

# Ground breaking

**Simulation Solutions** 

physics on screen

# Advancements in batch model preparation with the SDM-Console

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- Process Proposal
- Stamp-mapping
- Compare
- Data transfer from CAD to CAE
  - Model Structure
  - -CAD2ANSA
- Batch Meshing
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  - Tailor blank recognition & treatment

#### (1) **DURCHGÄNGIGER CAE-MODELLAUFBAU** INTEGRATION IN PROZESSKETTE VIRTUELLES FAHRZEUG

#### Datenbereitstellung Reviev Bewertung/ Simulation Gxx VxBG Konfigurationsphase Transparenz mit DCM kommunaler Umfang Zusammenführen mit DCM CAD-Trigger CAE-Mode Konvertierung spezifischer Umfan Qualitätssicherung spez. FE-Modell kompl. FE-Modell GEO COMPARE VIP CHECK Reduzierung von später Simulation Qualitätsschleifen "Höhere Daten-Qualitätscheck mit ursprünglichen CAD-Daten (Master) Geordneter Datenabzug Geordnete Maßnahmen Lieferung FE-Modelle Modellkonfiguration Verantwortungsübernahme Qualitätssicherung Seite 4

DCM I BMW Group I 23. November 2016

(1) Meder, M., Daunert H. P. (2016). Durchgaengiger CAE-Modellaufbau: BMW Group

## Process proposal



Crash Representation has been linked to source-data coming from stamping simulations



Process proposal

New process link: Stamp-data mapping

TUESDAY M	AY 21, 2019 - Afternoon Sessions
14:00 - 14:30	Stamp-Crash process: coupling of Forming and Crash Simulations at BMW
	Dr. Janine Mergel <sup>1</sup> , Andreas Ickes <sup>1</sup> , Marcel Meder <sup>1</sup> , Michael Tryfonidis <sup>2</sup> , Helga Reith <sup>1</sup> <sup>1</sup> BMW Group, <sup>2</sup> BETA CAE Systems

#### (1) **DURCHGÄNGIGER CAE-MODELLAUFBAU** INTEGRATION IN PROZESSKETTE VIRTUELLES FAHRZEUG



Process proposal

Focus on CAE Model preparation

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#### Compare



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Process proposal

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Data transfer from CAD to CAE Focus Structure • Time consuming • Not flexible • User unfriendly



Name	Value	OLD PROCESS
- Module Id		OLDTROOLOO
Version	Dort Info	
Study Version	Partinio	
Representation		
🖻 Secondary Attributes		
Name	7333407_H01_A_LI-AUFN/	AHME-HA
Status	ОК	
Created	19-SEP-2018 16:46:31	
- Last_Edit	19-SEP-2018 16:46:33	
User	demo	
Is Instance		
MaturityLevel	VERF	
Id	250	
🗄 Transformation_Matrix		
x0, y0, z0	0., 0., 0.	
- dx1, dy1, dz1	1., 0., 0.	
- dx2, dy2, dz2	0., 1., 0.	
dx3, dy3, dz3	0., 0., 1.	
🗄 CAD_FILE		
PDM/Part Files/Part File 1/CAD File Name	7333407_H01_A_5P_FRGN	10D_LI-A
PDM/Part Files/Part File 1/CAD File Path	/home/demo/BMW/00_Marce	elModels <u>.</u>
PDM/Part Files/Part File 1/Download Link		
🗄 CAD_Thickness		
🖻 CAE_Info		
PID	2, 3, 7333407	
Thickness	0.001, 0.001, 2.3	
Material Name	CR210BHGI50-50-U	
MeshParam	4mm	
Fertigungsmerkmal	Blech	
🖻 MappingData		
MappingPriority	Medium	
MappingSource		
MappingResult		

Data transfer from CAD to CAE

# Focus CAD2ANSAOnly capable under

- Linux
- Original cad files exposed
- Limited traceability





#### NEW PROCESS

## Data transfer from CAD to CAE Focus Structure



PDM System		KOMVO5 v19 0.0	NEW PI	ROCESS
Cogin Simulation Models	CAD4CAE: TSS-Kennung TSS-Passwort OEDE-Name Dokuld	Query for Plmxml file hendrix *********** P123456#A#01#A#ST#PACKAG		Logged in as thanaeis Diek Space : OK ★ to Bookmarks, History,
resulting Som Consucce Current: Dim path has Building contents fo Building contents fo Building contents fo Building contents fo Building contents for Building contents fo	OK OK Upload to Bi View True Antraduus/View subsyste Karosserie rubsyste Karosserie rubsyste Karosserie rubsyste Karosserie rubsyste Karosserie	TAULTSUR_LUNSULE_UV2015/2010002901VeITUAULT/CUNTIQ_SUR_LUNSULE_UNULT/UR. //OULTSUR_LUNSULE_UV2015/2017_BETA_Congress/SDM_COMSOLE/OM/ auts list:	Cancel	

## Data transfer from CAD to CAE Focus Structure



NEW PROCESS

# Data transfer from CAD to CAE • Focus CAD2ANSA

X

Cancel

TranslateJob Karosseriegerippe

Details TranslateJob Karosserieg...

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Name	Translation Status CAD-File	DokuId		Part Nr	<u> </u>	
F000443_L01_A_F000443_L01_A_LT-VERSTAERKLING-SCHARNIER	Not translated yet	18849536	~	Name	11	
F000444_N- Copy Ids To Clipboard CHARNIER	Not translated yet	18849541		Version		
F000684_O	Not translated yet	48483820	~	Translation Status		
F000685_Q	Not translated yet	48483805	~	CAD-File		
F000686_0 📴 Download CAD-File from Doku Id R-VORN-F30-F31	Not translated yet	48483786	~	DokuId		
F000687_Q- Check Catia file existence R-VORN-F30-F31	Not translated yet	48483756		Dokuld: File		
F000755_S- 🚯 Show Only (Open in Viewer) VTEN-F30-F31	Not translated yet	42315483		Dokuld: Response		CAD4CAE: Quent for Playmed file
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F000757_S- 🌇 Show (Merge in Viewer) VTEN-F30F31	Not translated yet	42315518				TSS-Kennung hendrix
F000758_S01_A_F000758_S01_A_ZB-FENSTERHEBER-HINTEN-F30-F31	Not translated yet	42315514				TSS-Passwort *****
F001254_K01_A_F001254_K01_A_VERSTAERKUNG-SCHLIESSBUEGEL	Not translated yet	18893125				
1164653_F01_A_1164653_F01_A_LEITUNGSCLIP	Not translated yet	16587794				
1176747_G01_A_1176747_G01_A_KUNSTSTOFFMUTTER	Not translated yet	17478235				Dokuld
1374075_E01_A_1374075_E01_A_SPREIZMUTTER	Not translated yet	809932				
1378908_A01_A_1378908_A01_A_HALTER-FUER-STECKVERBINDUNG	Not translated yet	5470696				
1855009_G01_A_1855009_G01_A_VERSCHLUSSSTOPFEN	Not translated yet	729932			~	ОК
Pending: 884, OK: 0, WARNING: 0, ERROR: 0				total 884 sele	cted 1	
Start CATIA->ANSA Conversion		Refresh				

#### Benefits

- Reading the hierarchy structure requires minutes instead of multiple hours
- No redundant cad-data exchange
- Transparent error handling
- CAD-Data get automatically cleared
- Model build process becomes function-able under Windows-OS
- User does everything in one tool -> KOMVOS

#### **Future Steps**

- Preview cad-data in 3d by exploiting view-files (cgr, jt etc.)
- Perform CAD-conversion on a server
- Automation of CAD->CAE model definition process

Data transfer from
CAD to CAE
Benefits and
opportunities of new
process

💿 CAD4CAE: Q	uery for Plmxml file	ß
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TSS-Passwort *		
OEDE-Name	P123456#A#01#A#ST#PACKAG	
Dokuld		
ОК		Cancel



## **Batch Meshing**

 Triggered through SDM-Consoleкомусся<sup>®</sup>









Aluminum Casted



Underbody covers, montage plates etc.





Shell parts with Pressed elements

Tailor Welded blank

Tailor Rolled blank

Shell parts constant thickness

Elongated aluminum parts

**Batch Meshing** Parts types to deal with in the BiW domain









Bolts/Screws/etc.



Aluminum Casted



Underbody covers, montage plates etc.





Shell parts with Pressed elements

Tailor Welded blank

Tailor Rolled blank

Shell parts constant thickness

Elongated aluminum parts

#### **Batch Meshing** Parts types to deal with in the BiW domain

- for up to ~30% parts manual input required









#### 🗹 Bolts/Screws/etc.

Underbody covers, montage plates etc.

Warning	×
There were 208 parts rejected:	
- parts with KONZ status	?
- same id but different version	?
- non-simu parts (screws etc.)	?
Do you want to open them in ansa?	
Start TP in ANSA No, thanks	
Rejected parts log file: open log-file	•

Details	META Viewer Part Manager
Set all Ac	tive Hide Inactive Reset Template Apply Temp
Structure	Part Files
Q select	ed:
	ame
Ē	- 🗂 1000000_A_FORD_TAURUS
	⊡ 100000_A_BIW_100000
	⊕ 🗂 103000_A_B_PILLAR_LEFT
	⊕ 🖺 104000_A_B_PILLAR_RIGHT
	⊕ ☐ 105000_A_C_PILLAR_LEFT
	⊕ 🖺 106000_A_C_PILLAR_RIGHT
	⊕ 🗂 108000_A_FLOOR
	125000_A_MODUL_ANBAUTEILE
	E 126000_A_MODUL_MONTAGE_PLATTEN

Using Smart string filters and submodel selection templates

#### Batch Meshing Strategies depending on part type

• CAE-irrelevant parts are filtered out



No user input required for their recognition. Key functions used:

- Skin for mid-surfacing
- Batch Mesh tool for meshing



Shell parts constant thickness

Batch Meshing Shell Parts constant thickness

• Shell Midsurfacing + Batch meshing





Shell parts with Pressed elements



Batch Meshing Shell Parts with Pressed elements

- Pressed elements lead to failure with regards to mid surface extraction
- Can be 10%-30% of BiW Parts



Shell parts with Pressed elements

Batch Meshing Solution for Shell Parts with Pressed elements

• Library of pressed elements geometries





Batch Meshing Solution for Shell Parts with Pressed elements

- Library of pressed elements geometries
- Automatic recognition



Batch Meshing Solution for Pressed elements:

- Library of pressed elements geometries
- Automatic recognition
- Pressed elements get removed
- Remaining geometries are healed
- Mid-surface extraction can now proceed

Tailor blank recognition developed. Key functions that includes this

- Skin
- Casting



Batch meshing Tailor Blanks

- Tailor Welded blank Tailor Rolled blank
- Recognition function







#### Benefits

- Increased automation: from >70% to >90%.
- Batch Mesh process overall not affected in terms of performance
- Pressed elements are marked as such and kept
- Distinction between welded or rolled blanks

#### **Future Steps**

- Expand recognition to further geometries
  - Small sized libraries: clips, springs etc.
  - New part types: casting, extrusion geometries etc.
- Apply predefined mesh patterns for recognized parts/elements





#### Batch Meshing Pressed Elements Tailor Blanks

Benefits and opportunities

TODAY			
17:30 - 18:00	Exploration of meshing strategies for highly complex parts Dimitris Zafeiropoulos <sup>1</sup> , Stylianos Karditsas <sup>2</sup> , Christos Sachanas <sup>2</sup> , Lazaros Adamoudis <sup>2</sup> , Michael Tryfonidis <sup>2</sup> <sup>1</sup> BETA CAE Systems Internationa <sup>2</sup> BETA CAE Systems		





### Stay connected

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## Title

#### Description

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**Text Box** 

Title

Description