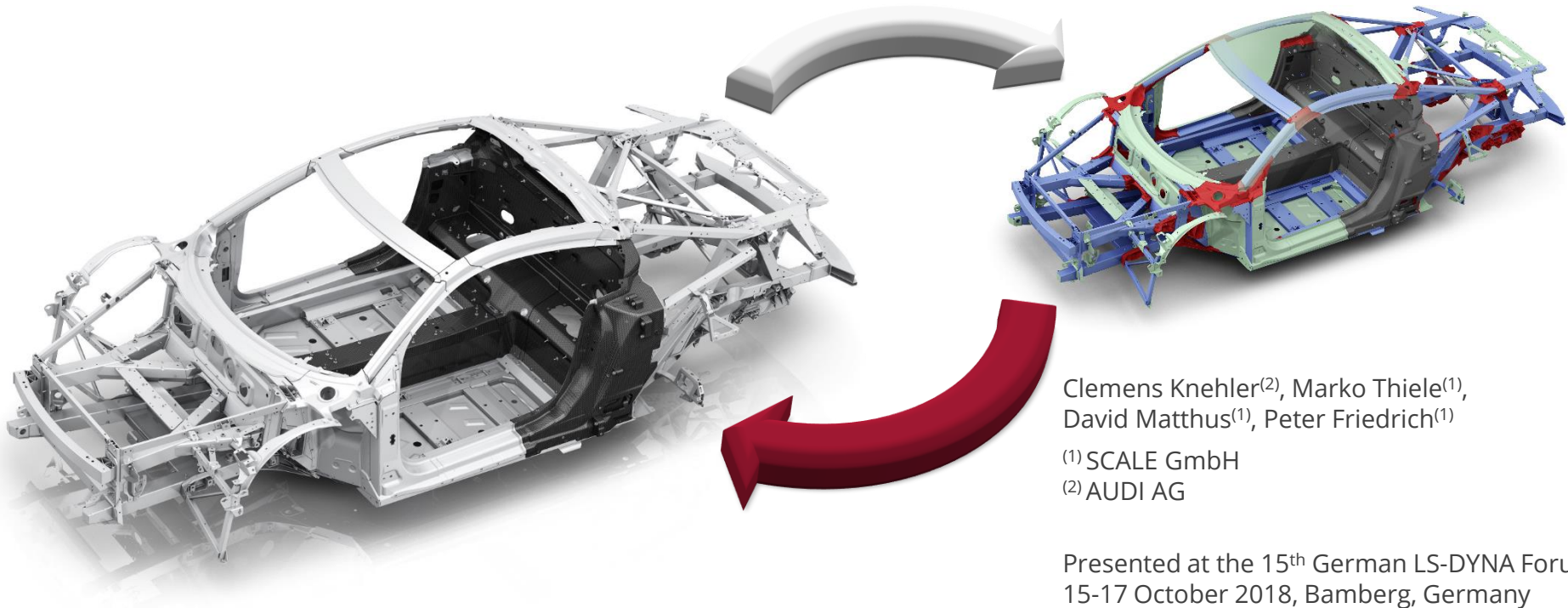




Audi

Prospects of integrating CAD and CAE in Simulation Data Management



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15-17 October 2018, Bamberg, Germany

Agenda

- Integrating CAD and CAE

- Body18 “Proof of Concept” at AUDI



- Proposed Approach

- Data structure
- Handling of connection information

- Implementation of Body18 “Proof of Concept”

- Integration of CATIA for CAD and ANSA for CAE
- Closing the gap between CAD and CAE
- Crafting simulations for different solvers and disciplines on the same data
- Project management



- Roundup

- Outlook

Agenda

Integrating CAD and CAE

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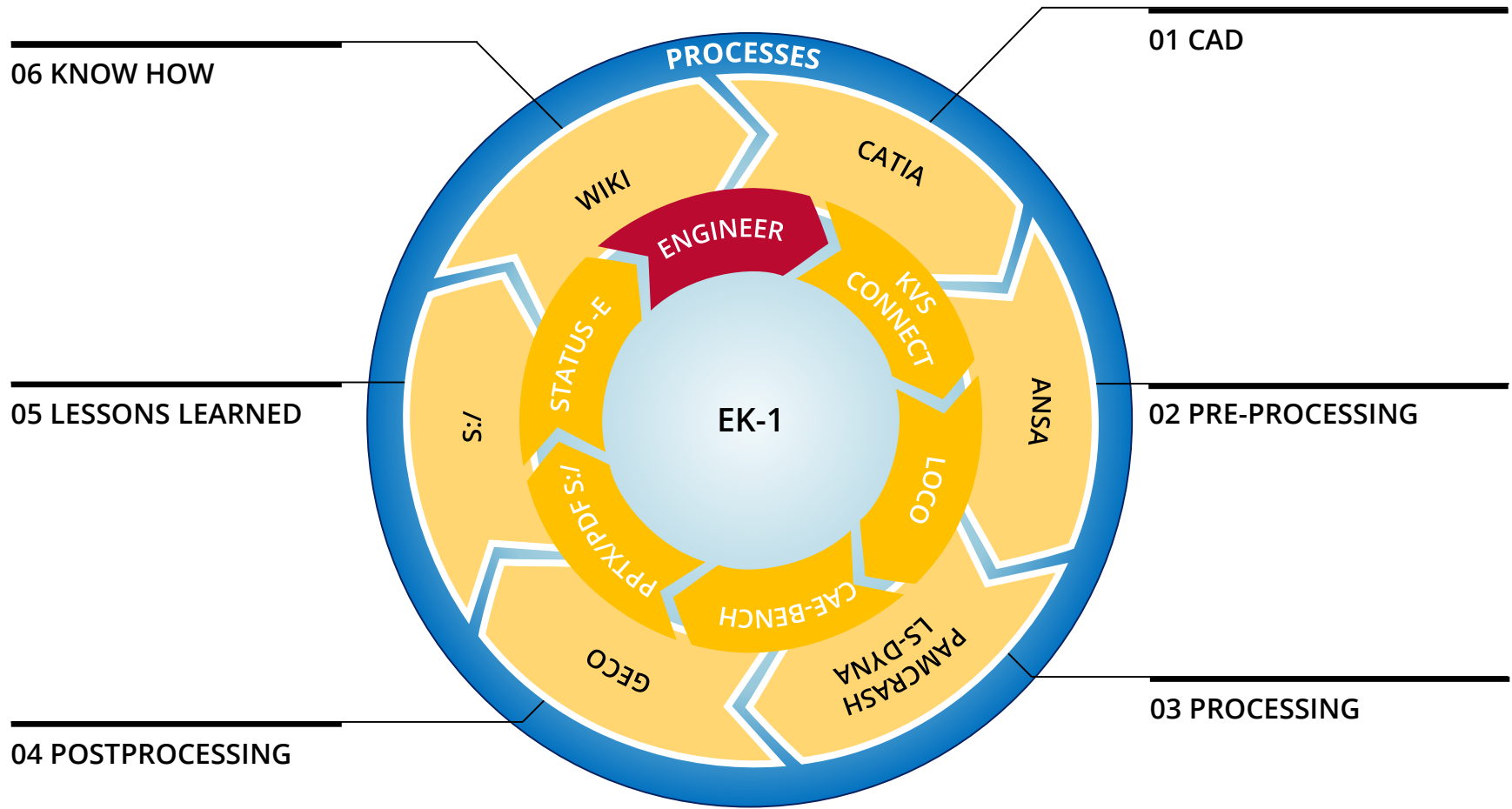
- Roundup

- Outlook

Integrating CAD and CAE - *motivation for Body18*

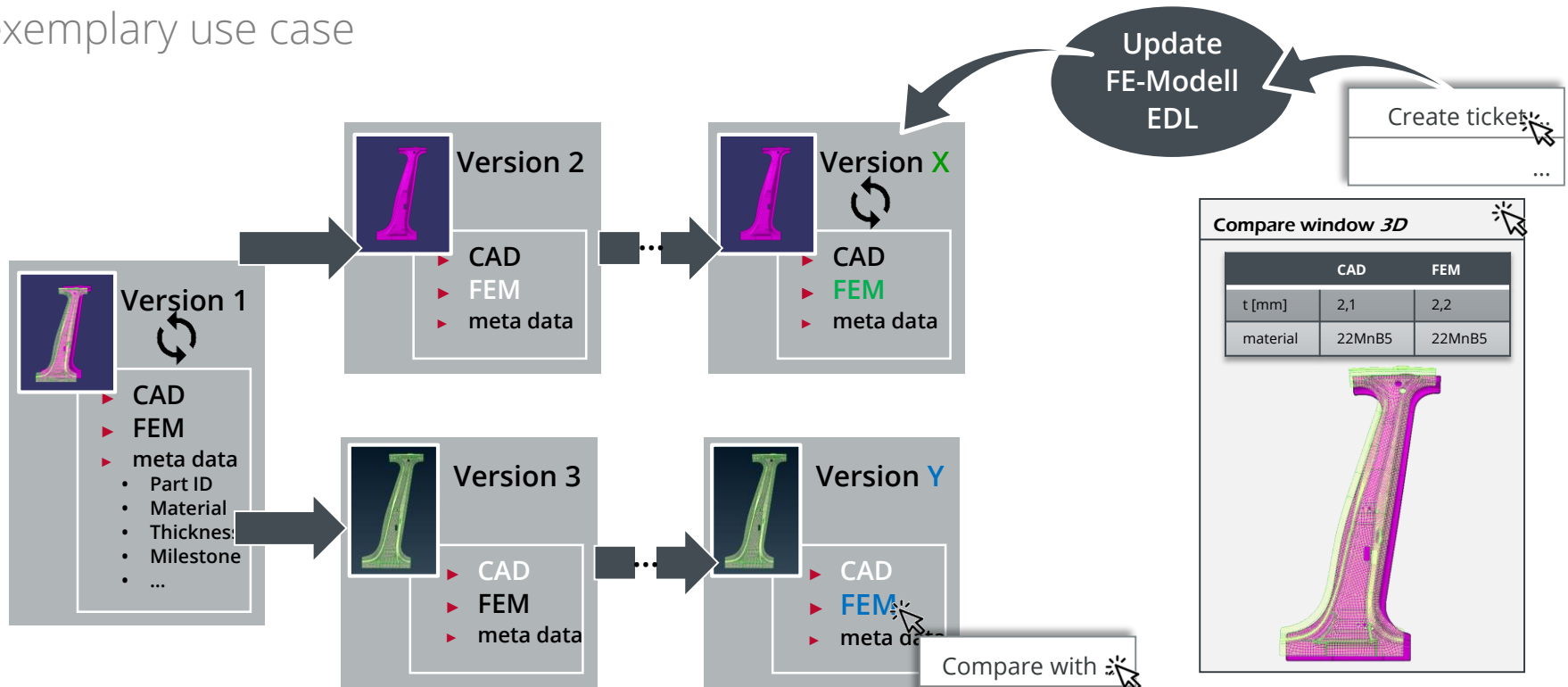


TOOL GENERATE DATA
TOOL STORE DATA



Integrating CAD and CAE - *motivation for Body18*

exemplary use case



- **goal:** < 30s
- **currently:** 10min - 30min
 - Search part ID
 - Download part from PDM to local disk
 - Load geometry in ANSA
 - Lookup CAD attributes in CATIA or some Excel sheet
 - Write E-Mail or call engineering service supplier to assign next task
 - Send data to engineering service supplier through data exchange platform

Agenda

- Integrating CAD and CAE

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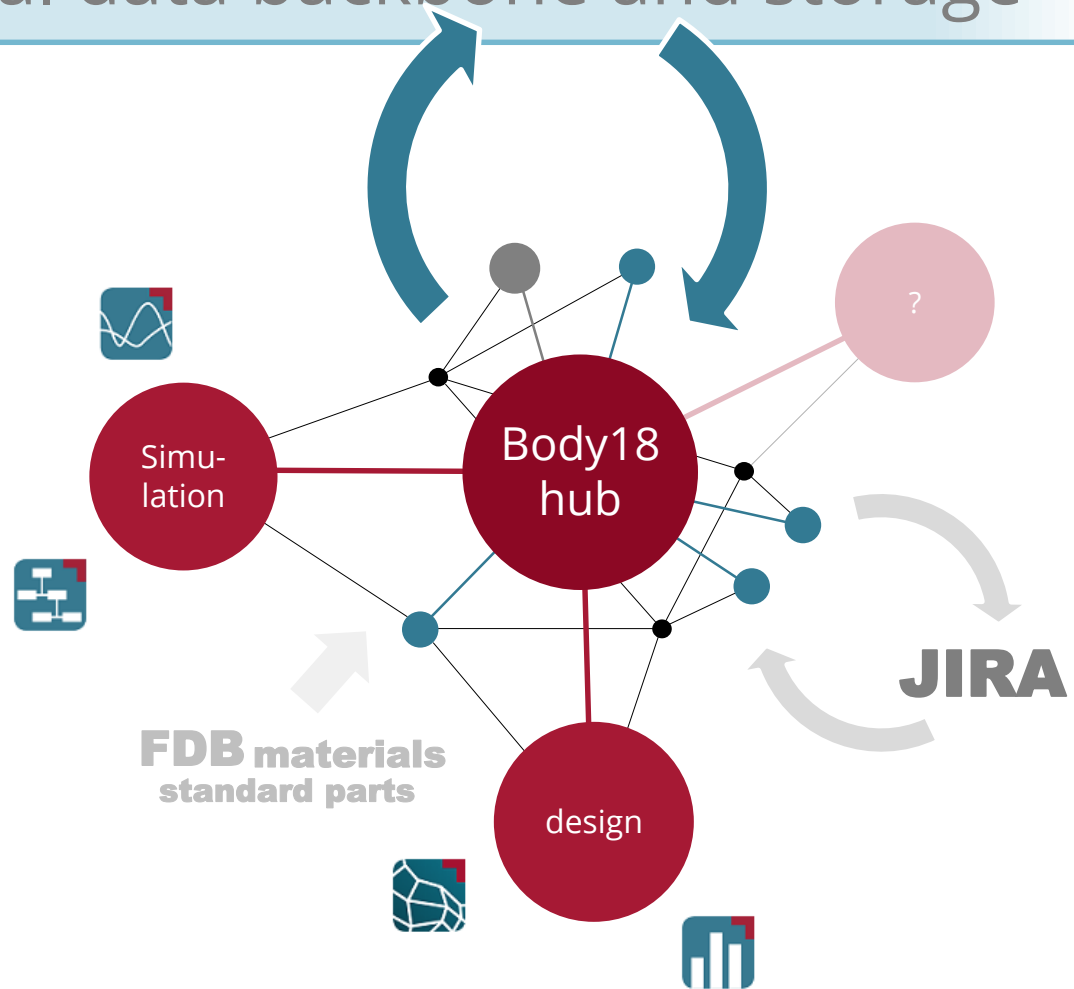




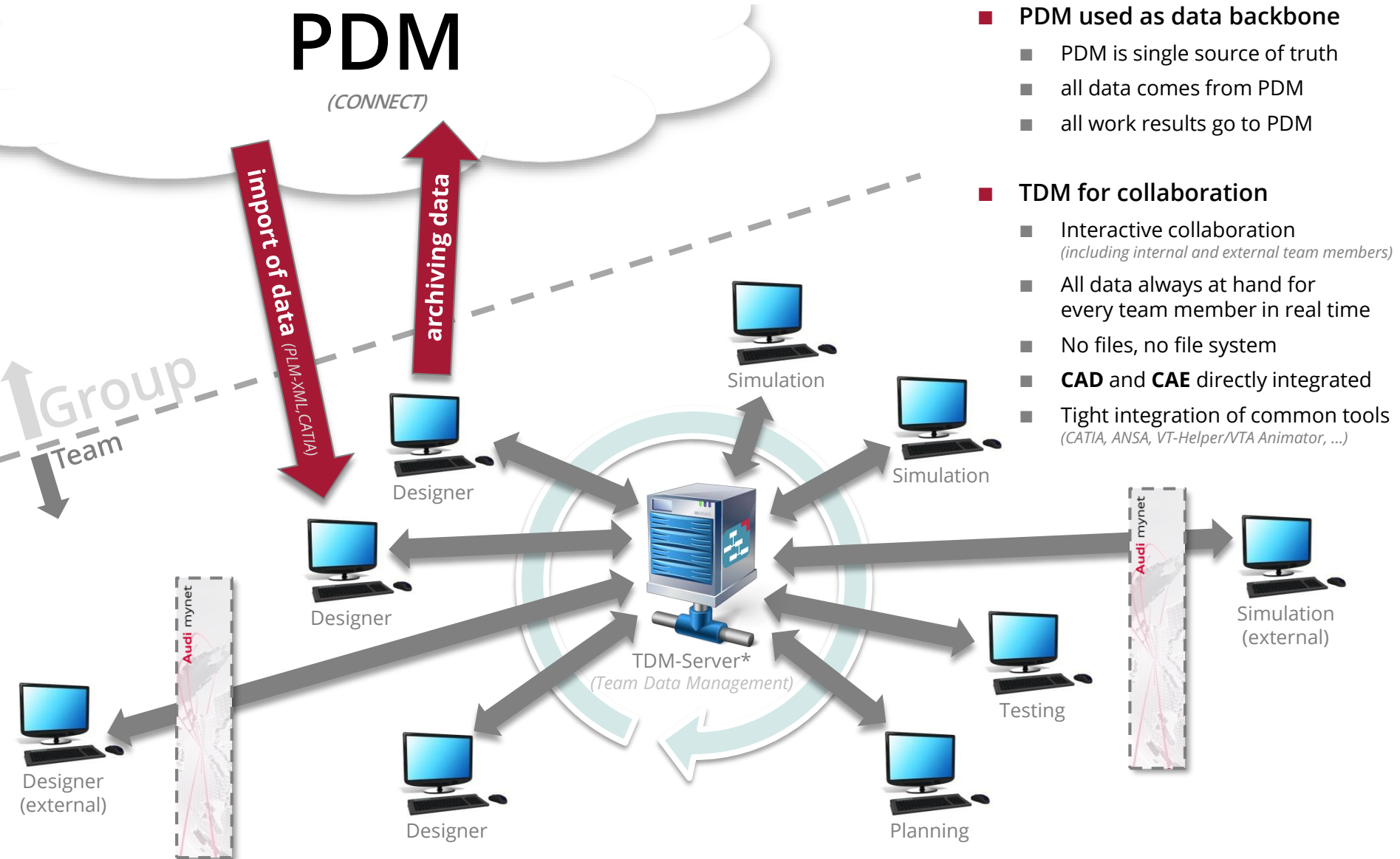
PDM / CONNECT

central data backbone and storage

- Supplement existing PDM with team collaboration
- Focus
 - Instant collaboration
 - Integrate CAD and CAE apps
 - Seamless data integration between CAD and CAE
 - Integration of project management system (*JIRA*)
- Create common platform to integrate further apps



Body18 "Proof of Concept" at AUDI - *setup*



Agenda

- Integrating CAD and CAE

- Body18 “Proof of Concept” at AUDI



Proposed Approach

- Data structure
- Handling of connection information

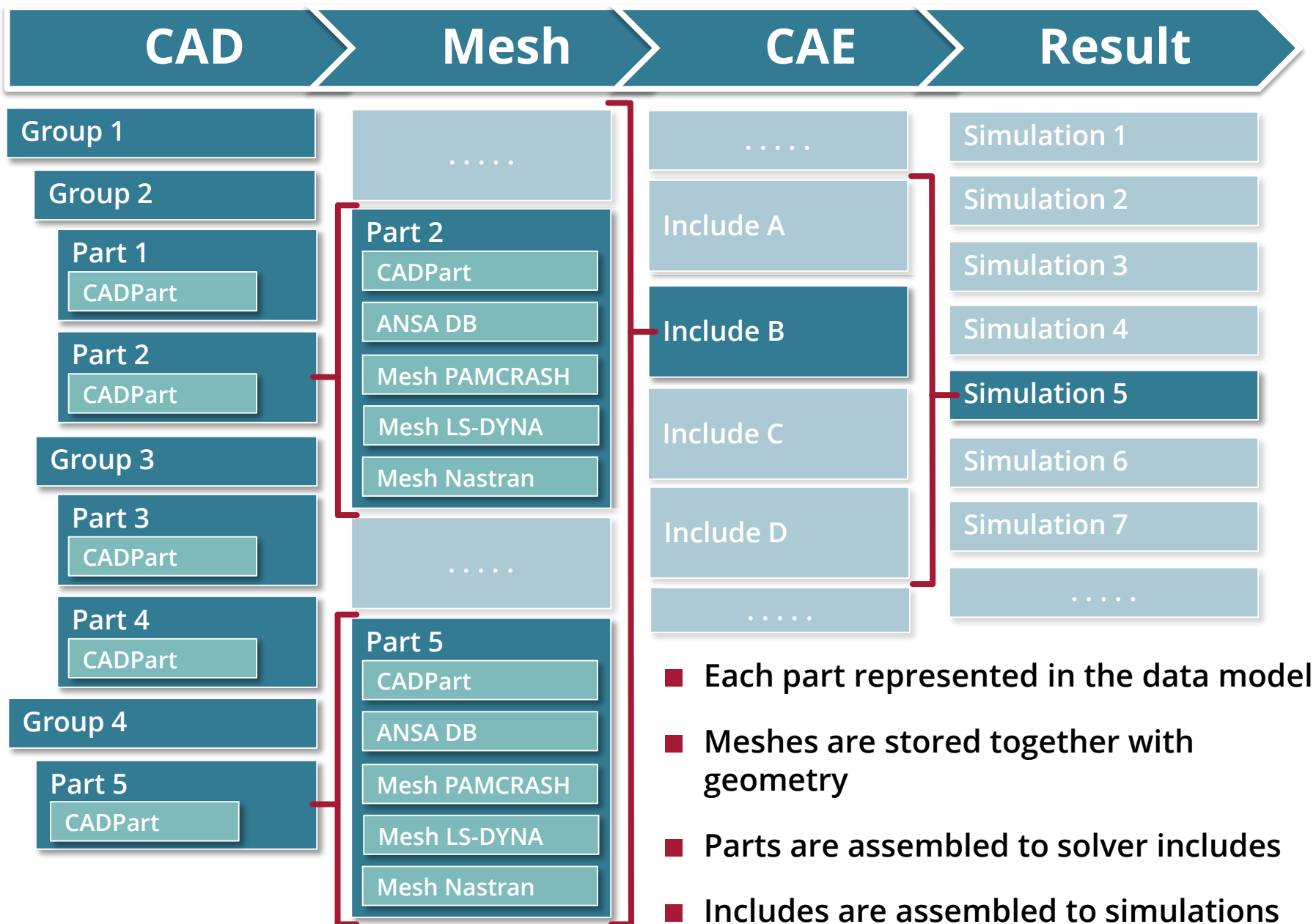
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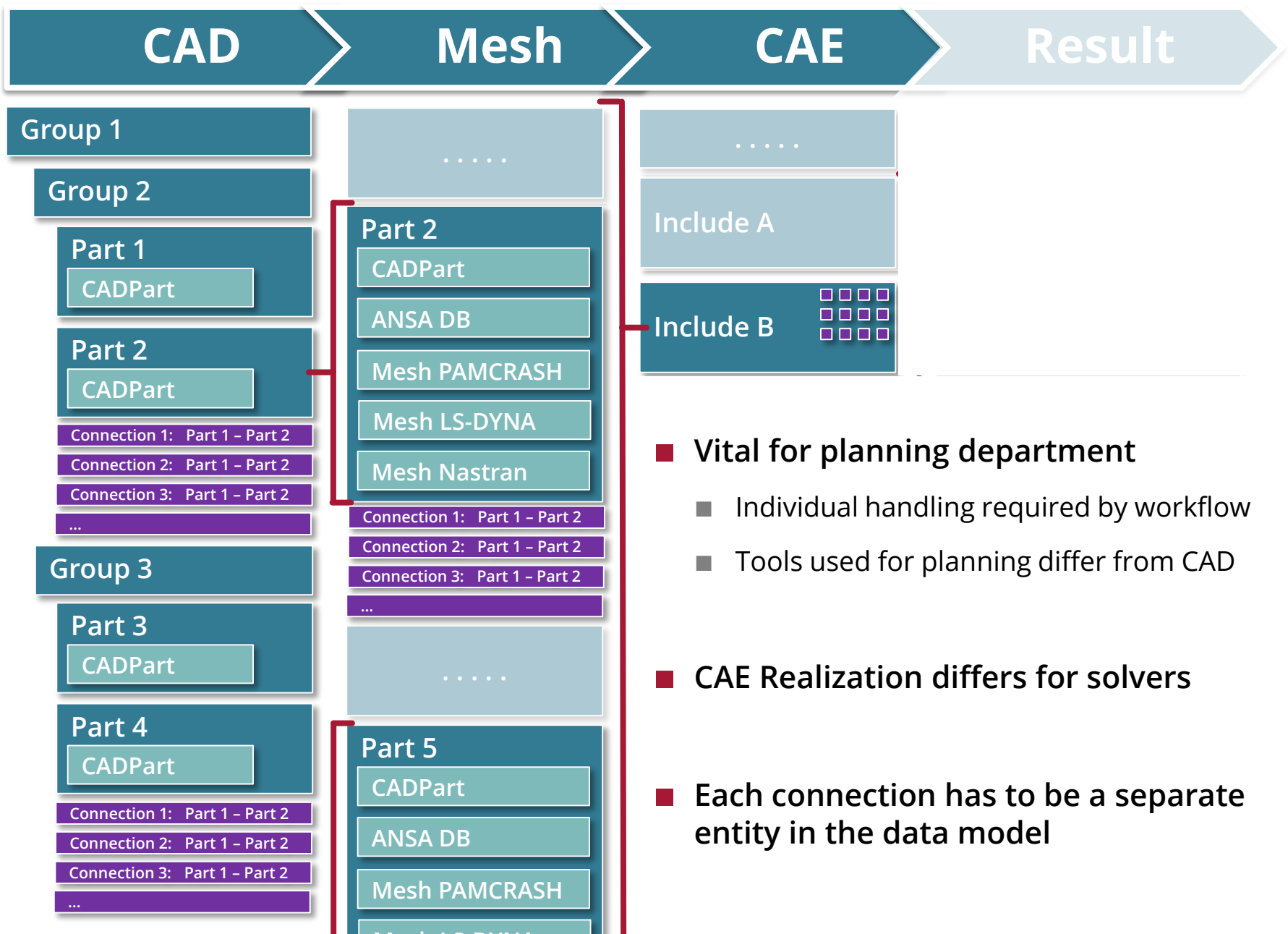


- Roundup
- Outlook

Proposed Approach - *data model*



Proposed Approach - *connection information*



- **Vital for planning department**
 - Individual handling required by workflow
 - Tools used for planning differ from CAD
- **CAE Realization differs for solvers**
- **Each connection has to be a separate entity in the data model**

Agenda

- Integrating CAD and CAE

- Body18 “Proof of Concept” at AUDI



- Proposed Approach

- Data structure
- Handling of connection information

Implementation of Body18 “Proof of Concept”

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- Roundup

- Outlook

CAD

Mesh

CAE

Result

Group 1

Group 2

Part 1

CADPart

Part 2

CADPart

Connection 1: Part 1 - Part 2

Connection 2: Part 1 - Part 2

Connection 3: Part 1 - Part 2

...

Group 3

Part 3

CADPart

Part 4

CADPart

Connection 1: Part 1 - Part 2

Connection 2: Part 1 - Part 2

Connection 3: Part 1 - Part 2

...

Challenges

- Simultaneous editing in CATIA by multiple team members
- Handling of connections and metadata directly in TDM
- Changes made in TDM have to be reflected in CATIA and vice versa
- Fast loading into CATIA
-

Implementation - CATIA

Body18

product structure from CATIA

Name	Short description	PR-Familie_KAR	PR-Familie_KSA	File Type	MaterialID	Nummer
AUS13_AUS13/6		K41	SC3	CATPart		
CAD #KE_810_553_PCA_TM_015	VERSTAERKUNG_DACHR_VFF_170519QCS1	K41				810_553
CAD #KE_809_655_B_PCA_TM_002	ET_SCHARNIERAU_HRL_NS_180119QCS1	K41				809_655_B
CAD #KE_806_207_PCA_TM_002	VERST_SCHARNIERAUFP_NS_180119QCS1	K41				806_207
CAD #KE_809_745_PCA_TM_022	VERST_SAEULE_C_OBE_VFF_170419QCS1	K41				809_745
CAD #KE_809_263_G01_TM_018	VERST_SAEULE_C_LINT_VFF_170419QCS1	K41, K58				809_263
CAD #KE_809_697_DMU_TM_006	SCHOTT_SA_C_LIN_BI_SKA_R08_CH01093037	K41				809_697
CAD #KE_810_391_A_G01_TM_001	VERL_SAEULE_A_AUSS_VFF_170419QCS1	K41				810_391_A
CAD #KE_810_889_DMU_TM_004	SCHOTT_SAEUL_D_MH_SKA_R05_CH01093043	K41				810_889
CAD #KE_809_647_DMU_TM_008	SCHOTT_SAEUL_C_MH_SKA_R08_CH01093036	K41				809_647
CAD #KE_809_697_A_DMU_TM_005	SCHOTT_SA_C_LIN_AU_SKA_R06_CH01093038	K41				809_697_A
CAD #KE_809_307_G01_TM_020	VERST_SAEULE_D_VFF_170505QCS1	K41				809_307
CAD #KE_806_095_PCA_TM_014	SCHOTTTEIL_SAEULE_BFG_170120QCS1	K41				806_095
CAD #KE_809_329_PCA_TM_014	SAEULE_D_INNEN_LINT_VFF_170519QCS1	K41				809_329
CAD #KE_810_555_PCA_TM_009	VERST_DACHREILING_VFF_170428QCS1	K41				810_555
CAD #KE_810_283_G01_TM_023	SAEULE_A_AUSS_OBEH_PVS_170922QCS1	K41				810_283
CAD #KE_809_111_PCA_TM_020	VERSTEUERUNGSTE_KFB_BFG_170120QCS1	K41, K58				809_111
CAD #KE_805_523_PCA_TM_014	SCHOTTTEIL_VERL_BFG_170120QCS1	K41, K58				805_523
CAD #KE_809_571_DMU_TM_003	SCHOTT_SAEUL_U_AU_SKA_R05_CH01093046	K41, K58				809_571
CAD #KE_809_285_G01_TM_009	VERST_SAEULE_A_MI_BFG_170120QCS1	K41, K58				809_285
CAD #W0_809_625_A_G01_TM_007_033	SCHARNIERVERST_BFG_170127QCS1	K41, K58				809_625_A
CAD #KE_810_215_G01_TM_014	SCHARNIERVERSTAERK_PVS_170714QCS1	K41, K58				810_215
CAD #KE_809_297_PCA_TM_020	SCHARNIERVERST_S_PVS_170630QCS1	K41, K58				809_297
CAD #KE_810_313_PCA_TM_017	STEGTEIL_SAEULE_C_VFF_170526QCS1	K41, K58				810_313
CAD #KE_809_695_PCA_TM_013	VERST_SCHWELLER_2_VFF_170526QCS1	K41, K58				809_695
CAD #KE_809_393_PCA_TM_015	VERST_SCHWELLER_1_VFF_170526QCS1	K41, K58				809_393
CAD #KE_809_067_PCA_TM_009	VERST_SCHWELLER_VO_VFF_170303QCS1	K41, K58				809_067
CAD #KE_809_755_G01_TM_016	SCHWELLER_AUSSEN_VFF_170602QCS1	K41, K58				809_755
CAD #KE_810_269_G01_TM_016	STEG_SCHWELLER_VO_PVS_170602QCS1	K41, K58				810_269
CAD #KE_809_739_G01_TM_021	VERSTAERKUNG_INNEN_VFF_170602QCS1	K41, K58				809_739
CAD #KE_809_801_DMU_TM_005	SCHOTT_SCHWELL_MI_SKA_R05_CH01093040	K41, K58				809_801

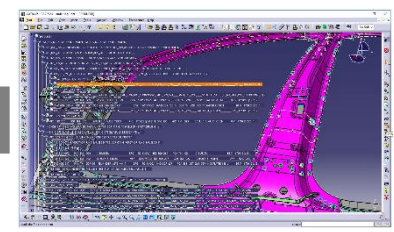
CAD parts

CAD meta data

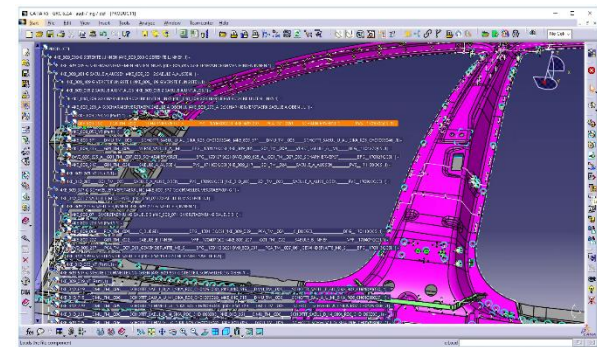
working with CAD data

control of variants

CATIA V5



CATIA V5



PDM System (CONNECT)



Implementation - *handling CAD data*

version control

product structure from CATIA

product variants

Short description

CAD parts

Name	Short description	Material	MaterialID	Nummer	Wandstärke
AU513	AU513/6	K4H	5C3		
CAD	4KE_810_553_PCA_TM_015_VERSTAERKUNG	K4H		4KE_810_553	1,8mm
CAD	4KE_809_655_B_PCA_TM_002_ET_SCHARNIE	K4H		4KE_809_655_B	1,2mm
CAD	4KE_806_207_PCA_TM_002_VERST_SCHARNIE	K4H		4KE_806_207	1,5mm
CAD	4KE_809_745_PCA_TM_022_VERST_SAEULE_C	K4H		4KE_809_745	0,9mm
CAD	4KE_809_263_G01_TM_018_VERST_SAEULE_C	K4H, K5B		4KE_809_263	0,9mm
CAD	4KE_809_697_DMJ_TM_006_SCHOTT	K4H		4KE_809_697	1,5mm
CAD	4KE_810_391_A_G01_TM_001_VERL_SAEULE	K4H		4KE_810_391	0,9mm
CAD	4KE_810_889_DMJ_TM_004_SCHOTT	K4H		4KE_810_889	1,5mm
CAD	4KE_809_647_DMJ_TM_008_SCHOTT	K4H		4KE_809_647	1,5mm
CAD	4KE_809_697_A_DMJ_TM_005_SCHOTT	K4H		4KE_809_697_A	1,5mm
CAD	4KE_809_307_G01_TM_020_VERST_SAEULE	K4H		4KE_809_307	0,7mm
CAD	4KE_806_095_PCA_TM_014_SCHOTT	K4H		4KE_806_095	1,1mm
CAD	4KE_809_329_PCA_TM_014_SAEULE_D	K4H		4KE_809_329	1,2mm
CAD	4KE_810_555_PCA_TM_009_VERST_DACH	K4H, K5B		4KE_810_555	1,2mm
CAD	4KE_810_283_G01_TM_023_SAEULE_A	K4H, K5B		4KE_810_283	1,4mm
CAD	4KE_809_111_PCA_TM_020_VERSTEIFUNG	K4H, K5B		4KE_809_111	2,1mm
CAD	4KE_805_523_PCA_TM_014_SCHOTT	K4H, K5B		4KE_805_523	1,2mm
CAD	4KE_809_571_DMJ_TM_003_SCHOTT	K4H, K5B		4KE_809_571	1,5mm
CAD	4KE_809_285_G01_TM_009_VERST_SAEULE	K4H, K5B		4KE_809_285	1,4mm
CAD	8W0_809_625_A_G01_TM_007_033_SCHARN	K4H, K5B		8W0_809_625_A	2,5mm
CAD	4KE_810_215_G01_TM_014_SCHARNIE	K4H, K5B		4KE_810_215	1,1mm
CAD	4KE_809_297_PCA_TM_020_SCHARNIE	K4H, K5B		4KE_809_297	2,5mm
CAD	4KE_810_313_PCA_TM_017_STEGTEIL	K4H, K5B		4KE_810_313	0,9mm
CAD	4KE_809_695_PCA_TM_013_VERST_SCHWEL	K4H, K5B		4KE_809_695	2,1mm
CAD	4KE_809_393_PCA_TM_015_VERST_SCHWEL	K4H, K5B		4KE_809_393	2,1mm
CAD	4KE_809_067_PCA_TM_009_VERST_SCHWEL	K4H, K5B		4KE_809_067	2mm
CAD	4KE_809_755_G01_TM_016_SCHWELER	K4H, K5B		4KE_809_755	1,4mm
CAD	4KE_810_269_G01_TM_016_STEGT_SCHWEL	K4H, K5B		4KE_810_269	1,5mm
CAD	4KE_809_739_G01_TM_021_VERSTAERKUNG	K4H, K5B		4KE_809_739	1,4mm
CAD	4KE_809_801_DMJ_TM_005_SCHOTT	K4H, K5B		4KE_809_801	1,5mm

Attributes

CAD meta data

Material	MaterialID	Nummer	Wandstärke
K4H	5C3		
K4H		4KE_810_553	1,8mm
K4H		4KE_809_655_B	1,2mm
K4H		4KE_806_207	1,5mm
K4H		4KE_809_745	0,9mm
K4H, K5B		4KE_809_263	0,9mm
K4H		4KE_809_697	1,5mm
K4H		4KE_810_391	0,9mm
K4H		4KE_810_889	1,5mm
K4H		4KE_809_647	1,5mm
K4H		4KE_809_697_A	1,5mm
K4H		4KE_809_307	0,7mm
K4H		4KE_806_095	1,1mm
K4H		4KE_809_329	1,2mm
K4H, K5B		4KE_810_555	1,2mm
K4H, K5B		4KE_810_283	1,4mm
K4H, K5B		4KE_809_111	2,1mm
K4H, K5B		4KE_805_523	1,2mm
K4H, K5B		4KE_809_571	1,5mm
K4H, K5B		4KE_809_285	1,4mm
K4H, K5B		8W0_809_625_A	2,5mm
K4H, K5B		4KE_810_215	1,1mm
K4H, K5B		4KE_809_297	2,5mm
K4H, K5B		4KE_810_313	0,9mm
K4H, K5B		4KE_809_695	2,1mm
K4H, K5B		4KE_809_393	2,1mm
K4H, K5B		4KE_809_067	2mm
K4H, K5B		4KE_809_755	1,4mm
K4H, K5B		4KE_810_269	1,5mm
K4H, K5B		4KE_809_739	1,4mm
K4H, K5B		4KE_809_801	1,5mm

- Same product structure as in PDM & CATIA
- Direct access to important meta data (material, thickness,...)
- Full version control (parts, groups, product,...)
- LiveMode for interactive collaboration
- Handling of product variants
- Representation of
 - Geometric data
 - Connections



"LiveMode" with interactive locking for instant collaboration

CATIA V5*

*the CATIA V5 integration for the "Body18" has been implemented by csi Entwicklungstechnik GmbH

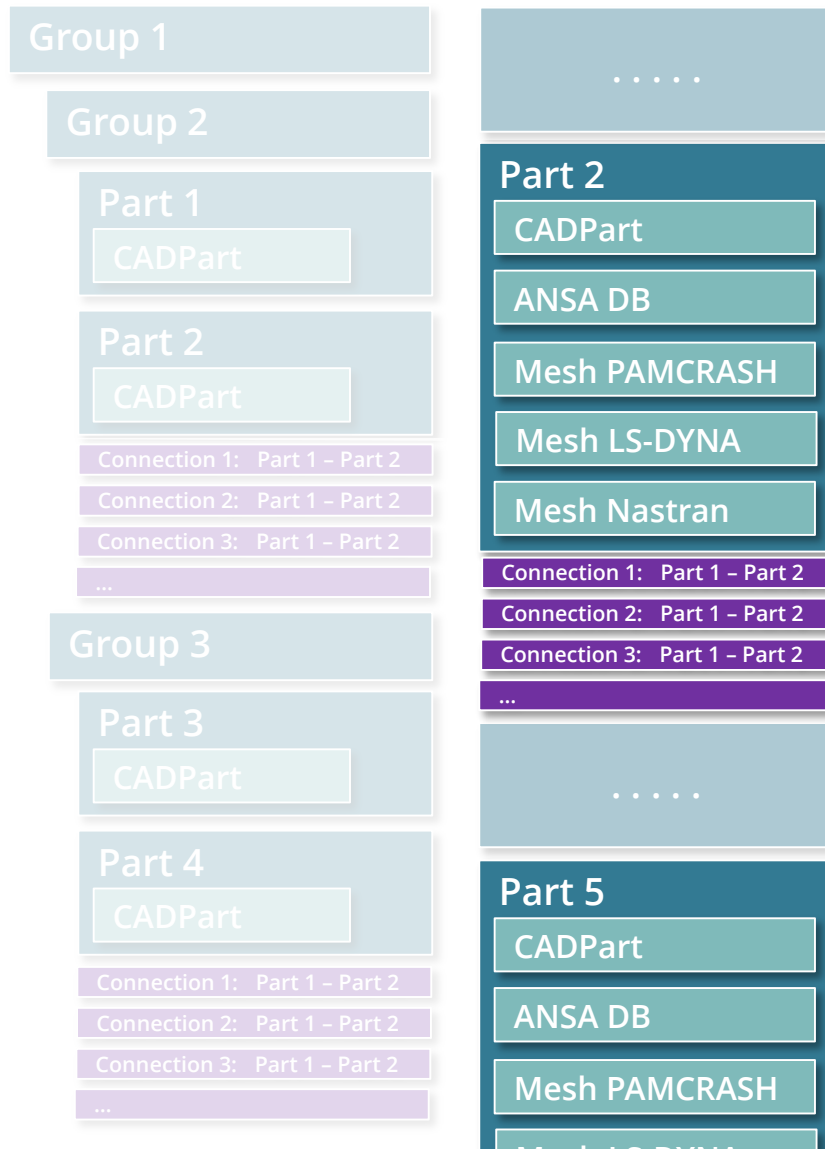


product structure in CATIA same as in TDM and PDM

one part is locked in design mode but the whole structure is loaded

all connections are updated from TDM





Challenges

- Handling of geometry for meshing
- Handling of meshes for working with the simulation models
- Connections created on the fly in ANSA from TDM system
- The whole product can be opened at once
- Changes are saved to each part and connection individually
- ...

Implementation - ANSA

CAD

Mesh

CAE

Result

Body18

product structure from CATIA

product variants

Name	Short description	PR-Familie_KAR	PR-Familie_KSA	File Type	MaterialID	Nummer	Wandstärke
AUS13/AUS13/6		K4H	SC3	CATPart			
CAD_KE_810_553_PCA_TM_015	VERSTAERKUNG_DACHR_VFF_170519QCST	K4H		CATPart		KE_810_553	1,8mm
CAD_KE_809_655_B_PCA_TM_002	ET_SCHARNIERAU_HRL_NS_180119QCST	K4H		CATPart		KE_809_655_B	1,2mm
CAD_KE_806_207_PCA_TM_002	VERST_SCHARNIERAUFP_NS_180119QCST	K4H		CATPart		KE_806_207	1,5mm
CAD_KE_809_745_PCA_TM_022	VERST_SAEULE_C_OBE_VFF_170419QCST	K4H		CATPart	CR300LA5G140/40-U	KE_809_745	0,9mm
CAD_KE_809_263_G01_TM_018	VERST_SAEULE_C_LINT_VFF_170419QCST	K4H, K5B		CATPart	CR300LA-G140/40-U	KE_809_263	0,9mm
CAD_KE_809_697_DMJ_TM_006	SCHOTT_SA_C_LIN_BI_SKA_R06_CH01093037	K4H		CATPart	PE-Copolymerisat	KE_809_697	1,5mm
CAD_KE_810_391_A_G01_TM_001	VERL_SAEULE_A_AUSS_VFF_170419QCST	K4H		CATPart	CR330Y590T-DP-G140/40-U	KE_810_391_A	0,8mm
CAD_KE_810_889_DMJ_TM_004	SCHOTT_SAEUL_D_MH_SKA_R05_CH01093043	K4H		CATPart	PE-Copolymerisat	KE_810_889	1,5mm
CAD_KE_809_647_DMJ_TM_008	SCHOTT_SAEUL_C_MIT_SKA_R06_CH01093036	K4H		CATPart	PE-Copolymerisat	KE_809_647	1,5mm
CAD_KE_809_697_A_DMJ_TM_005	SCHOTT_SA_C_LIN_AU_SKA_R06_CH01093038	K4H		CATPart	PE-Copolymerisat	KE_809_697_A	1,5mm
CAD_KE_809_307_G01_TM_020	VERST_SAEULE_D_VFF_170505QCST	K4H		CATPart	CR4-G140/40-U	KE_809_307	0,7mm
CAD_KE_806_095_PCA_TM_014	SCHOTTTEIL_SAEULE_BFG_170120QCST	K4H		CATPart	CR240LA-G140/40-U	KE_806_095	1,1mm
CAD_KE_809_329_PCA_TM_014	SAEULE_D_INNEN_LINT_VFF_170519QCST	K4H		CATPart	CR4-G140/40-U	KE_809_329	0,7mm
CAD_KE_810_555_PCA_TM_009	VERST_DACHRELING_VFF_170420QCST	K4H		CATPart	CR240LA-G140/40-U	KE_810_555	1,8mm
CAD_KE_810_283_G01_TM_023	SAEULE_A_AUSS_OBEH_PVS_170922QCST	K4H		CATPart	2294-ES-4560/60	KE_810_283	1,65mm
CAD_KE_809_111_PCA_TM_020	VERSTEUFGUNSTE_XFB_BFG_170120QCST	K4H, K5B		CATPart	CR240LA-G140/40-U	KE_809_111	1,2mm
CAD_KE_805_523_PCA_TM_014	SCHOTTTEIL_VERL_BFG_170120QCST	K4H, K5B		CATPart	CR240LA-G140/40-U	KE_805_523	1,2mm
CAD_KE_809_571_DMJ_TM_003	SCHOTT_SAEUL_U_AU_SKA_R05_CH01093046	K4H, K5B		CATPart	PE-Copolymerisat	KE_809_571	1,5
CAD_KE_809_285_G01_TM_009	VERST_SAEULE_A_MI_BFG_170120QCST	K4H, K5B		CATPart	CR240LA-G140/40-U	KE_809_285	1,4mm
CAD_8W0_809_625_A_G01_TM_007_033_SCHARNIERVERST_BFG_170120QCST		K4H, K5B		CATPart	HX340AD-42100MBO	8W0_809_625_A	
CAD_KE_810_215_PCA_TM_014	SCHARNIERVERSTAERK_PVS_170714QCST	K4H, K5B		CATPart	CR380LA-G140/40-U	KE_810_215	
CAD_KE_809_297_PCA_TM_020	SCHARNIERVERST_S_PVS_170630QCST	K4H, K5B		CATPart	CR330Y590T-DP-G140/40-U	KE_809_297	
CAD_KE_810_313_PCA_TM_017	STEGTEIL_SAEULE_C_VFF_170526QCST	K4H, K5B		CATPart	CR440Y780T-DP-EG47/47	KE_810_313	0,9mm
CAD_KE_809_695_PCA_TM_013	VERST_SCHWELLER_2_VFF_170526QCST	K4H, K5B		CATPart	CR330Y590T-DP-EG47/47	KE_809_695	2,1mm
CAD_KE_809_393_PCA_TM_015	VERST_SCHWELLER_3_VFF_170526QCST	K4H, K5B		CATPart	CR330Y590T-DP-EG47/47	KE_809	
CAD_KE_809_067_PCA_TM_009	VERST_SCHWELLER_VO_VFF_170303QCST	K4H, K5B		CATPart	CR330Y590T-DP-G140/40-U	KE_809	
CAD_KE_809_755_G01_TM_016	SCHWELLER_AUSSEN_VFF_170620QCST	K4H, K5B		CATPart	CR700Y980T-DP-G140/40-U	KE_809	
CAD_KE_810_269_G01_TM_016	STEGT_SCHWELLER_VO_PVS_170620QCST	K4H, K5B		CATPart	CR700Y980T-DP-G140/40-U	KE_810	
CAD_KE_809_739_G01_TM_021	VERSTAERKUNG_INNEN_VFF_170620QCST	K4H, K5B		CATPart	CR700Y980T-DP-EG47/47	KE_809	
CAD_KE_809_801_DMJ_TM_005	SCHOTT_SCHWELL_MI_SKA_R05_CH01093040	K4H, K5B		CATPart	PE-Copolymerisat		

CAD parts

CAD meta data

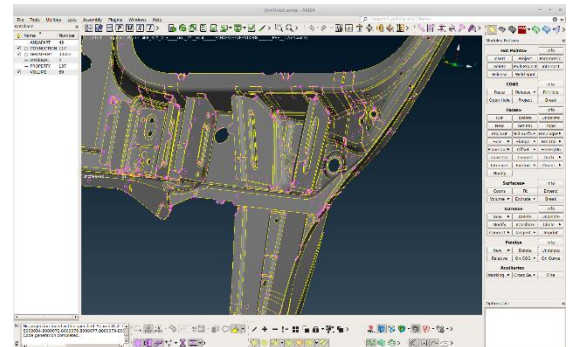
geometry

meshing CAD data

ANSA

mesh

control of variants



TDM System

product structure from CATIA

Components (PV:107)

Name

- 4KE_809_039 G:SEITENTEIL.INNEN
- 4KE_809_045 G:SEITENWANDRAHMEN HINTEN INNEN
- 4KE_809_051 G:SEITENTEIL HINTEN INNEN
- 4KE_806_241_B G:AUFNAHME SCHARNIER
- 4KE_809_453 G:EINSATZTEIL
- 4KE_810_417 G:VERSTAERKUNG DACHREILING
- 4KE_809_297_... (2 components)
- 4KE_809_055 Z:SAEULE A,UNT.AUSS
- 4KE_809_293_A G:SCHARNIERVERSTAERK SAEULE A OBEN
- 4KE_810_289 G:SCHARNIERVERSTAERKUNGEN LINKS
- 4KE_809_377 G:SCHWELLER VERSTAERKUNG
- 4KE_809_597 G:STEGTEIL,SCHWELLER SG OBEN
- 4KE_810_073 Z:SAEULE B,M.SCHWELL

Runs (PV:107)

Name

- CAE Zusammenbau LS-DYNA
- AU513_1xx_BK_Pf_EU_L_VD_-_K5B-L0L-3FA_-_0107
- AU516_1xx_BK_Pf_CN_L_VD_-_K4H-L0L-3FA_-_0107
- AU516_1xx_BK_Pf_EU_L_VD_-_K4H-L0L-3FA_-_0107
- CAE Zusammenbau NASTRAN
- CAE Zusammenbau PAM-CRASH

Container for all data related to one part

Geometry as CATPart

Mesh as ANSA DB

Assemblies for different solvers

ANSA v18.1.0 64-bit (/tmp/tmpaOuMhz/4KE_809_297_...PCA_TM_...020_...SCHARNIERVERST_...)

File Tools Utilities Lists Assembly Plugins Windows Help

1: 4KE_809_297_...PCA_TM_...020_...SCHARNIERVERST_S... PVS_170630QCSI_06
2: Model_1

Select FACE

Compare session s
Report exported to

Info

Modules Buttons

Hot Points ▶ Info

Insert Project Parametric.
Delete Mult.Proje. Intersect
Release Weld Spot

CONTS Info

Paste Release ▶ Fill Hole
Open Hole Project Break

Faces ▶ Info

Cut Delete Undelete
New Set PID Topo
Proj.Cut Mid.Surf. ▶ Rm.Log. ▶
Fuse ▶ Flange ▶ Rm.Dbl ▶
Plane Cu. ▶ Offset ▶ Freeze/Un
Zone Cut Convert Dach ▶
Intersect Extend ▶ Orient ▶
Modify

Surfaces ▶ Info

Options List

- Geometry and Mesh are stored together
- Whole product or groups can be opened
- Comparing of mesh and geometry
- Assemblies can create includes for multiple solvers

ANSA

product structure in ANSA same as in TDM and PDM

all connections are updated from TDM and created as ANSA connections

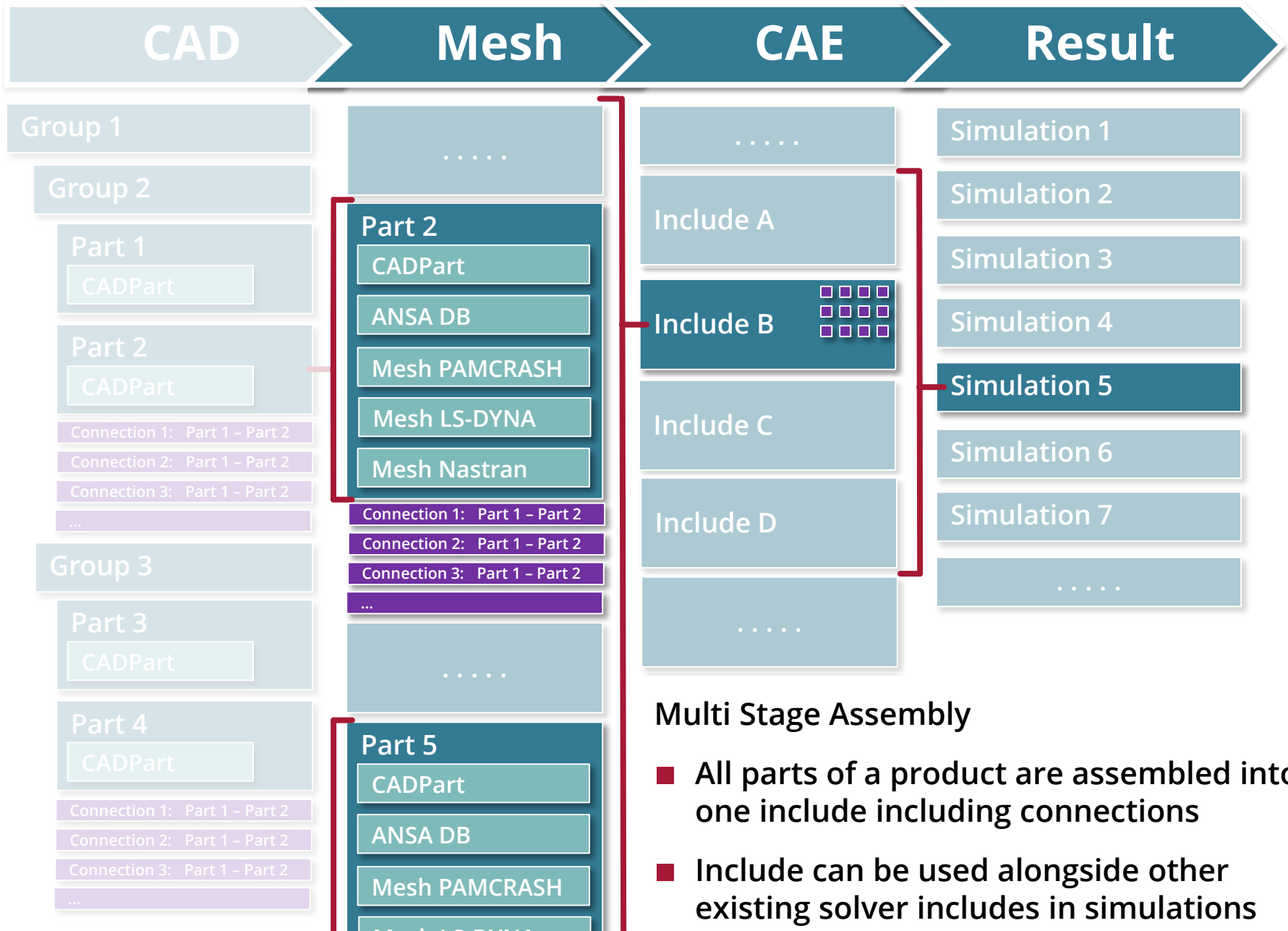
Name	Value
Name	4KE 809 217 PCA_TM ...
Module Id	4KE 809 217
Version	24
Study Version	0
Representation	Untitled
General	
Characteristics	

Module Id	Name
4KE 810...	4KE 810_391_A_G01_TM_001_VERL_SAEULE_A_AUSS
4KE 809...	4KE 809_201_G:SAEULE A.AUSSEN
4KE 809...	4KE 809_055_Z:SAEULE A.UNT.AUSS
4KE 809...	4KE 809_055_0210_A02_0005_L
4KE 809...	4KE 809_055_0210_A03_0010_L
4KE 809...	4KE 809_055_0210_A05_0001_L
4KE 809...	4KE 809_055_0210_A06_0005_R
4KE 809...	4KE 809_055_0210_A07_0004_L
4KE 809...	4KE 809_217_G01_TM_024_SAEULE A.AUSSEN
4KE 809...	4KE 809_217_PCA_TM_024_SAEULE A.AUSSEN
4KE 809...	4KE 809_285_G01_TM_009_VERST_SAEULE A_MI
4KE 809...	4KE 809_293_A G:SCHARNIERVERSTAERK SAEULE A OBEN LI.
4KE 810...	4KE 810_209 G:SCHARNIERVERSTAERK UNTEN LINKS



Implementation - *closing the gap to CAE*

CAD → Mesh → CAE → Result



Implementation - *closing the gap to CAE*

The result of the assembled CAD data (*RunOutputComponent*) is used as a solver include in simulations.

The solver include is directly linked to the CAD assembly and gets updated if CAD data changes.

CAD body in white pool mounted in simulation pool

CAE

Components (PV:57)

Name	Short description	Count
(4 values)		
AU516_1xx_B_PF_C	IIHS	7
Material	2016_connection_pc2015	2
Material	2016_misc	2
Material	2016_car_component	1
Material	2016_connection_d	1
Leichtmetalle	2016_light_metal	4
Leichtmetalle	2016_light_metal	1
Karosserie	Bild_Uebersich	10
Karosserie	AU516_EU_OutO	6
Karosserie	AU516_EU	2
info_gruppen.py		1
info_gruppen.py		2
Include-Zwischen	inter_inclu_def	
Header Projekts	Pyvar_Def	
Header	CB_01_CarImpact_Input_Pamcrash	9
Header	CB_05_ALL_Ende_Pamcrash	4
Header	CB_02_ALL_Solving_Pamcrash	6
Header		
Gummi		
Globale Defini		
Globale Defini	Masse	11
Globale Defini	OUTextract	9

Runs (PV:57)

- Strukturcrash
 - PAM-Crash
 - AU516
 - AU516_1xx_B_PF_C_US_sii_551_0057_Lqg_SR
 - AU516_1xx_B_PF_C_US_spfe_32_0057_Lqg_SR
 - LS-DYNA
 - NVH
 - Nastran

Simulations for different product variants, solvers and disciplines can be set up based on the same CAD and MESH data.

CAD

Assembly Tree

- 4KE_809_201 G:SAEULE A,AUSSEN
- 4KE_809_055 Z:SAEULE A,UNT.AUSS
- 4KE_809_293_A G:SCHARNIERVERSTAERK SAEULE A OBEN
- 4KE_810_209 G:SCHARNIERVERSTAERK UNTEN LINKS
- 4KE_809_109 G:VERSTEIFUNGSTEIL
- 4KE_809_377 G:SCHWELLER VERSTAERKUNG
- 4KE_809_597 G:STEGTEIL,SCHWELLER SG OBEN
- 4KE_810_073 Z:SAEULE B,M

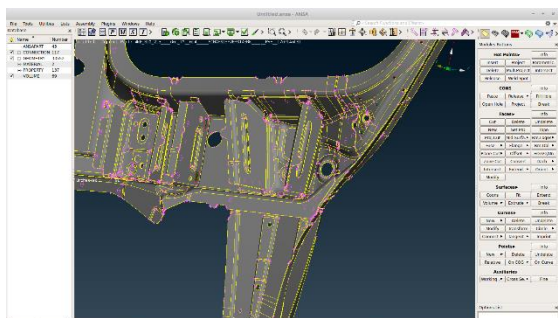
Runs (PV:107)

- CAE Zusammenbau LS-DYNA
 - AU513_1xx_BK_PF_EU_L_VD_-K5B-L0L-3FA_-0107
 - AU516_1xx_BK_PF_CN_L_VD_-K4H-L0L-3FA_-0107
 - AU516_1xx_BK_PF_EU_L_VD_-K4H-L0L-3FA_-0107
- CAE Zusammenbau NASTRAN
- CAE Zusammenbau PAM-CRASH

Includes for different product variants are created from the same data

working on the simulation model

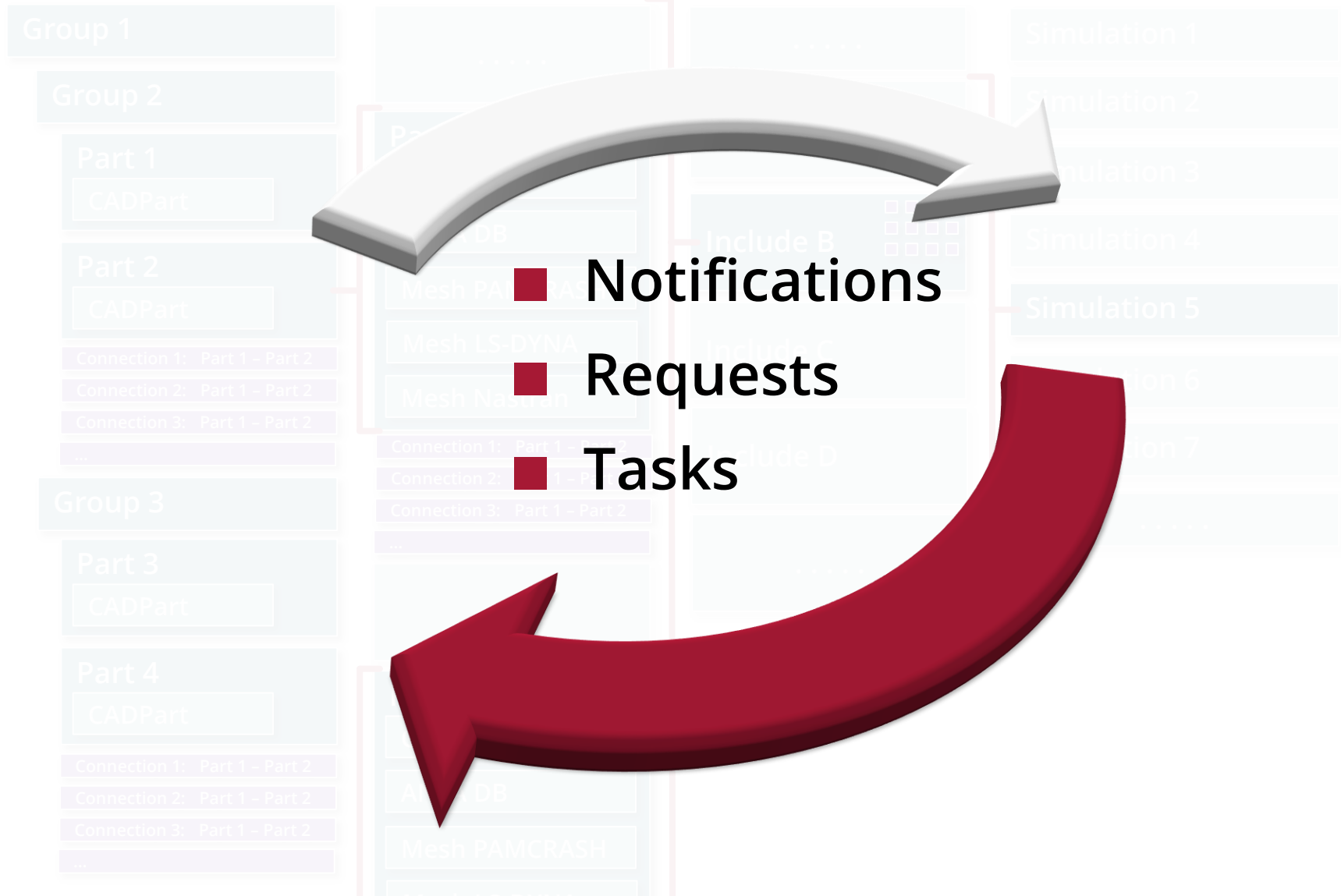
ANSA



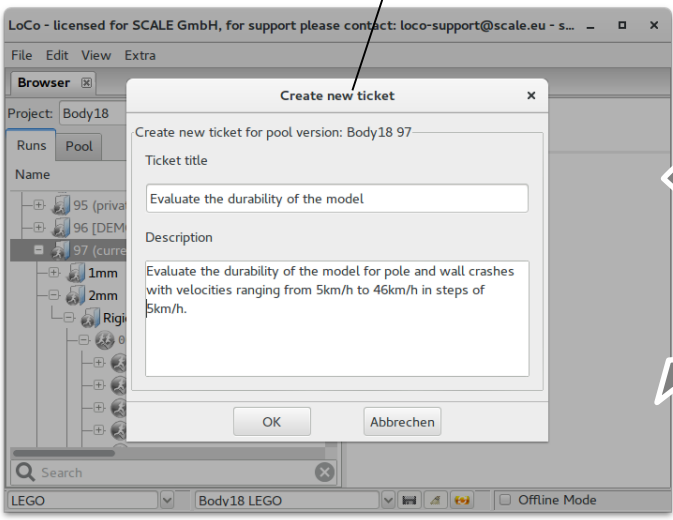
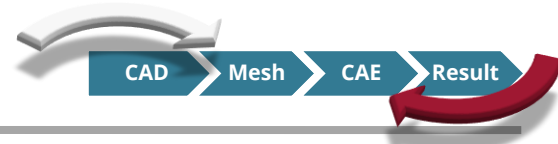
Assemblies for different solvers create as result solver include files. ANSA is used in batch to create the includes and connections are realized according to the needs of the simulation.

Working with simulation models in ANSA occurs on same meshes and CAD data

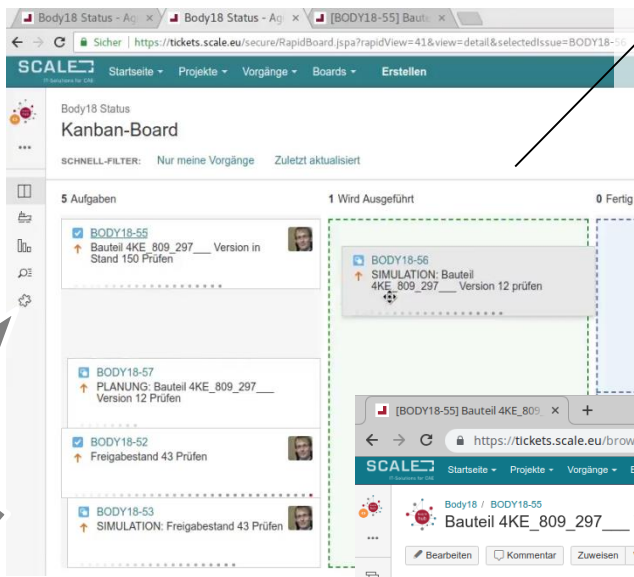
Implementation - *project management*



Implementation - *project management*



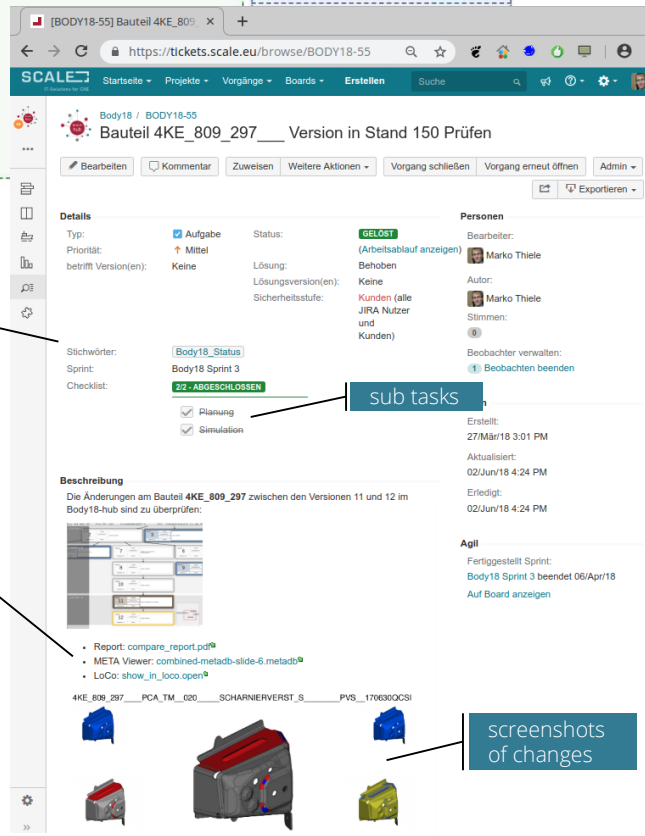
Tasks are created directly with the desktop clients



Kanban-Board for easy task management

- Integration of in house project management system
- Full capabilities of commercial project management systems
- Tasks are directly linked to CAD/CAE data
- All communication related to a task is documented

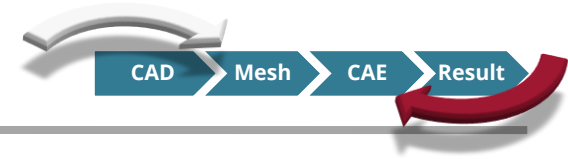
detailed task description with automatically created content



links to related documents

sub tasks

screenshots of changes



- Simultaneous working with CAD data in CATIA
- Geometry and meshes handled as one object *(part)*
- Seamless transition between CAD and CAE
- Using the same Geometry and Meshes for
 - Multiple product variants
 - Simulating with different solvers
 - Load cases in different disciplines
- Integration of project management tools

Outlook – upcoming GUI for designers in CAx-Hub

The screenshot displays the CAx-Hub interface with a tree view of components and a history panel. Annotations highlight key features:

- Pool (Projekt)**: Points to the top navigation bar.
- Version (PoolVersion)**: Points to the 'Version' column header in the tree view.
- Variante (RunConfig)**: Points to the 'Variante' column header in the tree view.
- Schweißgruppen**: Points to a component in the tree view.
- Geometrie**: Points to a component in the tree view.
- Verbindungstechnik**: Points to a component in the tree view.
- Drag'n'Drop**: Points to a component in the tree view.
- Hier Attribute und Metadaten z.B. Wandstärke, Material, Steuerung, ...**: Points to the 'Attributes' and 'Metadata' columns in the tree view.

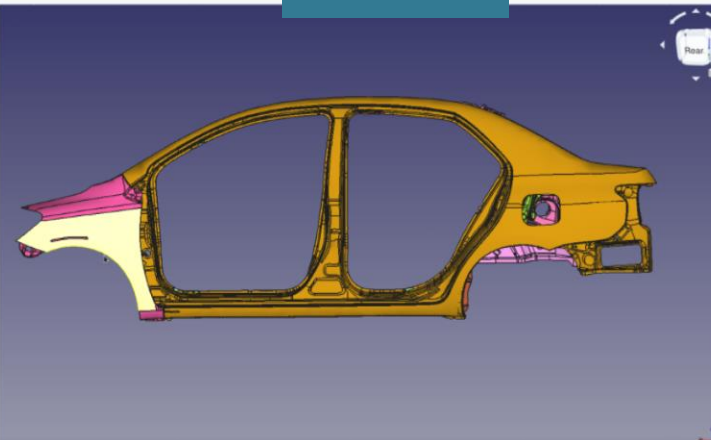
Name	Version	Metadata	Attributes
4KE_809_039 G:SEITENTEIL,INNEN	75		
4KE_809_045 G:SEITENWANDRAHMEN HINTEN INNEN	47		
4KE_809_201 G:SAEULE A,AUSSEN	53		
4KE_809_055 Z:SAEULE A,UNT.AUSS	47		
4KE_809_293_A G:SCHARNIERVERSTAERK SAEULE A OBEN LI.	37		
4KE_810_209 G:SCHARNIERVERSTAERK UNTEN LINKS	28		
4KE_809_109 G:VERSTEIFUNGSTEIL	35		
4KE_809_377 G:SCHWELLER VERSTAERKUNG	29		
4KE_809_739__G01_TM__021__VERSTAERKUNG_INNEN	9		
4KE_809_067__PCA_TM__009__VERST_SCHWELLER_VORNE	11		
4KE_810_269__G01_TM__016__STEGT_SCHWELLER_VORNE	30		
4KE_809_377__0210_A13_0005_L	31		
4KE_809_377__0210_A14_0053_L	25		
4KE_810_199 G:SCHLIESSTEIL SAEULE B	25		
4KE_810_121 G:SCHLIESSTEIL SAEULE B	24		
Bibliotheken	25		

History

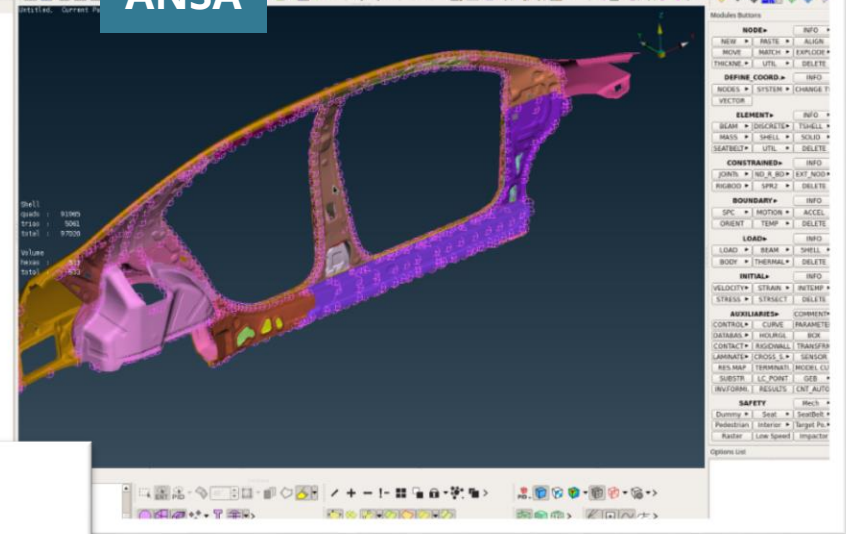
- 19 Attributes changed.
- 18 Attributes changed.
- 17 import test results...
- 16 Attributes changed.
- 15 added test sensor...
- 14 test_with_sensors
- 13 Short description ...
- 12 test
- 11 Change SWP to sol...
- 9 Attributes changed.
- 8 deleted space in b...
- 7 Academic Model: ...
- 6 Kommentarzeilen ...
- 5 Short description ...
- 4 Attributes changed.
- 3 Short description ...
- 2 master set for spo...
- 1 neuer Stand; Upd...

Outlook – *public DEMO setup using FreeCAD and ANSA*

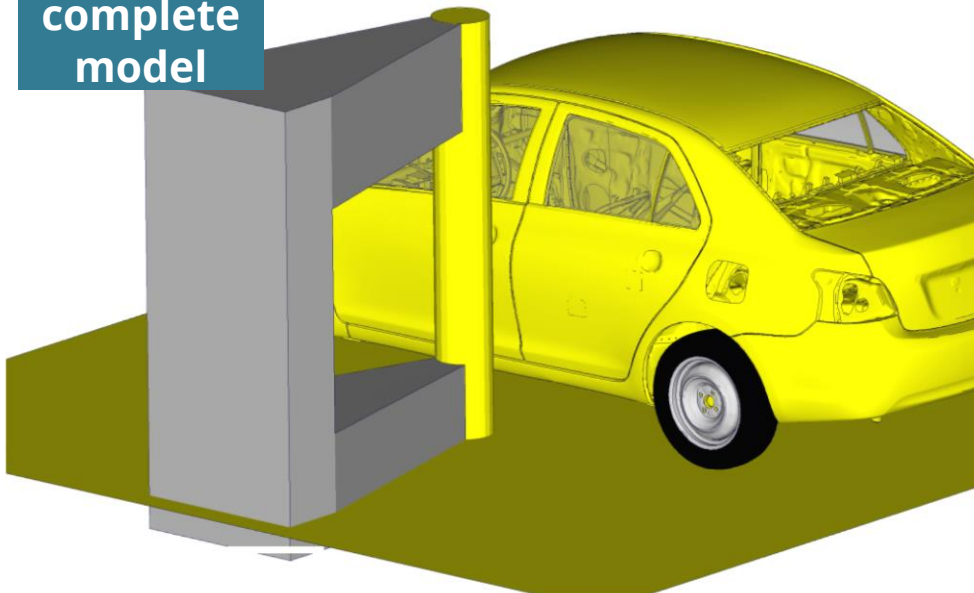
FreeCAD



ANSA



complete model

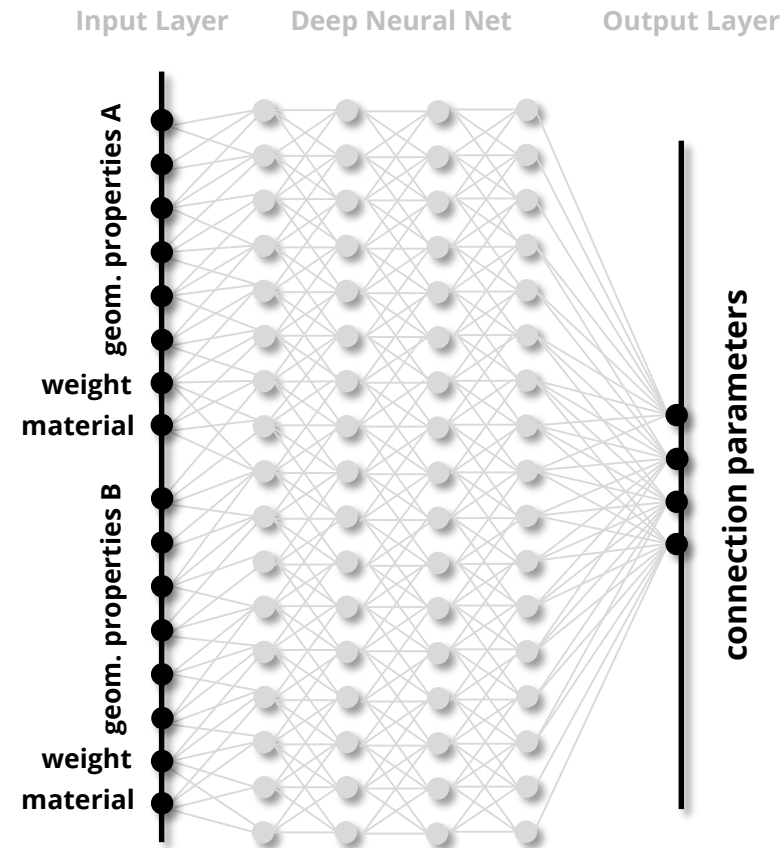
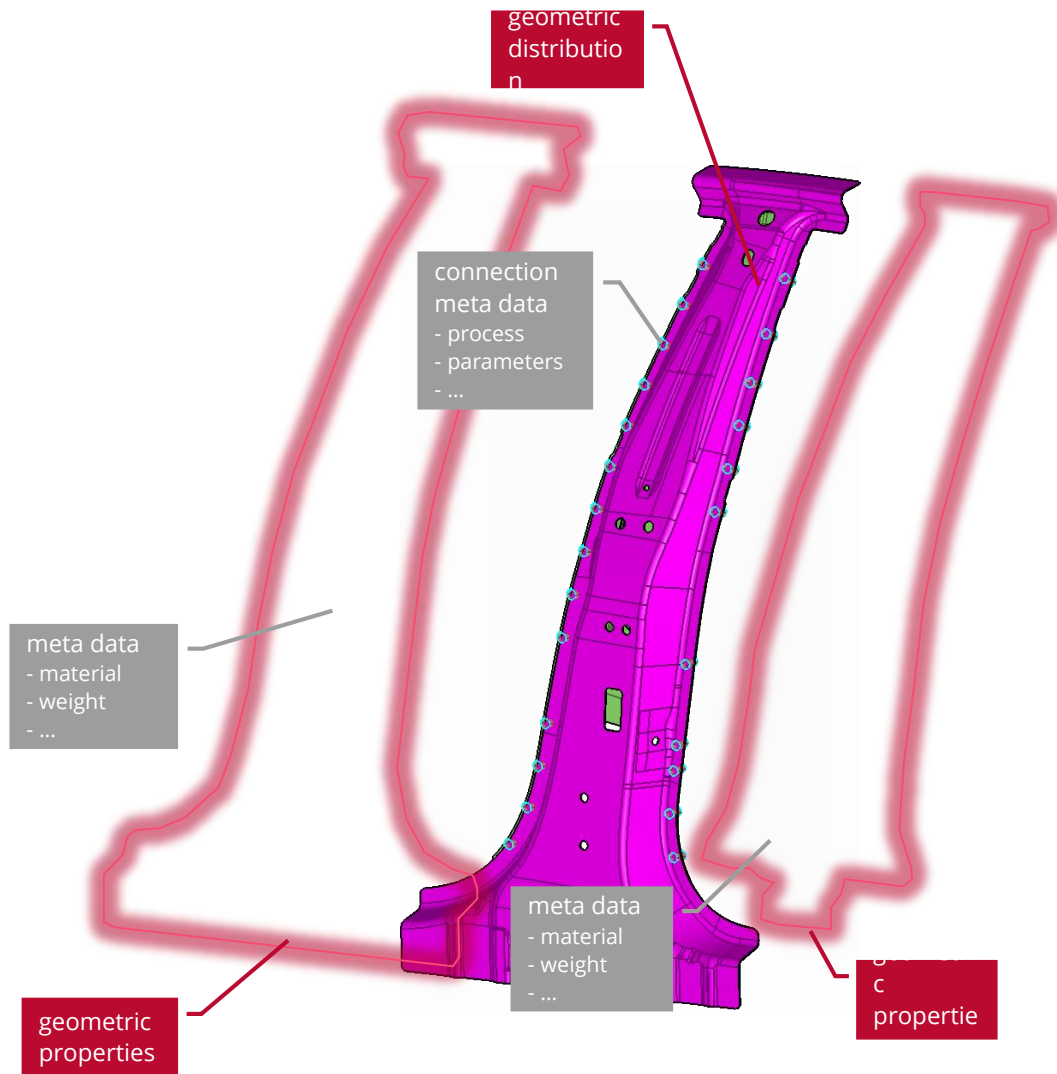


- CAD model in FreeCAD (*free and open-source CAD software*)
- Mesh generated by ANSA from CAD data
- Shared Connection definitions
- FE model for different solvers and disciplines (*including LS-DYNA for NVH and Crash*)

so long, and thanks for all the fish...



Outlook – using AI to generate initial spot weld designs



- Training data extracted from existing FEM data
- Estimation for initial spot weld layout with NeuralNet computed fast on local client