VALIMAT

User Defined Specimen & Input deck

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- Overview – User defined input deck
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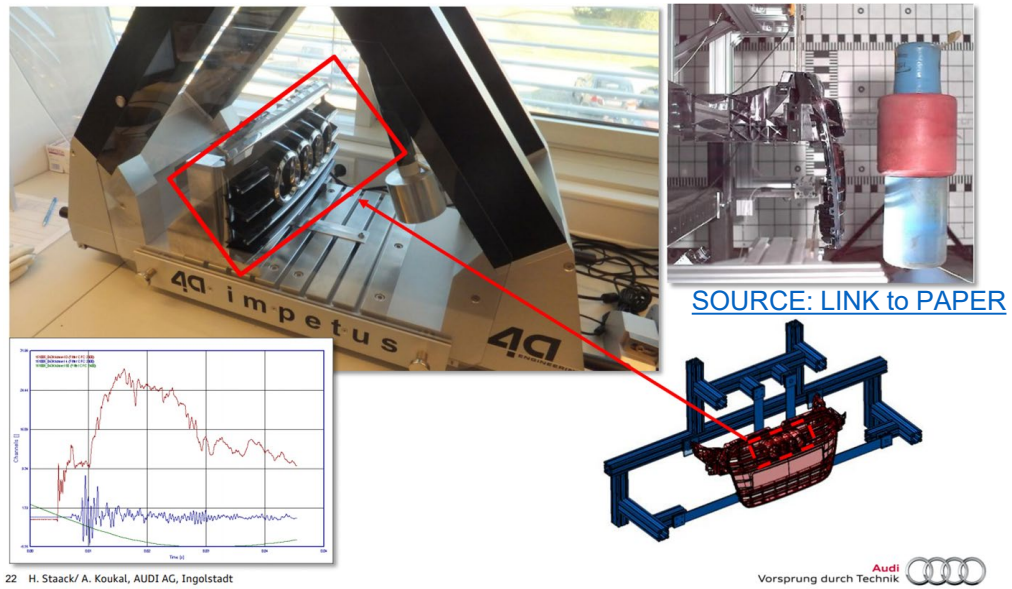
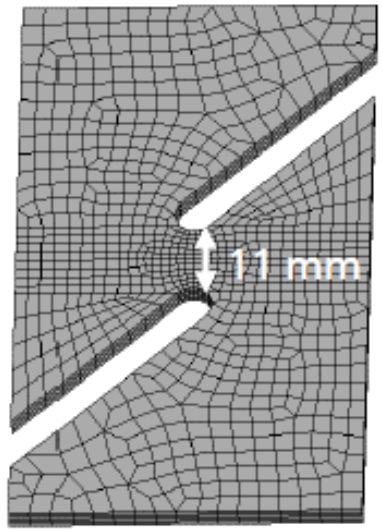
Introduction

- Why do we need a user-defined specimen / input deck
  - To work with specimens that are not already implemented in VALIMAT®
  - User-defined specimen → Only the specimen type is new and needs to be incorporated in VALIMAT®
  - User-defined input deck → Flexible → for component tests as an example



SOURCE: LINK to PAPER

Component test

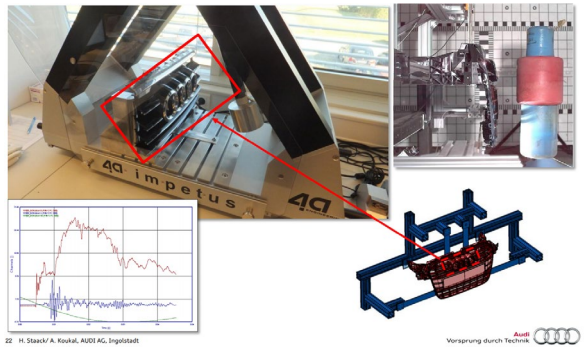


Shear tension specimen

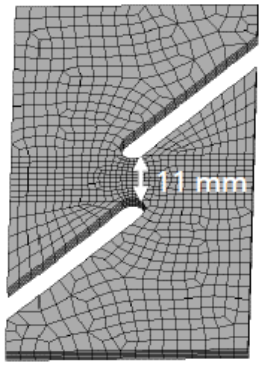
Introduction

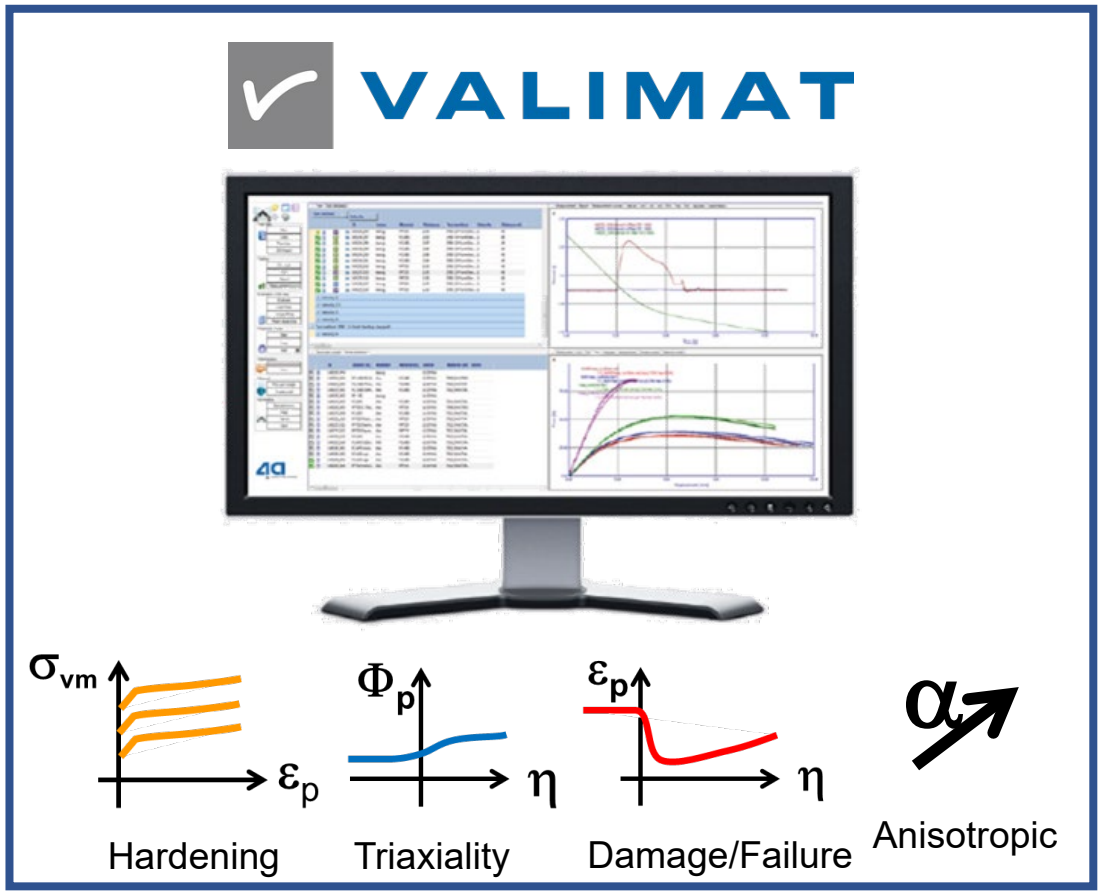
- How do we include new specimen types or custom test setups in VALIMAT®?

Component test



Shear tension specimen



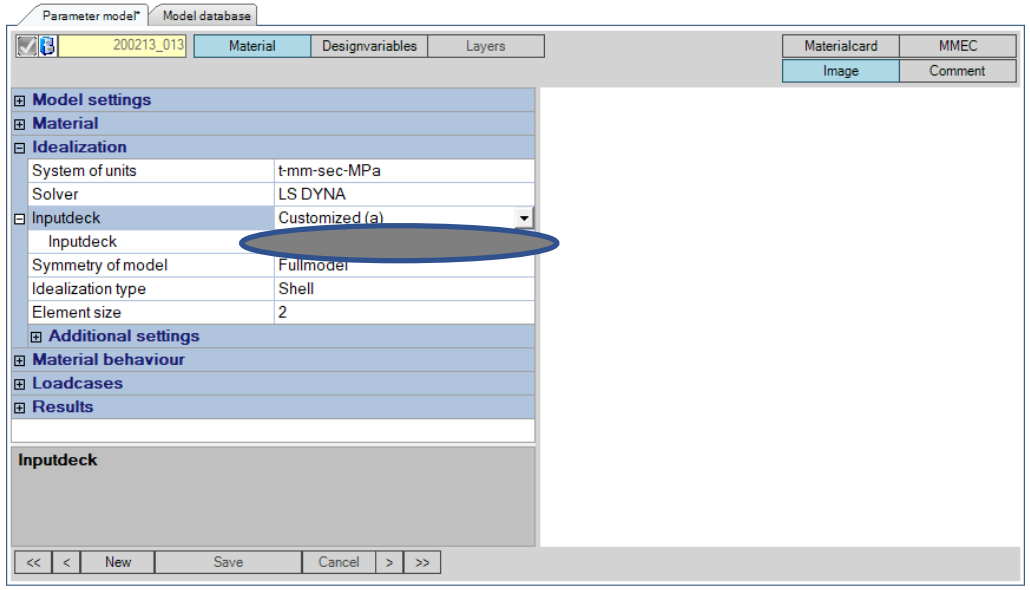


Implementation in VALIMAT®

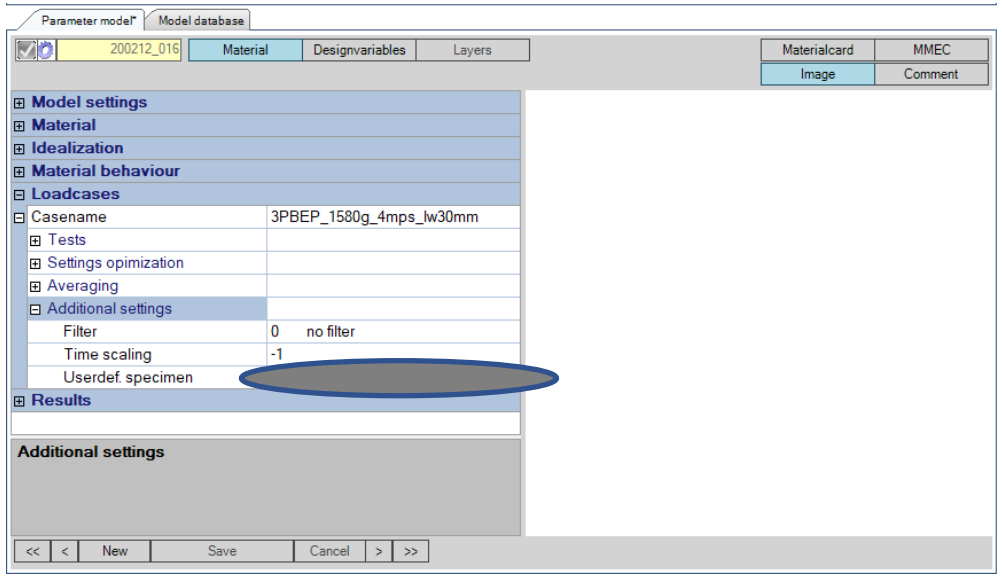
- In addition to the manual (chapter 5.4.3), the following presentation should help the user to create a user defined input deck and a user defined specimen
- You will need the following files:
  - File with geometry, boundary conditions, etc. (can be split into several files)
  - .Conf-file with commands for VALIMAT® for user defined inputdeck

Implementation in VALIMAT®

- Idealization → Inputdeck switch to ‘customized’ and name the .Conf file as Inputdeck
- All other files (Material, Geometry, Scripts) also need to be in this directory
- For a User-defined specimen → Switch to user defined specimen under Loadcases → Additional Settings



User defined input deck

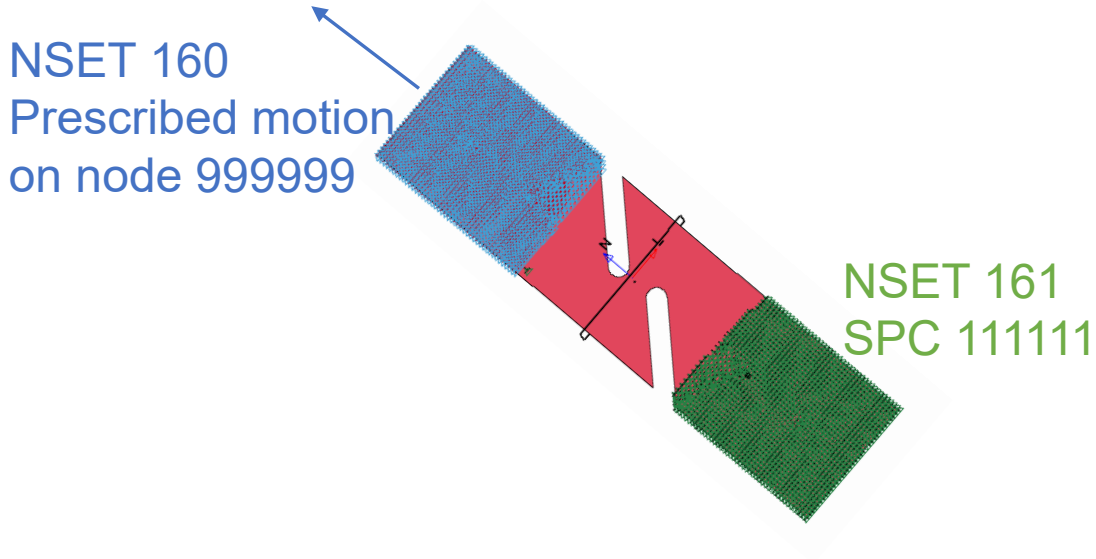


User defined specimen

Overview – User defined input specimen

General structure

- The test database is updated with the required fields from the tests
- The tests are linked in the model database with the correct settings for the averaging parameters
- Check the optimization curve generated from all the test results
- Carefully check for the entry in write part/section in the Idealization → Additional settings
- The elements in the user defined specimen mesh are renumbered and the right node set IDs are referenced in the *DATABASE_OUTPUT → displayed in VALIMAT®

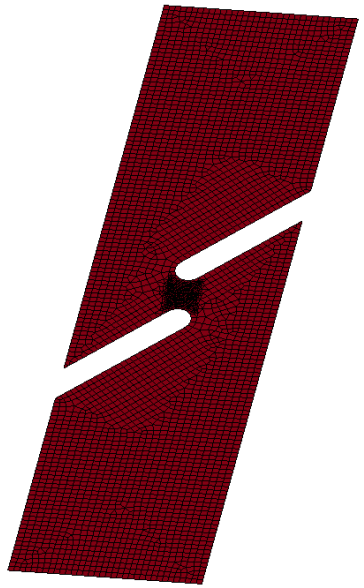


Overview – User defined input specimen

General structure

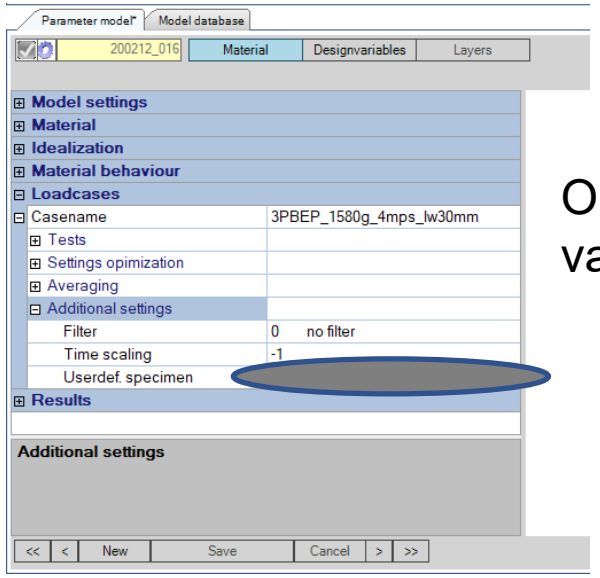
- A shear tension specimen that is not implemented in VALIMAT® → How do we use the user defined specimen feature to incorporate it in the software.

Step 1 : mesh, nodes, elements, sets

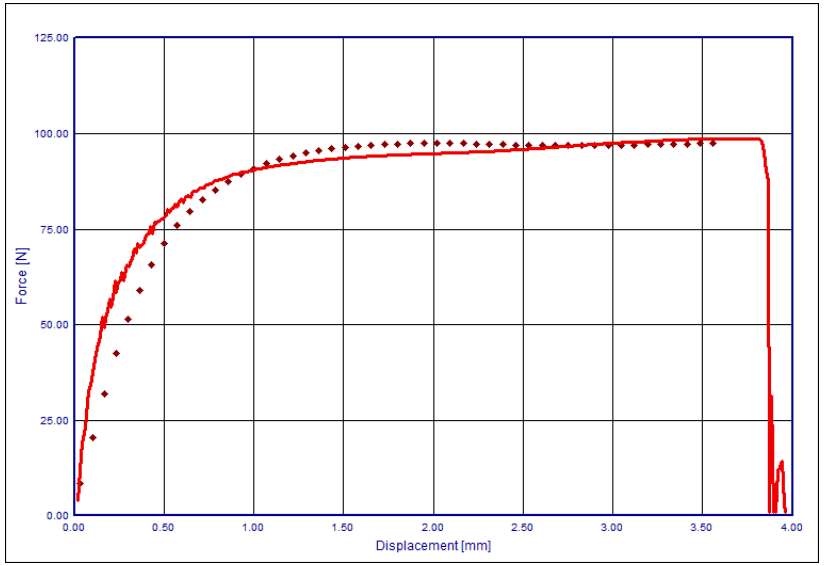


Renumbered PIDs, setIDs
VALIMAT® manual

Step 2



Optimization/ validation



User defined input deck

Overview – User defined input deck

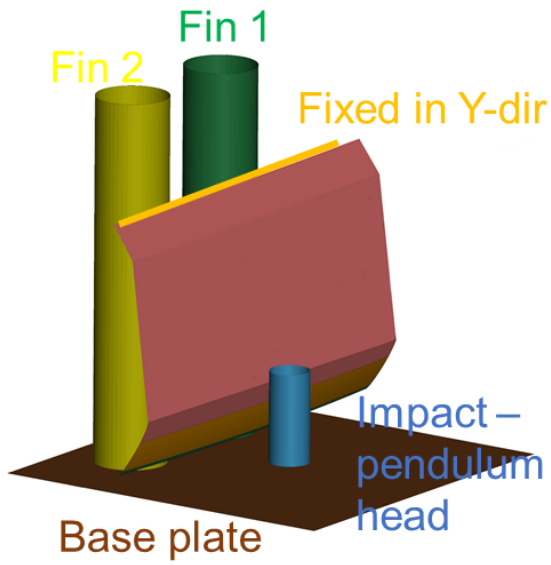
General structure

- A template folder containing:
  - A configuration file which will be selected in VALIMAT®(*.conf)
  - The main keyword file (suffix not a condition, but for readability a solver specific suffix is advised: *.k or *.key (LS-DYNA); *inp (ABAQUS), *.pc (PAMCRASH))
  - Conditional include files with the suffix *.inc. Commands in the main keyword file will lead to the inclusion of a subset of all the *.inc files in the main keyword file. *.inc references in *.inc references will have no effect. This allows for example to handle solid and shell idealization of the specimen.
  - Other input files with no conditions/parameters. For example meshes.
  - VALIMAT® python script for running the job and copying the files (Requires no modification and can be copied from any other model).

Overview – User defined input deck

General structure

- A component bending test with a non-standard setup that is not implemented in VALIMAT®.



Model

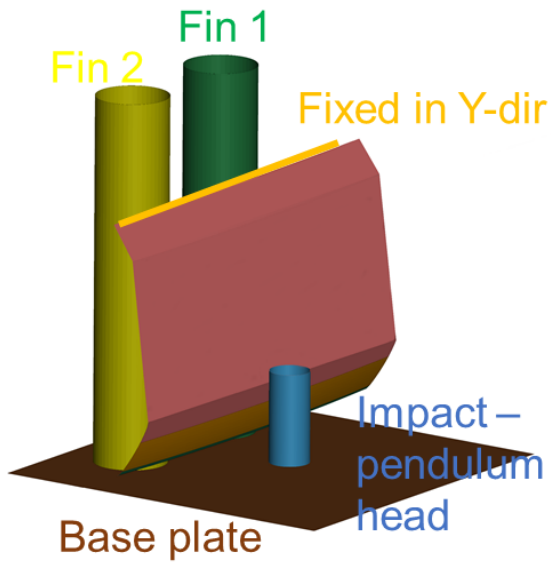
User defined input deck - content

Name	Änderungsdatum	Typ	
20020501_bhir_R40TubeSupport.conf	06.02.2020 15:07	CONF-Datei	Configuration file
vel_initial.inc	06.07.2017 19:24	INC-Datei	Supporting files
vel_prescribed.inc	06.07.2017 18:06	INC-Datei	
20020501_bhir_R40TubeSupport	06.02.2020 15:49	INP-Datei	Main keyword file
20020501_bhir_Fin	06.02.2020 12:15	KEY-Datei	Supporting files
20020501_bhir_R40TubeSupport	07.02.2020 12:33	KEY-Datei	
20020501_bhir_ulc_plate	06.02.2020 12:07	KEY-Datei	
20020501_bhir_ulc_tube1	06.02.2020 12:26	KEY-Datei	
20020501_bhir_ulc_tube2	06.02.2020 12:27	KEY-Datei	
20020502_bhir_hpot_ulc_fullmodel-nosides	06.02.2020 14:51	KEY-Datei	
copy_file	22.04.2016 12:28	Python File	python scipts for 4a impetus
run	14.06.2016 17:50	Python File	

Overview – User defined input deck

Example

- A component bending test with a non-standard setup that is not implemented in VALIMAT®.



Model

.conf file - definition

LS-DYNA solver command

Main keyword file

Material card (implemented or customized)

Supporting files – excluding the main file

Extraction of results

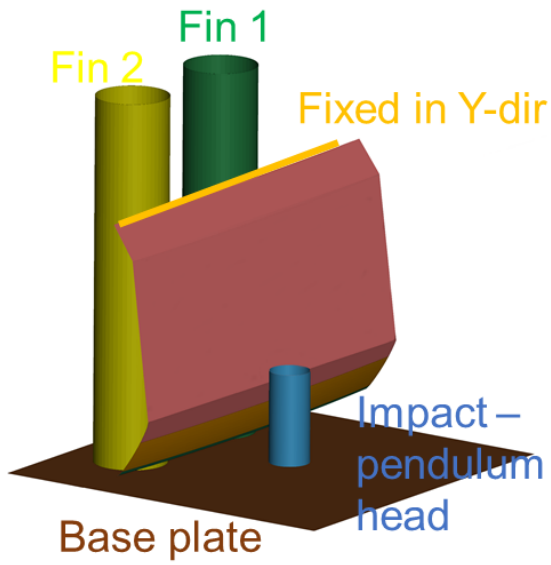
*Renumber PIDs, node and element sets in a VALIMAT® friendly format!

For optimization/validation/pre-simulation → the test database is updated and contains the necessary fields referenced in the loadcases tab under the model database

Overview – User defined input deck

Example

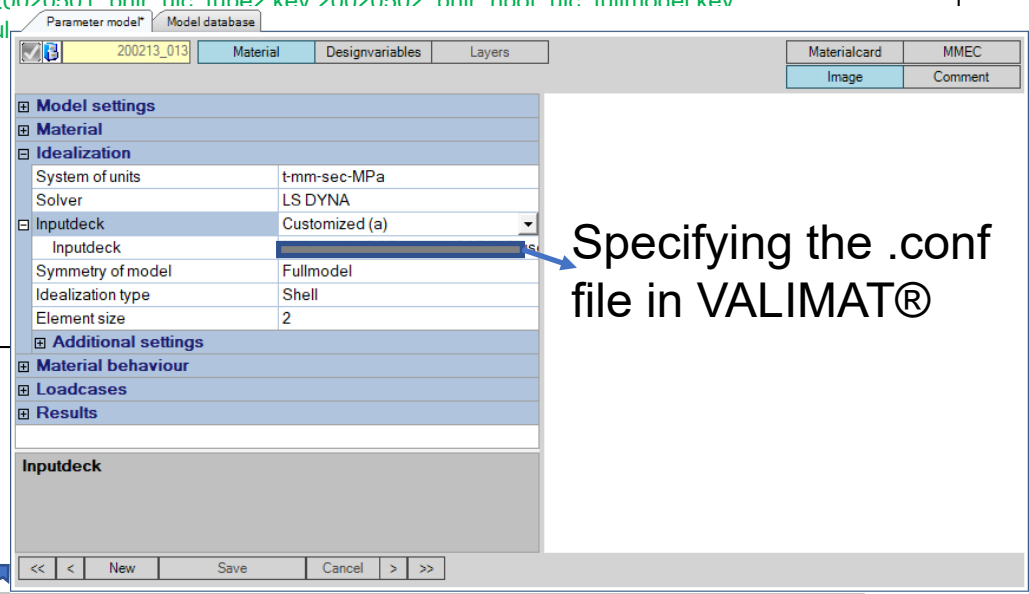
- A component bending test with a non-standard setup that is not implemented in VALIMAT®.



Model

.conf file - definition

```
#LSDYNA
#DEFINTION
impetus_command:
impetus_parameter:
solver_command:python ../../run.py -i UserOpt.inp -testtype 100 -oneElement <<db_oneElementSim>> -elmodell 1 -L0 <<db_s0>> -height <<db_h>> -width
<<if(db_l_Ten==0,db_b,db_b_Ten)>> -length <<db_l>> -pm <<db_pm>> -trueStressStrain <<db_trueStressStrain>> -filter
<<if(db_pm==3&db_timescale==0,0,db_filter)>>
solver_input:main.inp
solver_append:
solver_extraInpFiles:material.inp
solver_copy:copy_file.py run.py 20020501_bhir_R40TubeSupport.key 20020501_bhir_ulc_tube2.key 20020502_bhir_hpot_ulc_fullmodel.key
20020501_bhir_Fin.key 20020501_bhir_ulc_plate.key 20020501_bhir_ul
pre_command:
#-------------
#       force:
#-------------
res_force:1:python ../../copy_file.py force.xy LsoptHistory
#-------------
#       displ:
#-------------
res_disp:1:python ../../copy_file.py disp.xy LsoptHistory
#END FILE
```



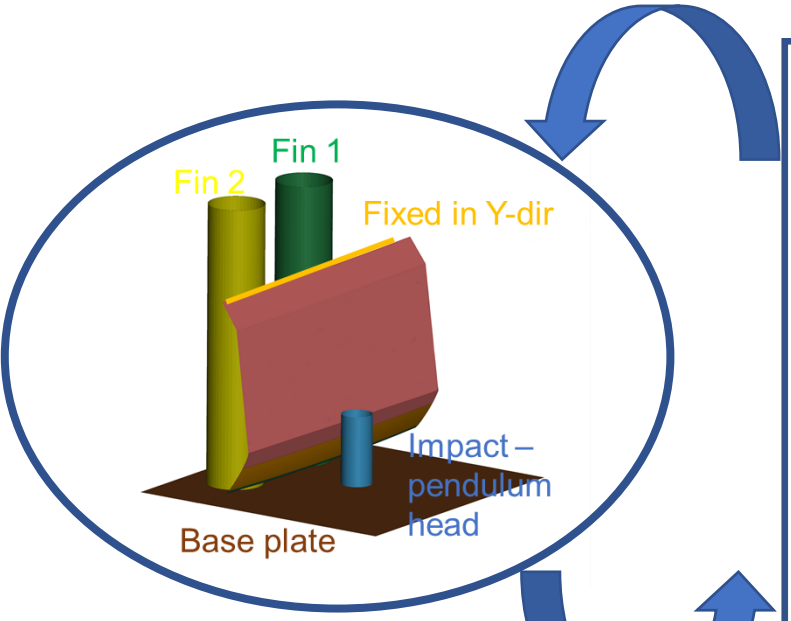
Specifying the .conf file in VALIMAT®

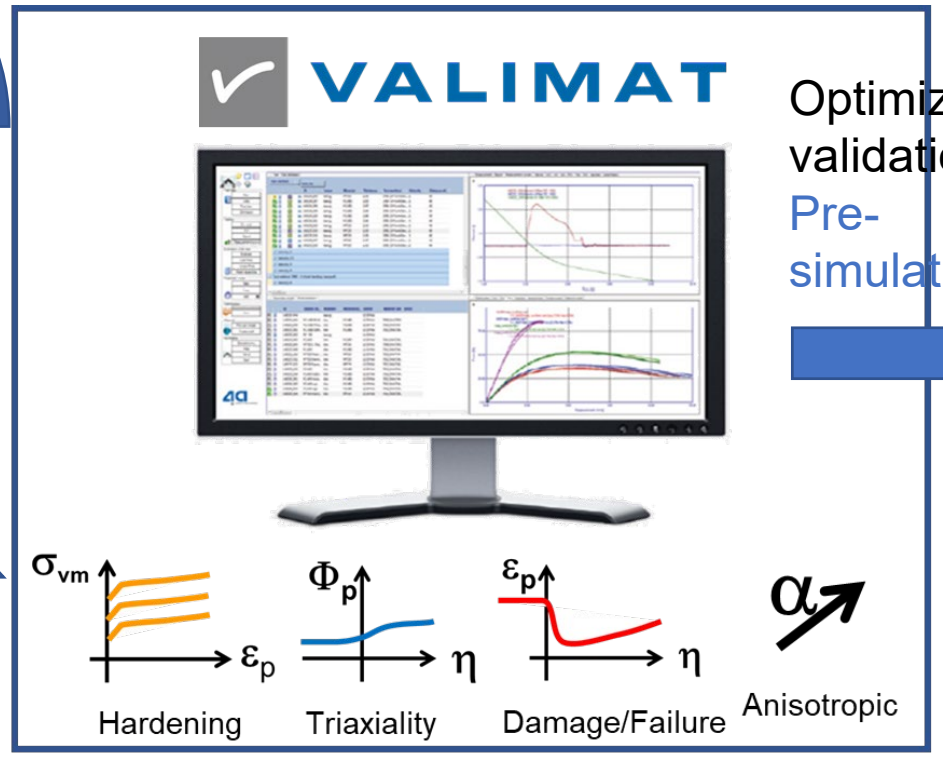
*ELEMENT_MASS → mass of the pendulum taken from the test database in VALIMAT®

Overview – User defined input deck

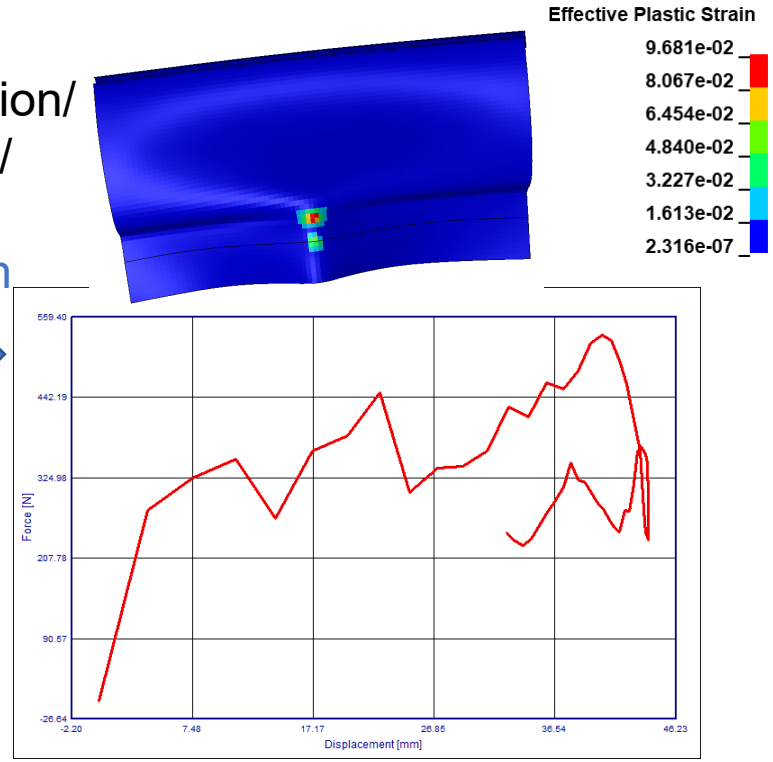
Example

- A component bending test with a non-standard setup that is not implemented in VALIMAT®.





Optimization/ validation/ Pre-simulation



Summary

- VALIMAT® plots depending on the load case and settings the following simulation results:
- For 3-point- bending tests:
  - Displacement of the node with the id 200000
  - Force: the contact force between the fin and the sample
  - stress/strain/strain rate results from the element with id 1 000 000 (Works for the implemented material models. For other materials the stored history variables might differ.)
  - Necessary Sets 140 & 141 (half model 150, 151; quarter model 152)

- Tensile test:
  - global displacement of the node with the id 200000 or 999999
  - local displacement: difference between node 999997 and 999998 for full model, 2*displacement 999998 for half and quarter model
  - Force: solver dependent either spc reaction forces or cross section forces
  - stress/strain/strain rate results from the element with id 1000000 (Works for the implemented material models. For other materials the stored history variables might differ.)
  - Necessary Sets 140,141, 160 & 161 (half model 150, 151; quarter model 152)