



Templates and Reports



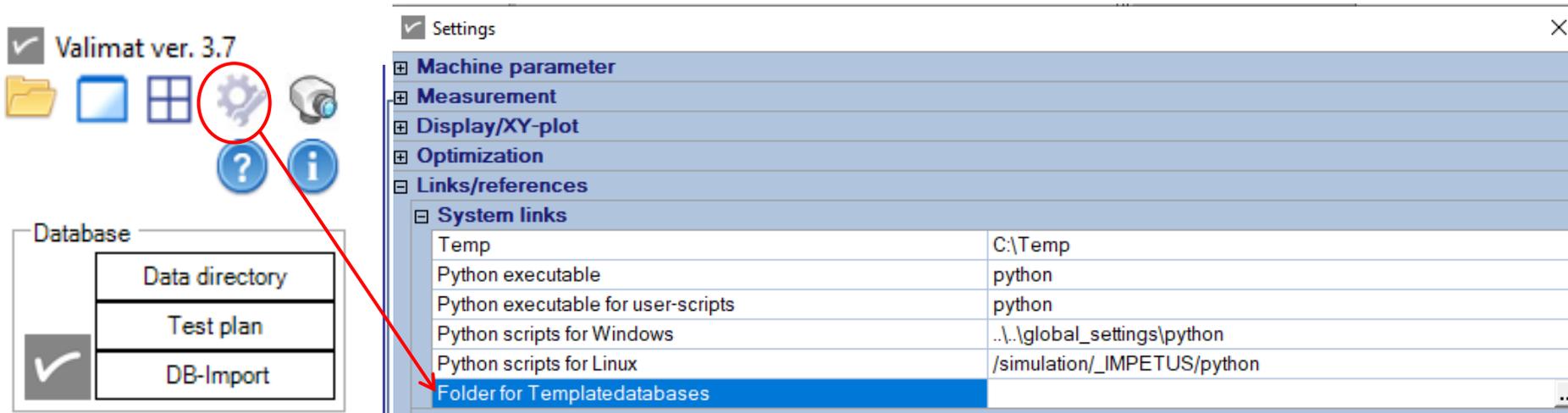
Content

- VALIMAT® - Template database
- Automatic report generation

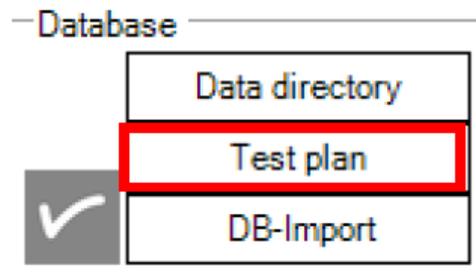
Recommended test packages – thermoplastic materials

Material	isoP (unreinforced or talc reinforced plastic)				frP (fiber reinforced plastic)			
	<i>basic</i>	<i>standard</i>	<i>temperature</i>	<i>professional</i>	<i>basic</i>	<i>standard + temperature</i>		<i>professional</i>
Material cards	1	1	2	1	2	2	4	1
Plate 102x80x 2mm		50	25	50	100	100	100	100
Multi specimen plate	50	50	100	100				50
Temperature	23°C	23°C	-30°C & 80°C	23°C	23°C	23°C	-30°C & 80°C	23°C
Static bending	2	2	4	2	2	2	8	2
Dynamic bending	3	3	4	3	6	6	8	6
Dynamic tension bending		1		1				
Static tensile test		1	2	1		2		2
Dynamic tensile test				1				2
Static puncture test				1				1
Dynamic puncture test		1	2	1		1	2	1
Static component test				1				1
Dynamic component test				1				1
Repetitions	5	5	5	5	5	5	5	5
Measurements	25	40	60	60	40	55	90	80
Remark		Detailed testing at 23°C			Orientation 0° & 90°	Orientation 0° & 90°		
strain rate/hardening		compression/tension-asymmetry		damage/failure			validation on component	

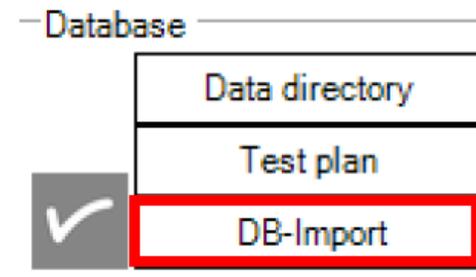
VALIMAT® - Template database



Setup the folder containing the template database under the settings tab



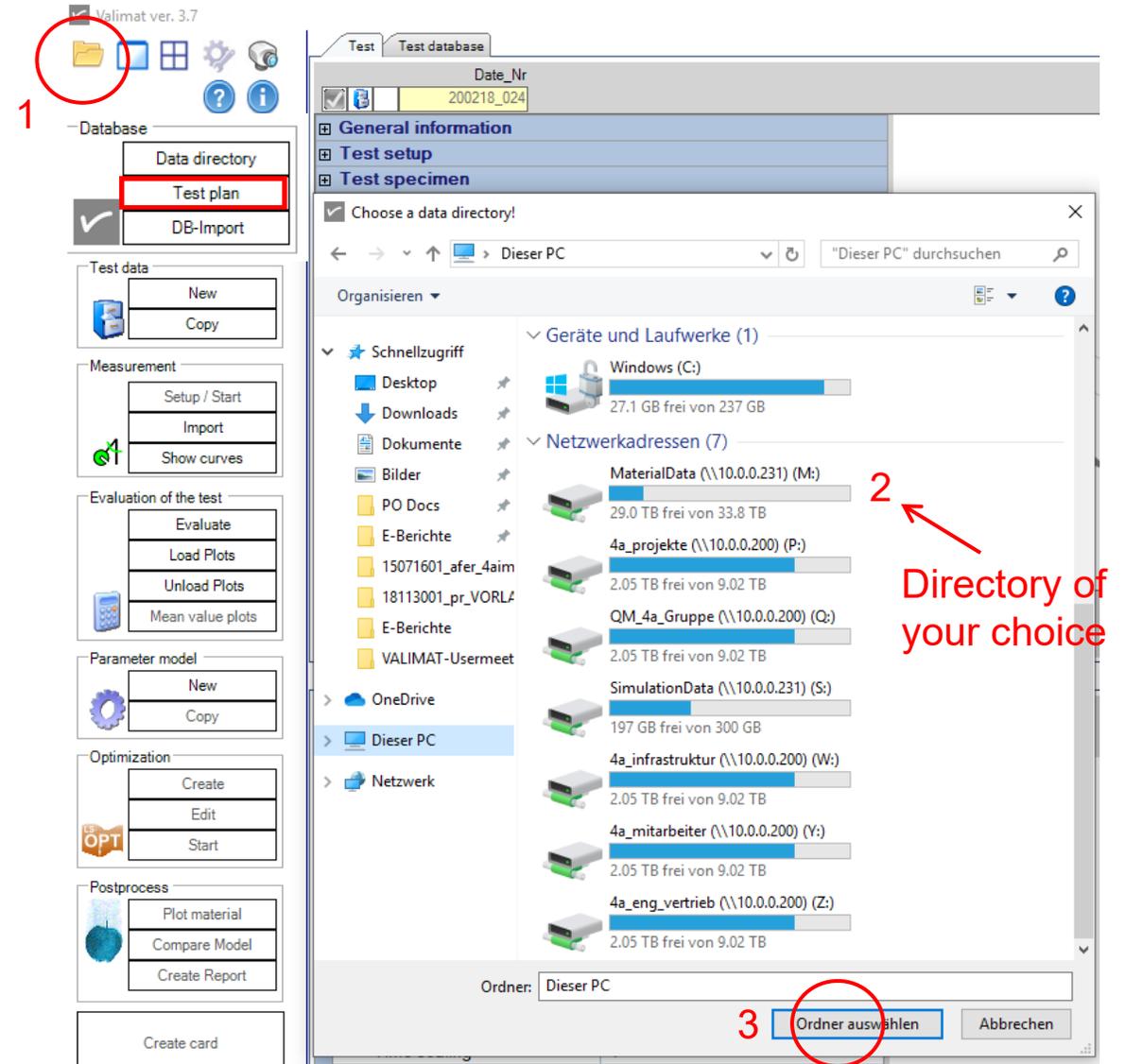
A template database can be imported using the `Test plan` button



An additional VALIMAT® can be imported in the already opened database

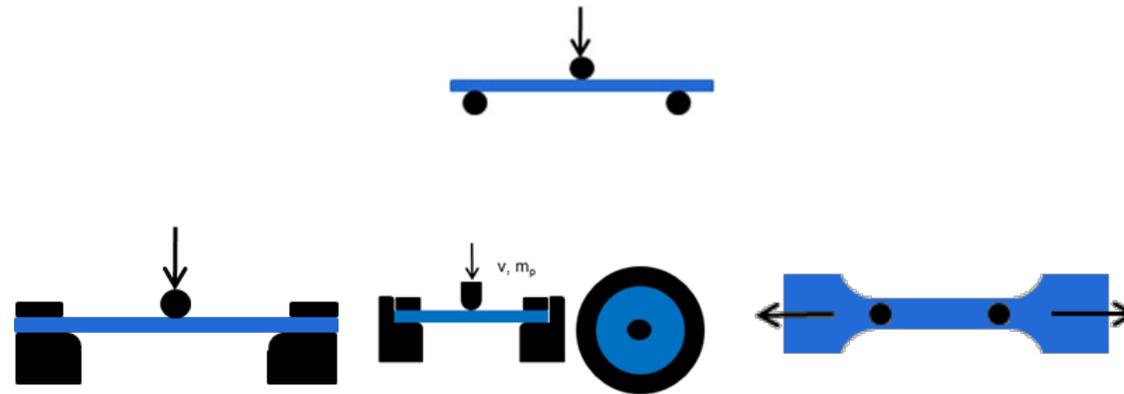
VALIMAT® - Template database

- To use the template database, you have to create it once → 4a provides you with an example template database
- The following steps need to be performed
 - Create a directory where you store tests and models
 - Create a new (empty) database in this directory



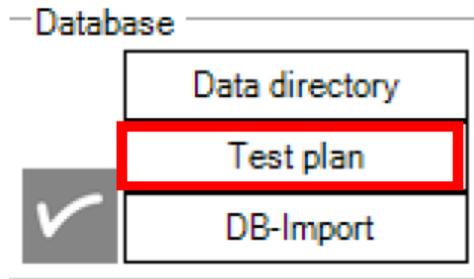
VALIMAT® - Template database

- The use of a template database streamlines the workflow of generating material cards from the tests conducted under the different loading conditions
- It is especially useful, when the test setups for the optimization or validation of the material cards are the same, as shown in the test package overview in the previous slide
- As a demonstrative example, we will go through the template database for the material package isoP standard
 - The material package uses static and dynamic bending tests to generate the material card.
 - Dynamic puncture, clamped 3-point-bending and tensile tests to validate the material card.



VALIMAT® - Template database

- The template database made available for the isoP standard package is shown here.

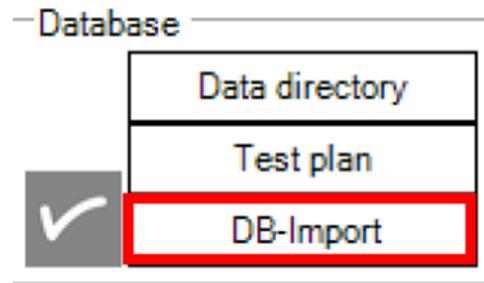


The screenshot displays the Valimat software interface. On the left, there is a sidebar with various toolbars including 'Database', 'Test data', 'Measurement', 'Evaluation of the test', 'Parameter model', 'Optimization', and 'Postprocess'. The main window is split into two panes. The top pane, titled 'Test database', shows a tree view for 'Material: material' with a list of test methods: 3PB (3-Point Bending), 3PBC (3-Point Bending clamped), TT (Tensile test), and PT (Puncture test)(b). A white box labeled 'Tests' is overlaid on this list. The bottom pane, titled 'Model database', shows a table of series for 'Material na...'. A white box labeled 'Generation of the material card' is overlaid on the top part of this table, and another white box labeled 'Validation of the material card' is overlaid on the bottom part.

Series	ID	Dataset name	Modeller	Series	Validation/...	Material na...
Series:						
Series: MC3-Autofit						
<input checked="" type="checkbox"/>	200224_171	0_VISUAL_AUTO	mr	MC3-Autofit	AutoValues	Kunststoff
<input checked="" type="checkbox"/>	200224_172	00_Validation_3PB_AUTO				
<input checked="" type="checkbox"/>	200224_160	1_Optimization_YoungsMod				
<input checked="" type="checkbox"/>	200224_161	2_Optimization_flow_data				
<input checked="" type="checkbox"/>	200224_162	3_Optimization_strainrate	mr	MC3-Autofit	Optimizatio...	Kunststoff
<input checked="" type="checkbox"/>	200224_163	4_Validation_3PB	mr	MC3-Autofit	Validation	Kunststoff
Series: MC5						
<input checked="" type="checkbox"/>	200224_164	5_Optimization_T/Bfactor_3PBC	mr	MC5	Optimization	Kunststoff
<input checked="" type="checkbox"/>	200224_165	6_Optimization_strainrate2_3				
<input checked="" type="checkbox"/>	200224_166	7_Validation_3PB_MAT187				
<input checked="" type="checkbox"/>	200224_167	7_Validation_3PBC_MAT187				
<input checked="" type="checkbox"/>	200224_170	7_Validation_PunctureTest_dynamic_MAT187	mr	MC5	Validation	Kunststoff
<input checked="" type="checkbox"/>	200224_169	7_Validation_PunctureTest_static_MAT187	mr	MC5	Validation	Kunststoff
<input checked="" type="checkbox"/>	200224_168	7_Validation_TensileTest_MAT187	mr	MC5	Validation	Kunststoff

VALIMAT® - Template database

- As an alternative, you can also import the template database in an already existing database by following these steps



Valimat ver. 3.7

Test Test database

Date_Nr
200218_024

General information
Test setup
Test specimen
Evaluation

Merge databases

Tests Models Reset data sets New ID's Import

Details

Offnen

P1-BXF... P1-Pruefung01-vom-171201 "P1-Pruefung01-vom-171201..."

Organisieren	Neuer Ordner	Name	Änderungsdatum	Typ
		curvestore	18.02.2020 17:23	Dateiordner
		DatenShimadzu	15.01.2020 11:20	Dateiordner
		Fotos	15.01.2020 11:20	Dateiordner
		model	13.02.2020 15:28	Dateiordner
		4a_impetus	19.02.2020 11:51	Microsoft Access ...

Dateiname: mdb (*.mdb) Offnen Abbrechen

4: Check on this box so that all tests and models get a new ID !!!

1 2 3 4 5

VALIMAT® - Template database

- Advantages of the template database
 - The test setup is already stored
 - The models for creating the material card are already stored
 - The test IDs in the models are linked to the tests
- Checks that need to be carried out before calculation using the database created from the template database
 - Update the test specimen names and geometry (e.g. pendulum mass, gauge length)
 - Check the length of the test curves in the models
 - Optimization of Youngs modulus → trim test curve to obtain a suitable length for the optimization
 - Optimization of plastic data and strain rate dependency → optimization curve should be a little over the force maximum
 - Check the starting values and limits of design variables
 - Check if the right test IDs are linked to the models

Automatic report generation

- Requirements
 - A testing database with correct values in the following fields

			ID	Project name	Customer	Material	Series	Thickness	Width	Length	Temperatu...	Mass of the pendulum	Velocity	Distance of support...
✓		B	140313_001	Ringversuch	4a engineering GmbH	PP LGF30	longitudinal	1.8	10	50	23	1466	1	39.89
✓		B	140313_002	Ringversuch	4a engineering GmbH	PP LGF30	longitudinal	1.81	9.97	50	23	1466	1	39.89
✓		B	140313_003	Ringversuch	4a engineering GmbH	PP LGF30	longitudinal	1.82	9.99	50	23	1466	1	39.89
✓		B	140313_004	Ringversuch	4a engineering GmbH	PP LGF30	longitudinal	1.82	9.98	50	23	1466	1	39.89
✓		B	140313_005	Ringversuch	4a engineering GmbH	PP LGF30	longitudinal	1.8	9.99	50	23	1466	1	39.89
✓		B	140313_006	Ringversuch	4a engineering GmbH	PP LGF30	longitudinal	1.82	10	50	23	1466	1	39.89
✓		B	140313_007	Ringversuch	4a engineering GmbH	PP LGF30	perpendicular	1.82	9.97	50	23	1466	1	39.89
✓		B	140313_008	Ringversuch	4a engineering GmbH	PP LGF30	perpendicular	1.81	9.97	50	23	1466	1	39.89
✓		B	140313_009	Ringversuch	4a engineering GmbH	PP LGF30	perpendicular	1.83	9.98	50	23	1466	1	39.89
✓		B	140313_010	Ringversuch	4a engineering GmbH	PP LGF30	perpendicular	1.82	9.99	50	23	1466	1	39.89

- A model database with correct values in the following fields

	ID	Dataset name	Material name	Series
+	Material name:			
-	Material name: PPLGF30			
-	Series: longitudinal			
✓	140318_002	Young's Modulus	PPLGF30	longitudinal
✓	140318_003	Plastic Data	PPLGF30	longitudinal
✓	140318_004	Strain Rate Dependency	PPLGF30	longitudinal
✓	140318_005	Validation	PPLGF30	longitudinal

- Powerpoint templates

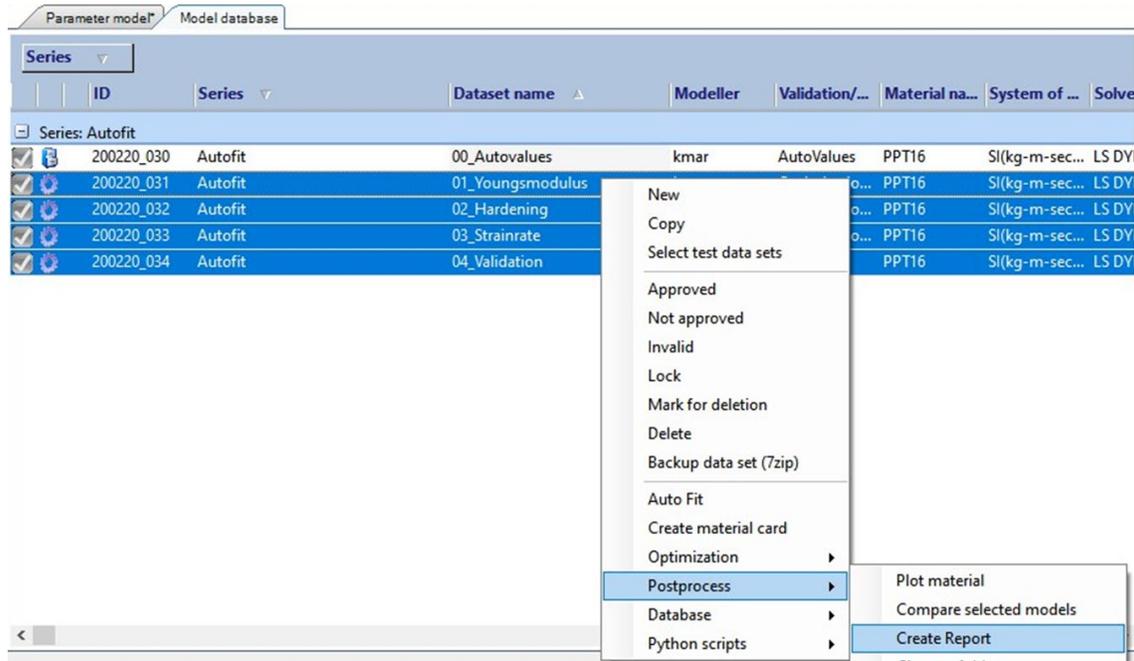
Automatic report generation

- Generation of a template
 - You can of course generate template of your own
 - It must be a .PPTX
 - There are several possibilities to choose from
 - `<<img_sc_F(s);auto;legend_off>>` : image of the simulation curve force vs. displacement with auto scaling and without a legend
 - `<<img_sc_F(s);0;0.002;0;1000>>` : image of the simulation curve force vs. displacement with scaling from 0 to 0.002 m and from 0 to 1000 N
 - `<<img_sc_sig(eps);auto;legend_off;sc_only>>` : image of the simulation curve stress vs. strain with auto scaling and without a legend; just the simulation curves are displayed (without the test curves)
 - `<<img_tc_v(t)>>` : image of the test curve(s) velocity vs. time with auto scaling
 - `<<img_tc_F(t);xmin;xmax;ymin;ymax>>` : image of the test curve(s) force vs. time with the scaling xmin to xmax for time and ymin to ymax for force; the values have of course to be replaced

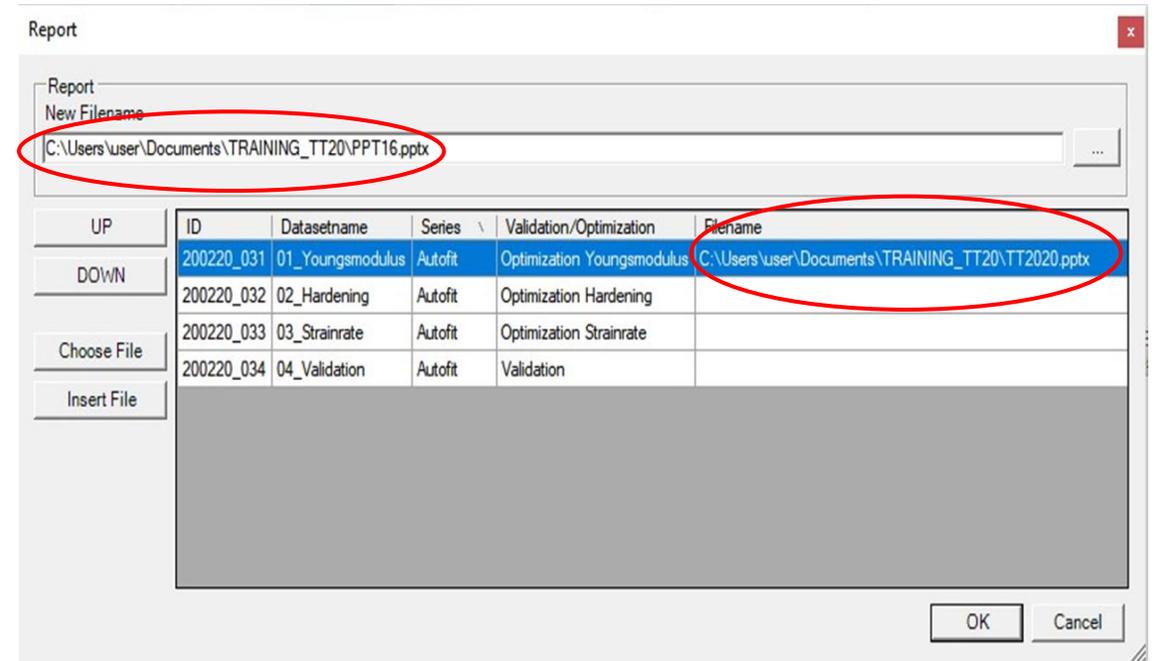
Automatic report generation

- Test curves are optimized using VALIMAT[®] and then exported to Powerpoint

Template



Generated report



Automatic report generation

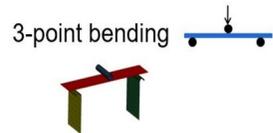
- Templates are needed to generate an automatic report

Template

measurement results, <<db_T_case_1>>°C, <<db_mattyp>>
overview



E moduli  Hardening 
<<img_sc_F(s);auto;legen d_off;index:1>> <<img_sc_F(s);auto;legen d_off;index:2>>

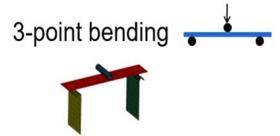
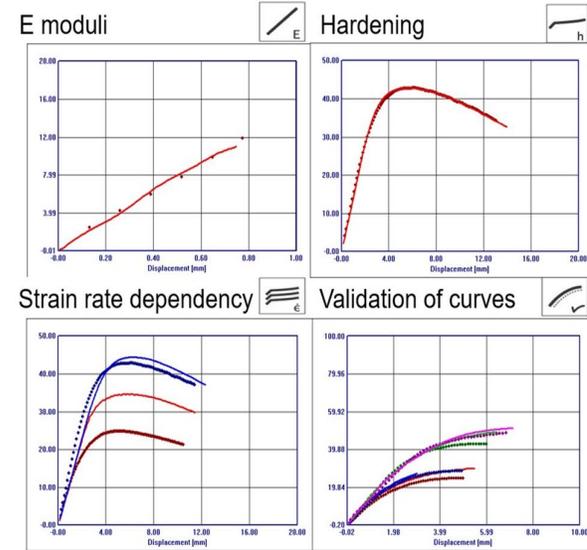


Strain rate dependency  Validation of curves 
<<img_sc_F(s);auto;legen d_off;index:3>> <<img_sc_F(s);auto;legen d_off;index:4>>



Generated report

measurement results, 23°C, PPT16
overview



Automatic report generation

- Quasi-static and dynamic 3-Point bending tests are exported to a Powerpoint

Template

Reverse engineering, <<db_mattyp>>, <<db_T_case_1>>°C
3-point-bending tests



<<img_sc_F(s);auto;legend_off>>

Case	V ₀ [m/s]	l ₀ [mm]	m _{Pendulum} [g]	b [mm]	t [mm]	l [mm]
<<case_1>>	<<db_v_a>>	<<db_l_w>>	<<db_mp>>	<<db_b1_2>>	<<db_hf_2>>	<<db_lf_2>>
<<case_2>>						
<<case_3>>						
<<case_4>>						
<<case_5>>						

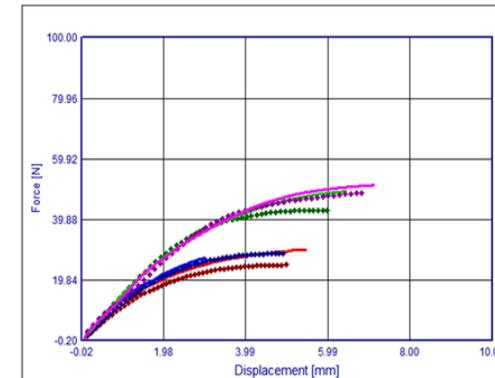
◆◆◆ Mean value curves testing
— optimization curves simulation

model <<db_model_id>>
solver <<db_solver>>, material card <<db_mat_file>>, element size <<db_etsize>>mm,
element type <<db_elform>>, through thickness integration points <<db_allayer>>
assumptions: Poisson's ratio <<db_nu>>, friction coefficient <<db_fr>>



Generated report

Reverse engineering, PPT16, 23°C
3-point-bending tests



Case	V ₀ [m/s]	l ₀ [mm]	m _{Pendulum} [g]	b [mm]	t [mm]	l [mm]
stat_low_vel_VP	0.0001	40.01	0	10.02	2.42	50.19
stat_high_vel	0.001	40.01	0	10.03	2.42	50.20
dyn_low_vel_EL_HC_VP	1	40.03	1580	10.03	2.42	50.18
dyn_high_vel	4	40.03	1580	10.02	2.42	50.20

model 200220_034
solver LS DYN4, material card *MAT_PIECEWISE_LINEAR_PLASTICITY (*MAT_024), element size: 2mm,
element type 10: Fully integrated shell element (very fast), through thickness integration points: -1
assumptions: Poisson's ratio: 0.3, friction coefficient: 0.1



Automatic report generation

- `<<img_mc_1>>` : material curve (stress-/strain curve (1) or flow curve (2))
- `<<db_mattyp>>`, `<<db_lw>>`, ... all variables (according to the 4a impetus manual)
- `<<db_T_case_1>>` : Temperature of case_1

Case name	v_0 [m/s]	l_w [mm]	m_{Pendulum} [g]	b [mm]	t [mm]	l [mm]
<code><<case_1>></code>	<code><<db_va>></code>	<code><<db_lw>></code>	<code><<db_mp;4>></code>	<code><<db_b;f1>></code>	<code><<db_h;f2>></code>	<code><<db_l;f1>></code>
<code><<case_2>></code>						
<code><<case_3>></code>						
<code><<case_4>></code>						

- For the table just the first row has to be filled out. “f1” means just one digit after the comma, “f2” analogue two digits after the comma; “4” means over all four digits.
- This formatting can also be used on the other variables outside the table.
- The image has the size of the text field set.

Automatic report generation

Live demonstration!

Autofit → Report (workflow)