LoCo

Multistage Assembly with a wheel generation process example.

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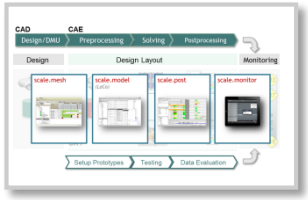
SCALE

Agenda

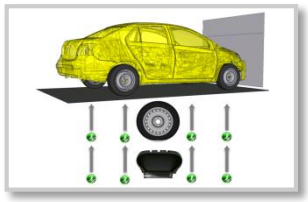


LoCo in SCALE.sdm

- Overview of LoCo's part in the SCALE.sdm chain
- Key Features

Assembly Process and Multistage Assembly

- Assembly Process with LoCo
- Multistage Assembly overview



Wheel generation with Multistage Assembly

- Example overview
- LoCo setup
- Assembly processes

Summary, Conclusions and Outlook

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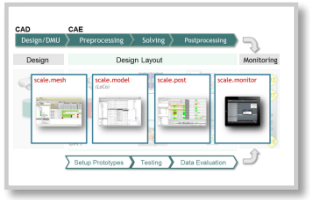

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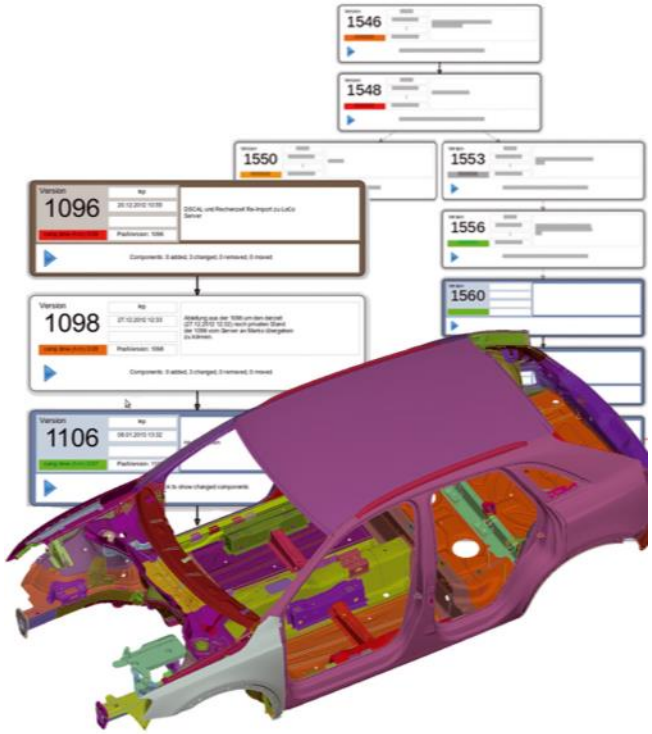
LoCo in SCALE.sdm:

CadMe | **LoCo** | CAViT | Status.E

CAD/Meshing → Modelling → Solving → Results → Monitoring



- **Simulation Data- / Variant Management**
  - Workbench for Simulation Engineers
  - Unique RichClient/Offline-concept with sync-mechanism *(internal/external)*
- **Workflows / Features**
  - Integration of arbitrary CAE processes
  - Solver: PAM-Crash, LS-DYNA, Nastran, Abaqus, ...
  - Job submit and monitoring
  - Optimization, robustness, DOE, ...
  - Quality checks of models
  - Advanced security features
    - Two factor authentication
    - Encryption
    - Sophisticated roles and rights management
  - Distributed, collaborative work environment
  - ....

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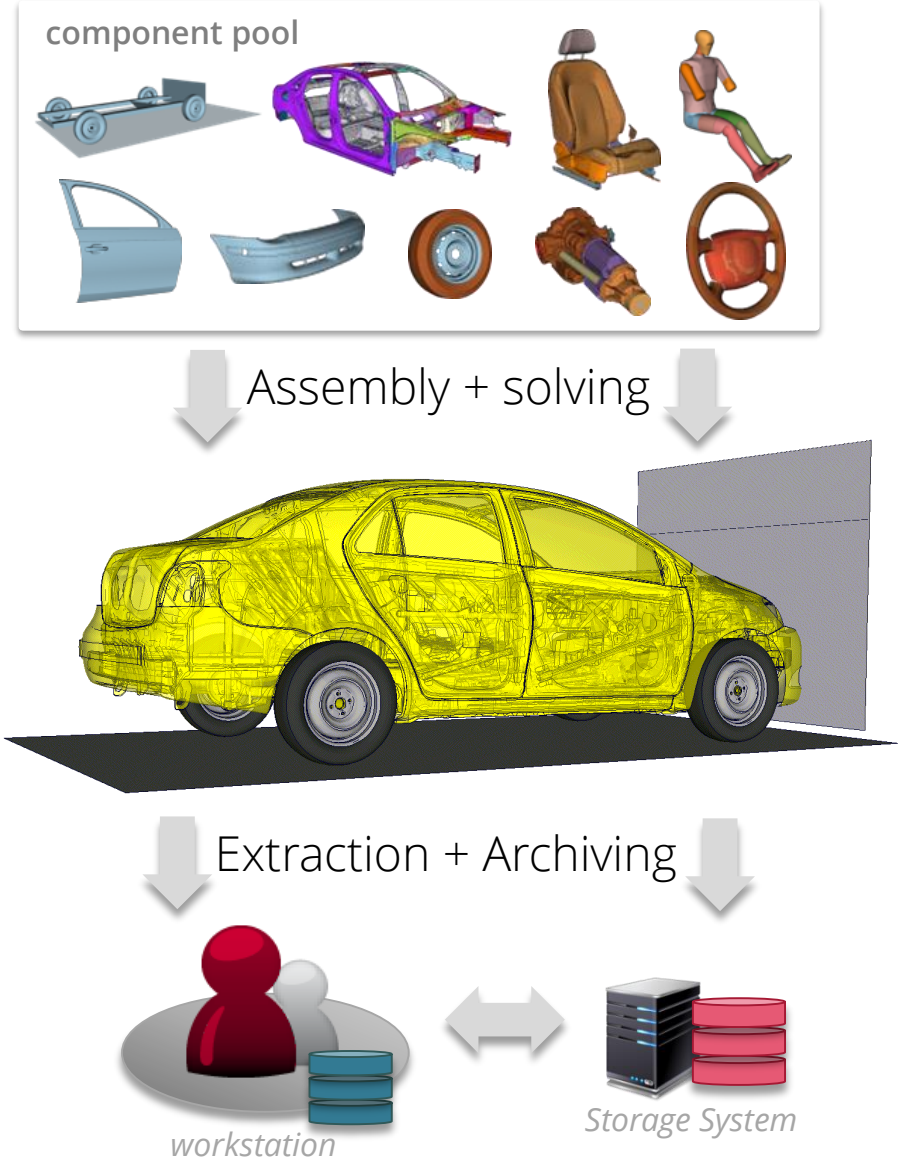
SCALE.sdm: *Assembly process*

- **Assembly input data**
  - Get assembly specific components
  - Build main input file *(template based)*
  - Run user specified scripts

- **Solving step**
  - Start solver *(locally or HPC cluster)*
  - Monitor solving process

- **Operations after Solving**
  - Run user specified scripts
  - Download results to workstation *(if solving was on HPC cluster)*
  - Upload results to LoCo-Server or other Storage System



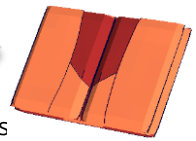
SCALE.sdm: *Multistage assembly process*

Bag folding

- Bag geometry
- Housing
- Tools
- Parameters

Folding simulations

Folded air bag



Inflate and load wheel

- Rim
- Tire
- Parameters

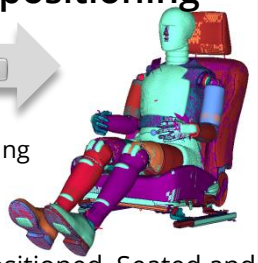
Wheel simulations

Inflated and loaded wheel

Dummy, Seat, Belt positioning

- Dummy
- Seat
- Belt
- Parameters

Preprocessing

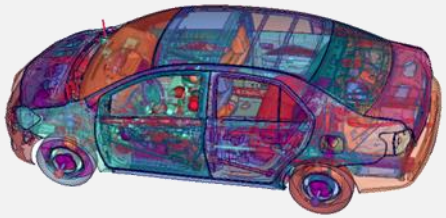


Positioned, Seated and belted Dummy

...

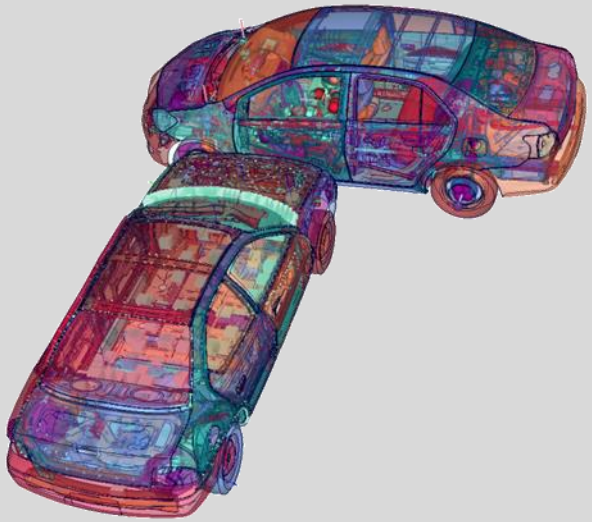
car assembly

Assembled car model



car 2 car assembly

Assembled car 2 car crash model



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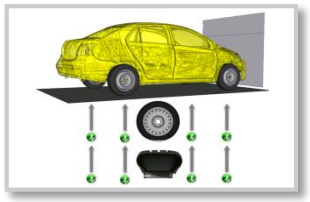

Wheel generation with Multistage Assembly

- Example overview
- LoCo setup
- Assembly processes

Summary, Conclusions and Outlook

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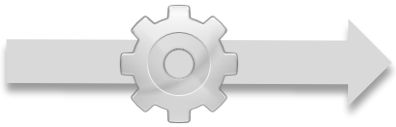
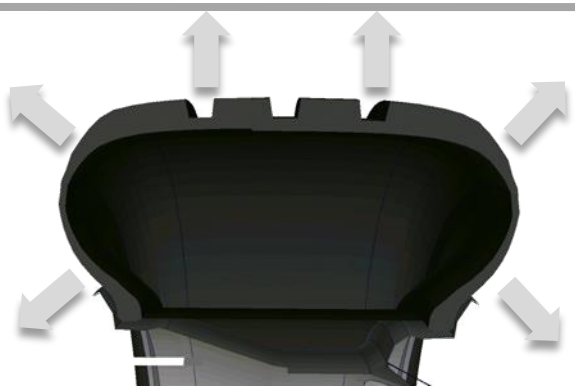
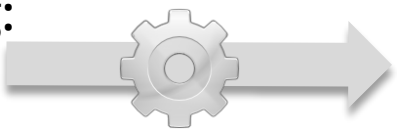
SCALE.sdm: *Wheel generation example*

- **Simulate the wheel inflation:**
  - Individual simulation;
  - Uses a rim component;
  - Uses a tire component.

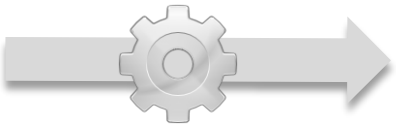


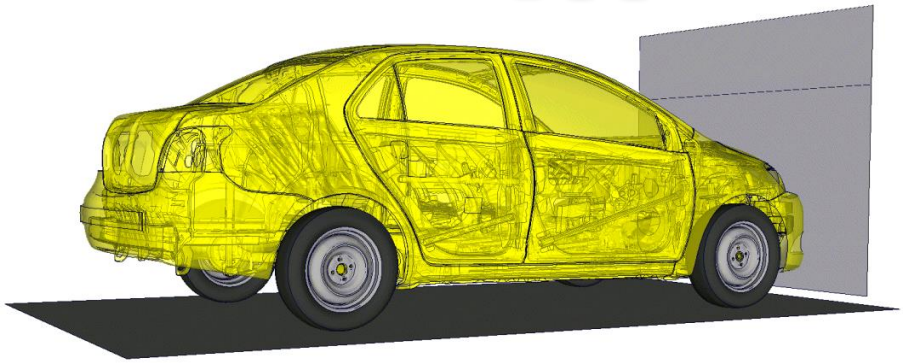


- **Simulate the wheel loading:**
  - Individual simulation;
  - Uses the inflated wheel.

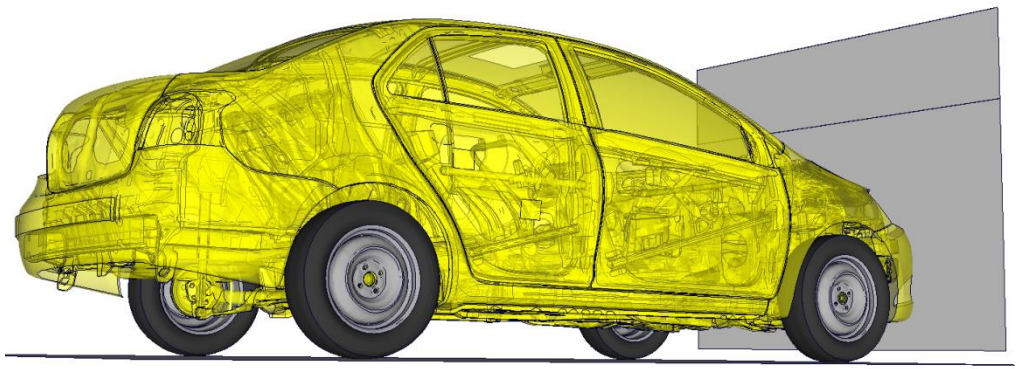


- **Inflated and loaded wheel can now be used in a car crash simulation:**
  - Individual simulation;
  - Uses 4 inflated and loaded wheels.





SCALE.sdm: *Setup in LoCo*



0335_YARIS_EuroNCAP_RW_____f_50kmh_lhd

	Rad	vo_li_loaded
	Rad	vo_re_loaded
	Rad	hi_li_loaded
	Rad	hi_re_loaded
	Rad R01	vo_li_loaded
	Rad R01	vo_re_loaded
	Rad R01	hi_li_loaded
	Rad R01	hi_re_loaded

ab_rad_2.8bar_vo_li_abpl500kg

Run Output

vo_li_loaded.R01

vo_li_loaded.inc

Import run output component...

au_rad_2.8bar_vo_li

Run Output

vo_li_pumped.R01

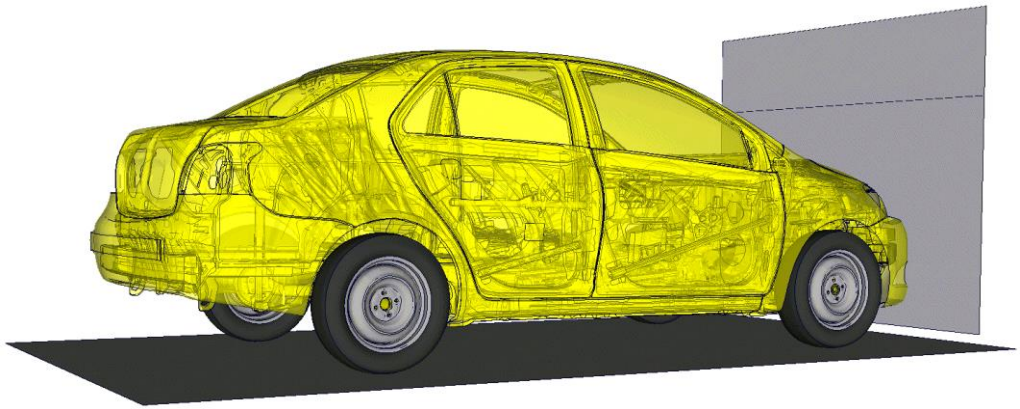
vo_li_pumped.inc

Import run output component...

_vo_re _hi_li _hi_re

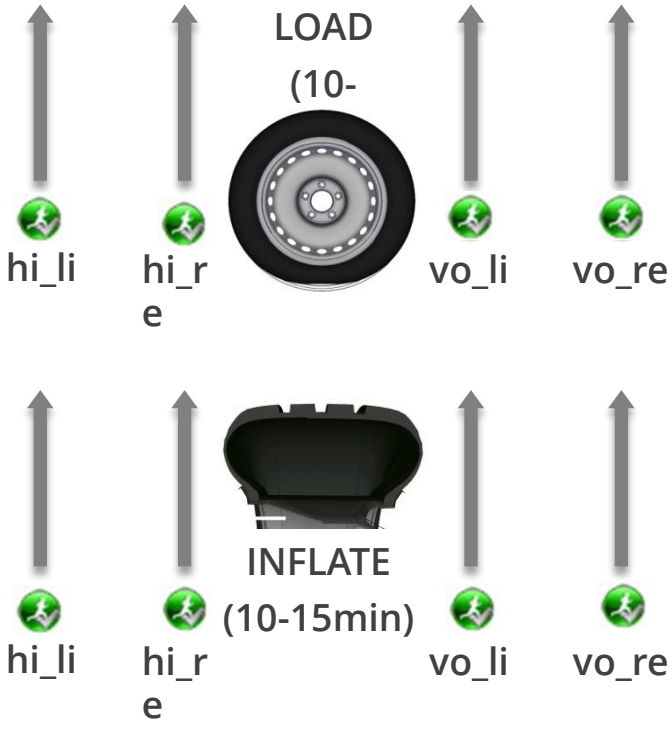
_vo_re _hi_li _hi_re

SCALE.sdm: *What happens when the car job is assembled*



- Starting car crash simulation(~10h):
  - 0335_YARIS_EuroNCAP_FW_____f_50kmh_lhd_

- requires:
  - LOAD vo_li;
  - LOAD vo_re;
  - LOAD hi_li;
  - LOAD hi_re.
- requires:
  - INFLATE vo_li;
  - INFLATE vo_re;
  - INFLATE hi_li;
  - INFLATE hi_re.



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Summary, Conclusions and Outlook

SCALE.sdm: *Summary, conclusions and outlook*

Summary:

- With multistage assembly, results from specified simulations can be automatically imported and used in further simulations
- The dependency of an imported result of a subassembly is remembered and used by LoCo
- Changes to the input of subassemblies are automatically recognized and the corresponding subassemblies are automatically carried out before the main assembly;

Conclusions:

- With multistage assembly, the run configurations and the dependencies between them have to be defined only once
- A high degree of process automation is achieved
- The steps that have to be performed by user are significantly reduced

Outlook:

- Enhanced user interface for setup of subassemblies
- Parallel running of multiple subassemblies and their corresponding simulations

Thank you for your attention!

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