

VirtualPaintShop® CATIA Toolkit

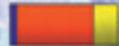
The Module for Modeling and Finite Element Meshing of Car Body Cavities

Model processing time

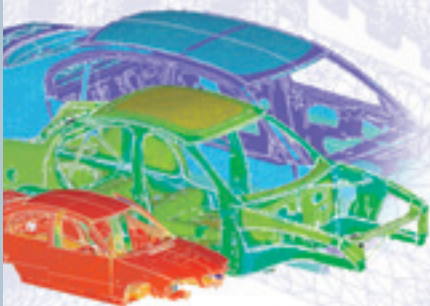
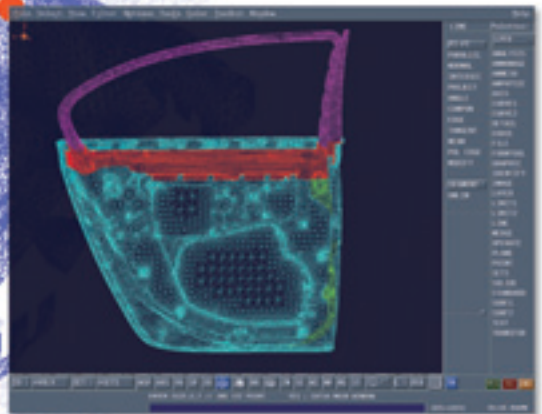
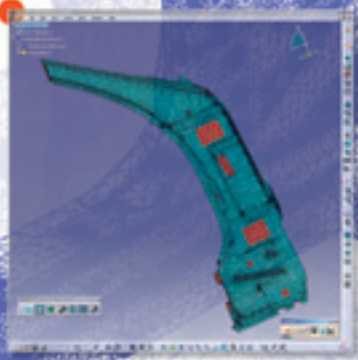
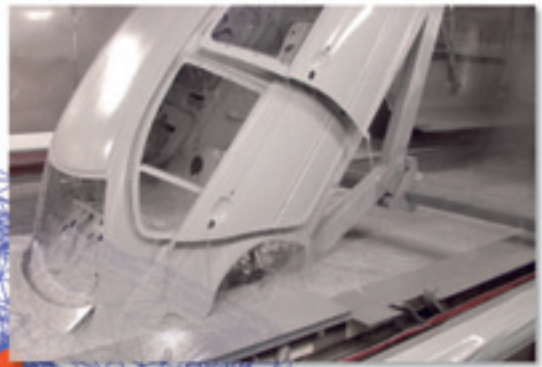
Traditional CAD workflow



Supported by CATIA Toolkit



- Preparation
- Modeling
- Meshing



VirtualPaintShop® – CATIA Toolkit

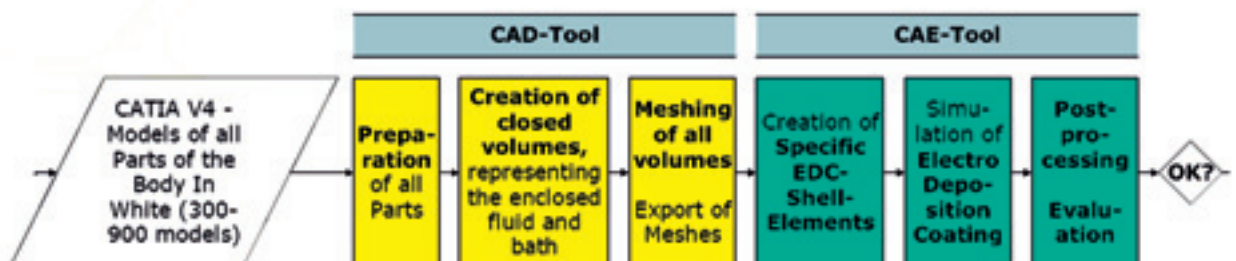
Various numerical simulation tasks in automobile virtual prototyping, e.g. airflow, sound, electro-deposition coating, dipping analysis or CFD simulations require finite-element meshes of the space enclosed by or surrounding the structure. Due to the geometric complexity of a car body the modeling and meshing process cannot be effectively done by pure manual methods. Especially the simulation of electro-deposition coating requires a high degree of details within the model since even very small openings affect the resulting layer thickness within cavities.

CADFEM's VirtualPaintShop® (VPS) module "CATIA Toolkit" provides a large number of interactive functions to enable and accelerate such a complex work. The produced master model containing all cavities as volume definitions can be the starting point for meshes of different type and purpose. Within the VPS software suite CATIA Toolkit provides finite-element source models for the e-coat simulation module VPS/EDC.

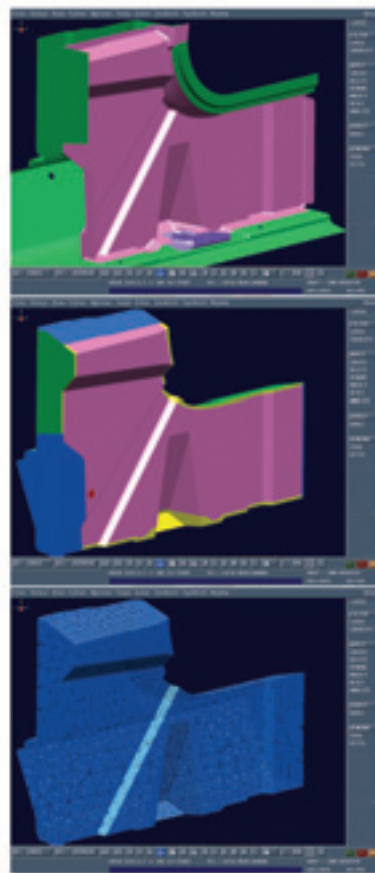
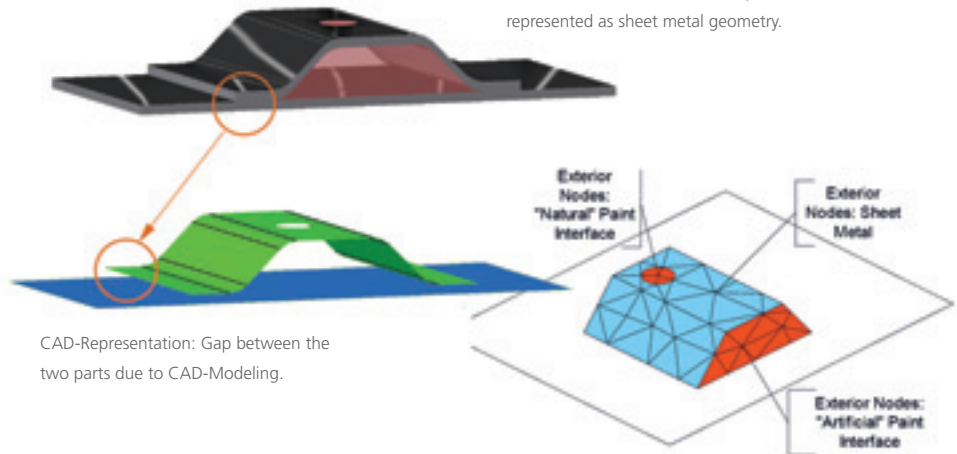
Main modeling steps:

- **Assembling**, clean-up and structuring of 300 ... 900 CAD-parts of the body-in-white
- **Modeling** of 250... 300 closed volumes representing the enclosed and surrounding air or liquid, respectively
- **Meshing** of all volumes and linking identification data to created nodes and elements
- **Export** of the volume mesh and associated data, e.g. to VPS/EDC, VPS/DIP, VPS/ESC, AcousticPathAnalyzer and other CAE processes

CATIA Toolkit is a part of a complete process from the collection of the CAD parts up to the delivery of the simulation results:



CATIA Toolkit provides specific techniques in order to create closed volumes of all complex cavities of car bodies represented as sheet metal geometry.



CATIA Toolkit volume meshes are very detailed compared to a crash mesh, for example. Even small openings are taken into account allowing very accurate simulations.

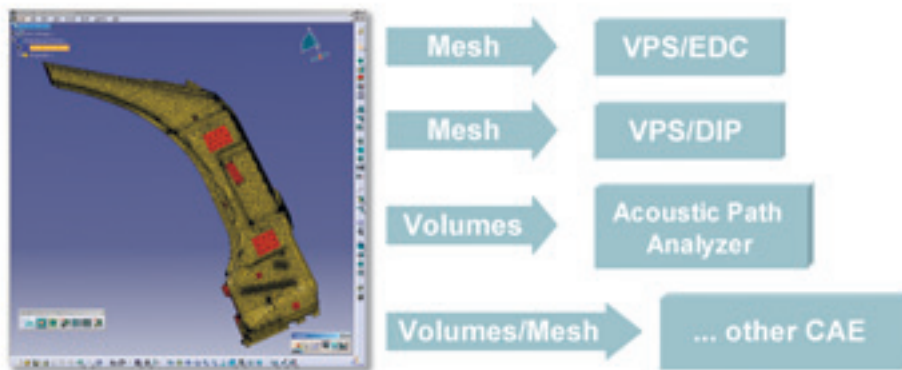


CATIA Toolkit supports the CAD designer at all process steps. Around 40 interactive functions are completely integrated in CATIA.

Additional usage of volume models and meshes: The Master-Model Approach

Once the closed volumes of all cavities are created, those volumes can be used in a wide range of application fields. Different types of meshes can easily be created based on the same geometric model. All simula-

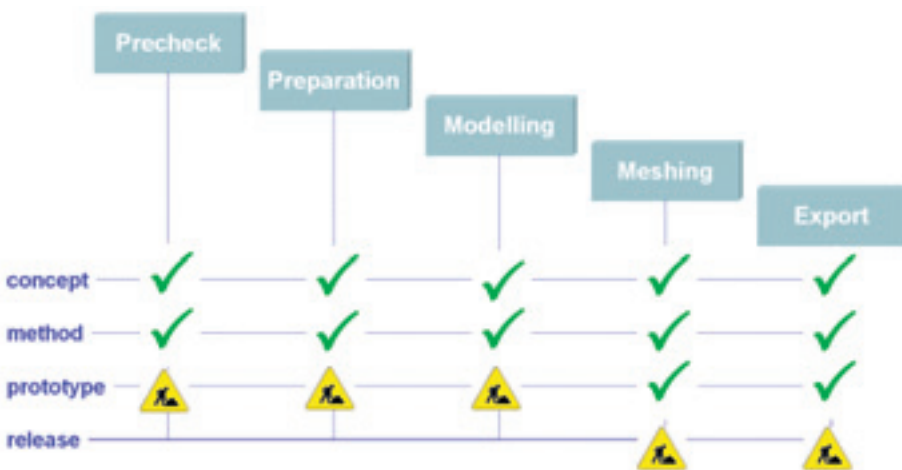
tion disciplines which require meshes of car body cavities might take advantage of this so-called "Master-Model Approach", including acoustics, fluid dynamics, electromagnetics, etc.



CATIA Toolkit V5

New data structures under CATIA V5 along with CADFEM's experience will lead to a significant reduction of modeling and

meshing time. CATIA Toolkit V5 will be a customer specific tool. The first base components will be ready for customization in Q1-2008.



CATIA Toolkit components

TECHNICAL OVERVIEW OF CATIA Toolkit for CATIA V4 (release V1.3, as of OCT. 2007)

- Powerful interactive functionalities for preparation, modeling and meshing of car body cavities
- Fully integrated in CATIA
- Model clean-up and structuring in batch mode
- Preparation functions, e.g. closing of holes or associating different information to each part
- Search functions like welding flange identification
- Check functions for verifying the geometric quality
- Geometric functions for creating closed volumes
- Auxiliary functions for speeding up frequently used tasks
- Meshing functions for creating the required volume meshes including all necessary information like part IDs etc.
- CAD software platform: CATIA V4.2.4, Operating systems: SGI IRIX, SUNOS, HP-UX

THE MODULES OF VirtualPaintShop®:

- VPS/DIP** Simulation of transient air inclusions and resulting carry over of fluids due to immersion in basins
- VPS/EDC** Simulation of electro-deposition coating
- VPS/DRY** Simulation of thermal heat up and cool down of structures; curing of paint layers or adhesives
- VPS/UV** Simulation of ultraviolet curing of coatings
- VPS/ESC** Simulation of electrostatic or pneumatic coat application
- VPS/CP** Simulation of cavity preservation by wax spraying and propagation

CATIA BASED SOLUTIONS

(some modules require customization to customer specifics for implementation)

- CATIA Toolkit** Preparation of Simulation Models for VPS/EDC, VPS/DIP, VPS/ESC, CFD or AcousticPathAnalyzer
- AcousticPathAnalyzer** Simulation of acoustic paths within car body cavities

Further information can be found on www.virtualpaintshop.de

DEVELOPER

CADFEM GmbH
 Marktplatz 2
 85567 Grafing b. München
 Phone +49 (0) 80 92-70 05-0
 Fax +49 (0) 80 92-70 05-77
 E-Mail info@cadfem.de
 www.cadfem.de

EVALUATE BY PILOT PROJECT

For evaluation of the CATIA Toolkit capabilities as well as its suitability for your product and process design environment a pilot project conducted in cooperation with CADFEM is recommended. CADFEM will provide the entire modeling and meshing workflow at a real auto-mobile structure out of your current or prospective product line.

CADFEM SERVICES

- **Modeling and meshing of cavities of complete car bodies.** CADFEM offers the service to create models and meshes of cavities of complete car bodies on behalf of the customer. These Projects cover all necessary steps from the collection of the required CATIA-models to the delivery of the volume mesh.
- **Licensing and training on CATIA Toolkit**
- **Customization of CATIA Toolkit** for customer-specific requirements

DISTRIBUTORS

Germany / Switzerland / Austria

CADFEM GmbH
 Marktplatz 2
 85567 Grafing b. München
 Phone +49 (0) 80 92-70 05-0
 Fax +49 (0) 80 92-70 05-77
 E-Mail info@cadfem.de
 www.cadfem.de

Italy

EnginSoft SpA
 Via Malfatti 21
 38100 Trento
 Phone +39 (0) 461-915-391
 Fax +39 (0) 461-915-926
 E-Mail info@enginsoft.it
 www.enginsoft.it

France

ANSYS France
 Les bureaux de Sèvres
 2, rue Troyon
 92316 Sèvres Cedex
 Phone +33 (0) 141-14 83 45
 Fax +33 (0) 141-14 83 46
 E-Mail fradmin@ansys.com
 www.ansys.fr

UK

IDAC Ltd.
 Airport House
 Purley Way
 Croydon, Surrey CR0 0XZ
 Phone +44 (0) 870-1 60 59 00
 Fax +44 (0) 870-1 60 59 10
 E-Mail info@idac.co.uk
 www.idac.co.uk

Czech Republic and Slovakian Republic

SVS FEM s.r.o.
 Skrochova 3886/42
 615 00 Brno, Czech Republic
 Phone +42 (0) 543-254 554
 Fax +42 (0) 543-254 556
 E-Mail info@svsfem.cz
 www.svsfem.cz

Poland

MESco
 ul. Powstancow Slaskich 10
 42-600 Tarnowskie Gory
 Poland
 Phone +48 (0) 32-7 68 36 36
 Fax +48 (0) 32-7 68 36 35
 E-Mail info@mesco.com.pl
 www.mesco.com.pl

Russia

CADFEM GmbH – Repräsentanz Moscow
 Office 1703
 77, Shelskovskoe Shosse
 107497 Moscow
 Phone +7 (0) 95-9 13 23 00
 Fax +7 (0) 95-9 13 23 00
 E-Mail info@cadfem.ru
 www.cadfem.ru

Brazil

TTS – Technology Tools & Services
 Rua do Rocio, 423 10o. Andar cj. 1002.
 04552-000 - São Paulo - SP - Brazil
 Sergio R. Rodrigues
 Phone +55-11-3853-4970
 E-Mail sergio@ttsbr.com.br
 www.ttsbr.com.br

Japan

Cybernet Systems Co. Ltd.
 FUJISOFT Bldg. 3, Kanda-neribeicho
 01-0022 Chiyoda-ku, Tokyo
 Phone +81-3-5297-3208
 Fax +81-3-5297-3637
 E-Mail anssales(at)cybernet.co.jp
 www.cybernet.co.jp/english/

China

CCA Engineering Simulation Software
 (Shanghai) Co., Ltd.
 RM. 918, No.777 Zhao Jia Bang Rd
 200032 Shanghai
 Phone +86-21 6471-6031
 Fax +86-21 6471-6050
 E-Mail info@cca-es.com
 www.cca-es.com

India / Malaysia

CADFEM Engineering Services India PVT Ltd.
 H.No: 48, 1st Floor
 Parkview Enclave, Old Bowenpally
 Hyderabad – 500011
 Phone +91-40-64 54 35 79
 Fax +91-40-64 54 35 79
 E-Mail info@cadfem-india.com
 www.cadfem-india.com

Korea

ATES Co. Ltd.
 #1401 Woolim e-Biz Center II, 184-1
 Guro3 Dong
 Guro-Gu
 Seoul Korea 152-848
 Phone +82-2-890-3800
 Fax +82-2-890-3810
 E-Mail info@ates.co.kr
 www.ates.co.kr

USA and Canada

Mindware Engineering, Inc.
 39555 Orchard Hill Place
 Suite 160
 Novi, MI 48375
 Phone +1 248 380-0808-101
 Fax +1 248 380 0811
 E-Mail info@mindwr.com
 www.mindwr.com
 OZEN Engineering, Inc.
 1210 E. Arques Ave.
 Suite 207/208
 Sunnyvale, CA 94085
 Phone +1-408-732-4665
 Fax +1-408-834-4557
 E-Mail info@ozeninc.com
 www.ozeninc.com

All other countries

CADFEM GmbH
 Marktplatz 2
 85567 Grafing b. München
 Phone +49 (0) 80 92-70 05-0
 Fax +49 (0) 80 92-70 05-77
 E-Mail info@cadfem.de
 www.cadfem.de