastics with pronounced stretchability. Elongate tough hard plastics, unless otherwise specified.

Permissible elongation [%]: 1.5 - 3.8

Secant E-module (tensile stress) [N/mm²]: 527 - 527

Transverse contraction number (secant module): 0.45 - -0.45

Calculations / Results

Minimum wall thickness (s) [mm]: 1.49

Ordinate of the maximum stress for the **minimum wall thickness (X_{m2}) [mm]: 72**

Selected wall thickness [mm]: 3

Ordinate of the maximum stress of the **selected wall thickness (X_{m2}) [mm]: 101**

Proof of strength (max./permissible tension) [N/mm²]: **3.92 / 7.91**

Proof of strength (safety factor): **2.01**

Other information / values / results

resulting application or liquid temperature [°C]: **31.5**

Maximum wall pressure [N/mm²]: **0.020**

last change/calculation: 10/30/2026 1:32:00 PM

Principle sketch:

Diagram of a cylindrical tank with diameter d , height H , and wall thickness s . The tank is filled with liquid at pressure p_{liq} . The maximum stress σ_{max} is indicated at the bottom of the wall.

Figure 28: Inputs and results of the tank calculation

5.5 Saving and printing

Saving and printing work in the same way as for snap-fits, via **Project management** or the **“Project”** menu. The report contains all inputs, the load scheme and the results.

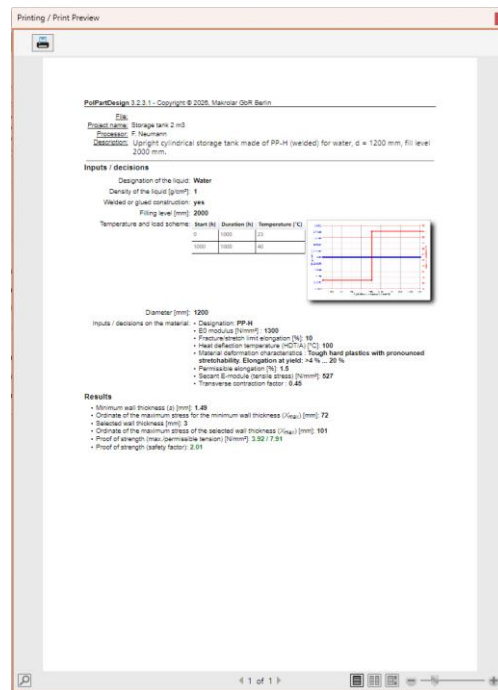


Figure 29: Print preview of the tank calculation

6 Calculation modules

The “**Calculation modules**” menu in the main menu bar contains three auxiliary calculations that you can call independently of a project and from any tab. They are used to quickly estimate material properties, e.g. before creating a project. The results are not saved; “**Close**” closes the window.

6.1 Calculate modulus of elasticity

The “**Secant/tangent e-module**” window estimates the modulus of elasticity of a plastic under operating conditions:

Input	Meaning
E-modulus	Secant E-module or Tangent e-module.
Type of load	Tension / compression or Bending / torsion / shear.
Type of time course	rapid, static, intermittent, oscillating (swelling) or oscillating (alternating). The principle sketch on the right shows the selected course; depending on the type, further fields appear, e.g. Load time for static load.
E0 modulus [N/mm²]	Original modulus of the material.
maximum elongation [%]	Elongation at which the modulus is to be determined.
Heat deflection temperature [°C]	HDT of the material.
Application temperature (TA) [°C]	Temperature in use.

Once all fields are filled in, the **Result of the approximate calculation** appears at the bottom. Example: PP with $E_0 = 1300 \text{ N/mm}^2$, 1 % elongation, HDT 100°C , 40°C and 10,000 h static load → secant modulus 450.6 N/mm^2 .

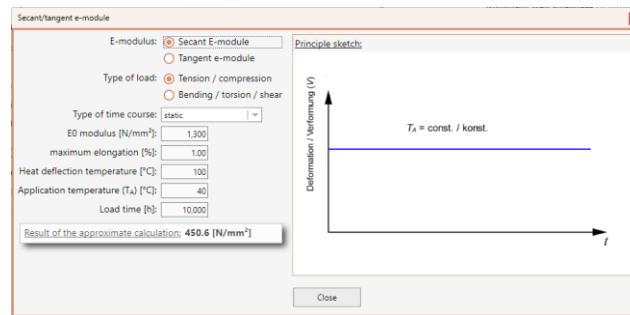


Figure 30: Calculation module "Calculate modulus of elasticity"

6.2 Calculate permissible elongation

The "Permissible elongation" window estimates the permissible elongation of a plastic. Select the **Type of time course** and the **Material deformation characteristics** (brittle plastics, tough hard plastics with limited deformability, tough hard plastics with pronounced stretchability or flexible plastics; the info icon explains the groups with examples) and enter **Fracture/stretch limit elongation**, **Heat deflection temperature** and, if applicable, the **Load time**.

Example: tough hard plastic, yield elongation 10 %, HDT 100 °C, 10,000 h static load → permissible elongation 3.48 %.

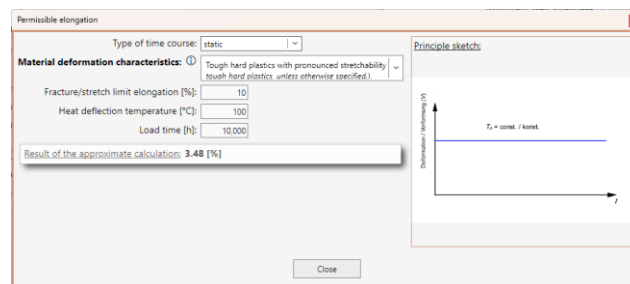


Figure 31: Calculation module "Calculate permissible elongation"

6.3 Calculate heat penetration coefficient

The heat penetration coefficient $b = \sqrt{\lambda \cdot \rho \cdot c}$ describes how quickly a material absorbs heat; it is needed, for example, for the temperature calculation of gears. Enter **Density** [g/cm³], **Thermal conductivity coefficient** [W/m·K] and **Specific thermal capacity** [J/g·K]; the result is shown in N/(mm·K·Vs).

On the left, the window lists **orientation values** of common plastics (abbreviation and designation). **Double-clicking** a row copies its values into the input fields. Example: PA6 GF30 → density 1.36 g/cm³, thermal conductivity 0.24 W/m·K, thermal capacity 1.5 J/g·K → heat penetration coefficient 0.7.

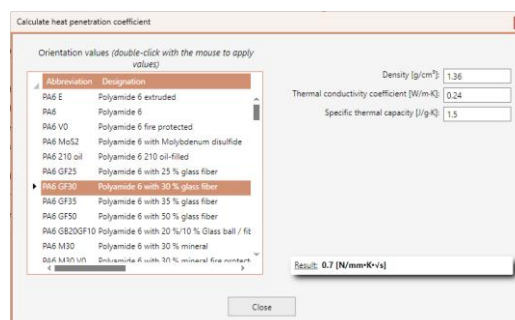


Figure 32: Calculation module "Calculate heat penetration coefficient" with orientation values

Tip: The auxiliary calculations within the projects (e.g. the “...” buttons for snap-fits) use the same methods but apply the result directly to the project.

7 Menus

Menu	Commands
Program	Exit Program; Info about...
View	Switch between Snap-fits , Gear calculations , Plastic tank calculations and Commercial products ; Original size (100%) ; results change view.
Calculation modules	Calculate modulus of elasticity... , Calculate permissible elongation... , Calculate heat penetration coefficient... (chapter 6)
Settings	Server connection... ; Activate the license... ; Reset the license... ; Options... ; Language/Sprache...
Help	Check for software update... ; To our homepage... ; Register for the software... ; View online help ; View local help... (F1 key); View local Help (Commercial products database)...
Project (module bar)	New project, Load, Save, Save as, Printing / Print Preview; for gears additionally Close project and General project information...
Snap-in element (snap-fits)	Select a different snap-in element.
Data management (gears)	File management... ; Molding compound data from the database... ; Metal data from the database...

8 Tips and frequently asked questions

Question	Answer
Why are no results shown?	Inputs are still missing. The “Notes” area or the red message “Inputs/decisions are still missing” names the missing data.
Can I change decisions from the wizard later?	Yes. All data can be changed in the project view; the results are updated immediately.
Are the values of the auxiliary calculations saved?	No, only the applied result is saved in the project.
How do I find the best geometry for a snap-fit?	Use the progression charts: select the quantity to vary as X-axis and read off forces and elongation.
My material is missing from the gear database.	Create it as an own plastic under “Data management → File management...”.
The tank is welded. What do I need to consider?	Tick the check box for welded or glued construction and reduce the permissible elongation according to the weld quality.