



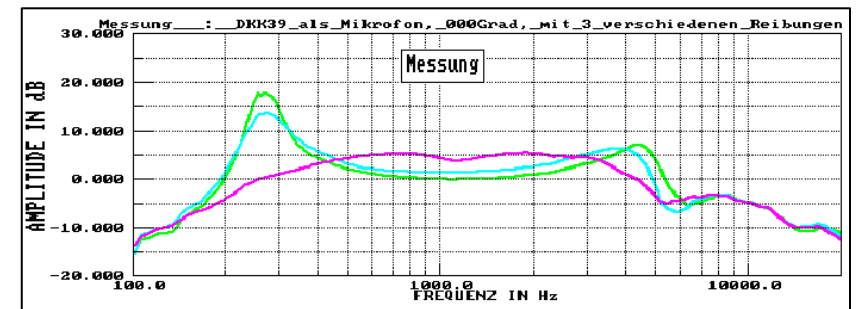
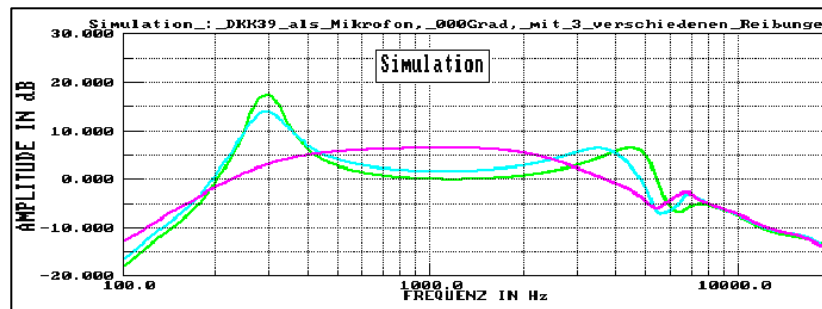
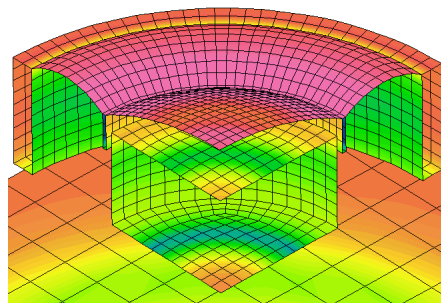
# 25 Years of Industrial Multiphysical Applications

The Journey of Evolution

- Introduction
- The Early Years – 1990s
- Getting Ready for the Industry – 2000s
- Increasing Maturity – 2010s
- Commercial Roll-out and Dissemination – 2020s
- The Next Big Thing

- Multiphysics today
  - The International Society of Multiphysics
    - <http://www.multiphysics.org/>
  - NAFEMS
    - <https://www.nafems.org/community/working-groups/multiphysics/>
- Multiphysics yesterday
  - 1992: AKG Acoustics (member of Harman International)
    - Request for FSI in acoustics for microphone simulations

**MULTIPHYSICS®**  
[www.multiphysics.org](http://www.multiphysics.org)



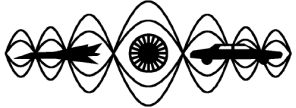
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## The Early Years – 1990s

Theory and Software Development, First Industrial Applications

- Theory and software development
  - FSI in acoustics
    - Major challenge: validation & verification



SEVENTH INTERNATIONAL CONGRESS  
ON SOUND AND VIBRATION  
4-7 July 2000, Garmisch-Partenkirchen, Germany

**A COUPLED FE/BE-METHOD FOR ELASTO-ACOUSTICS:  
FORMULATION AND APPLICATIONS**

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**FENET**

FENET is an EU-funded thematic network which involved over 110 European organisations from many key industrial sectors and was developed between 2001 and 2005. The network sought to coordinate activities within Europe aimed at improving both the quality of industrial applications of finite element technology and the level of confidence that could be placed in the computed results. The principal objective was to collate and structure existing information and to facilitate the efficient exchange of experience and knowledge within and between different EU industrial sectors.

QAIC10A, FENET Meeting Proceedings, Malta, 17<sup>th</sup> – 20<sup>th</sup> May 2005, Summary of Project Findings, 2005.

This contains the papers presented at the final meeting of the FENET project in May 2005. It is composed of individual reports from the coordinators responsible for each industrial sector, each technology area, and education and dissemination.

**Document Details**

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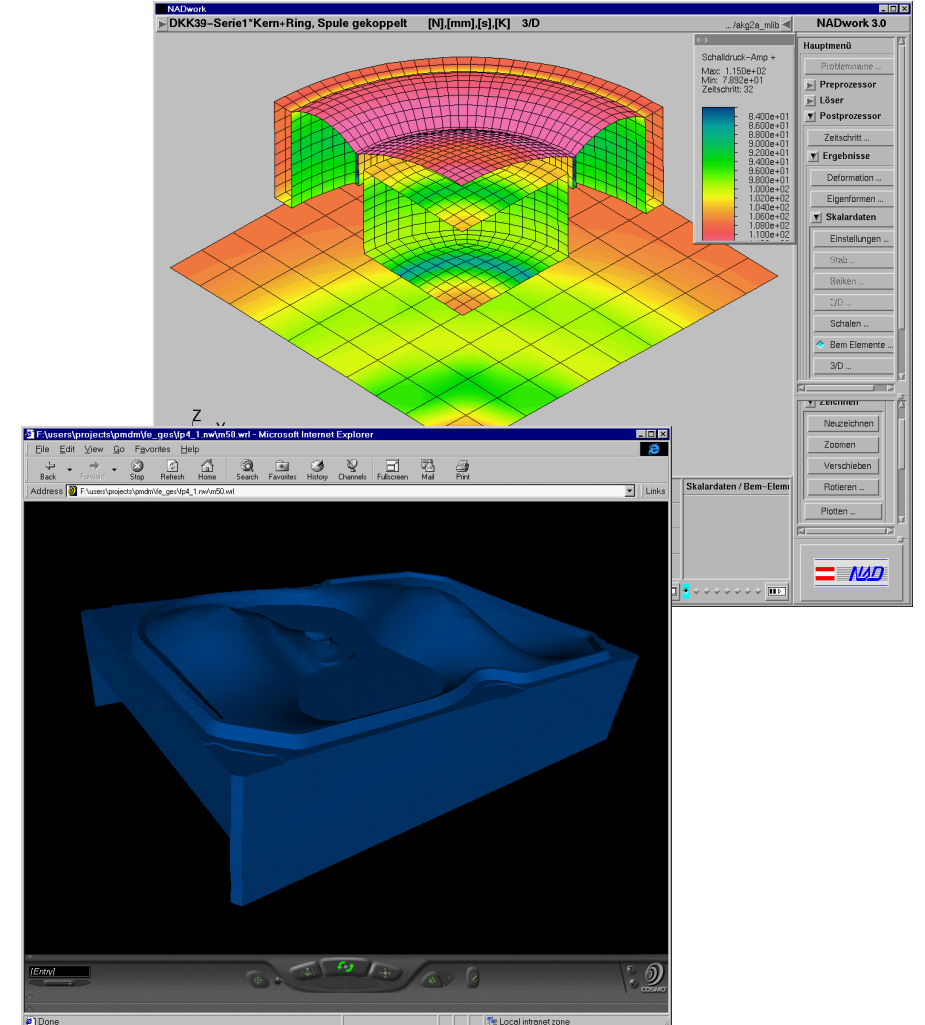
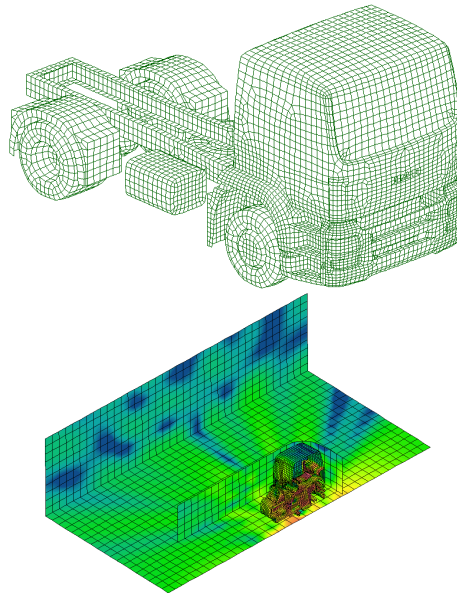
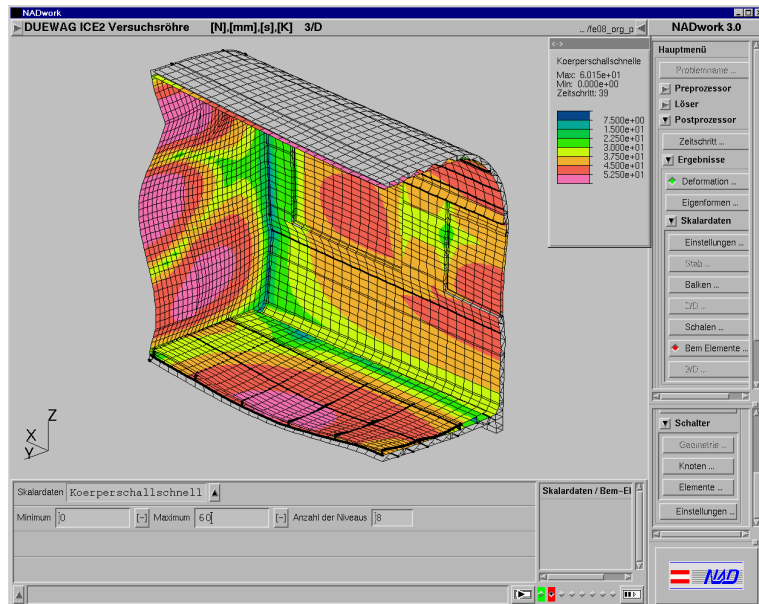


Benchmarks For Radiation and Scattering of Sound



THE INTERNATIONAL ASSOCIATION FOR THE ENGINEERING ANALYSIS COMMUNITY

- First industrial applications
  - Requirement for HPC
  - Grid computing
  - Remote computing
  - 3D Web

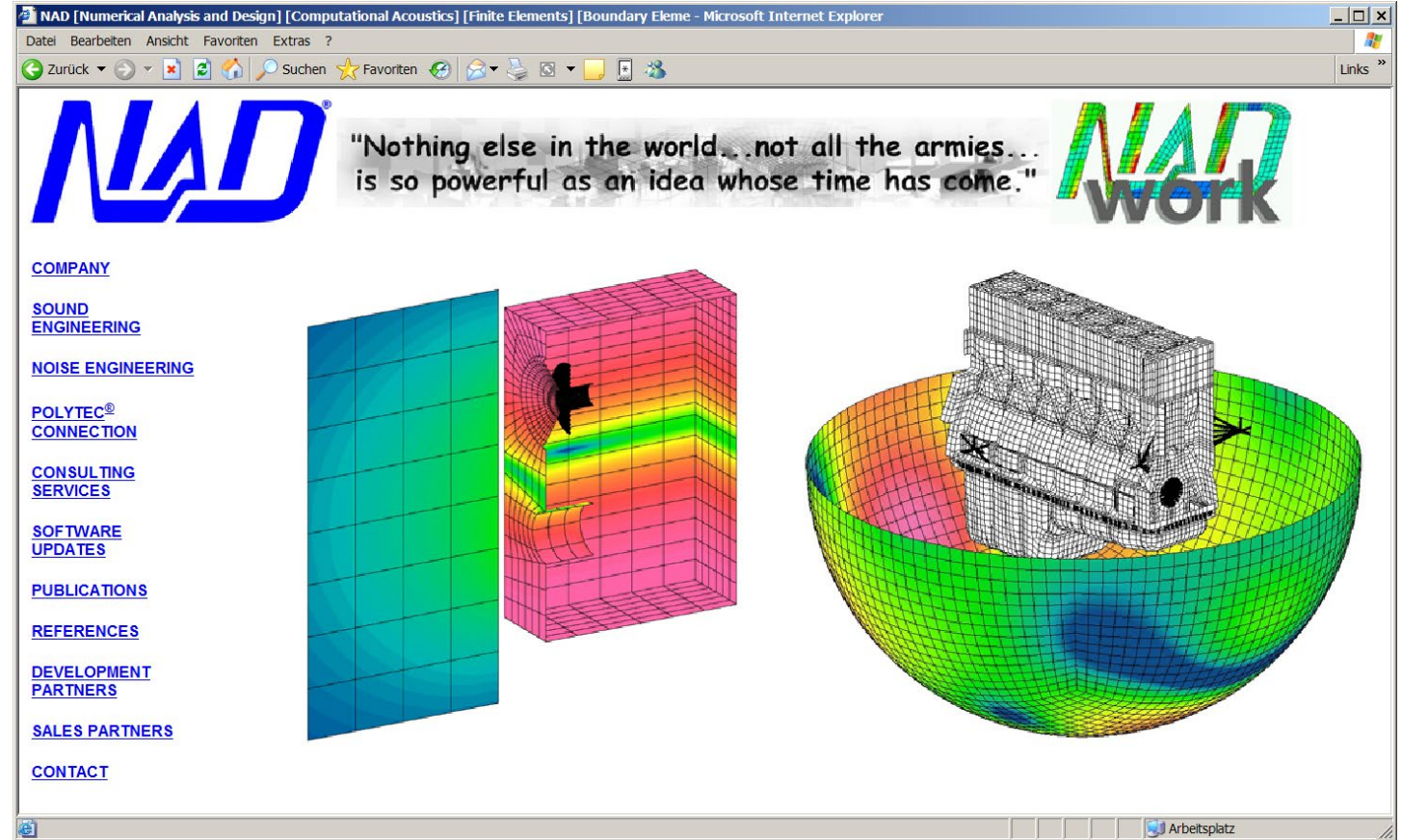
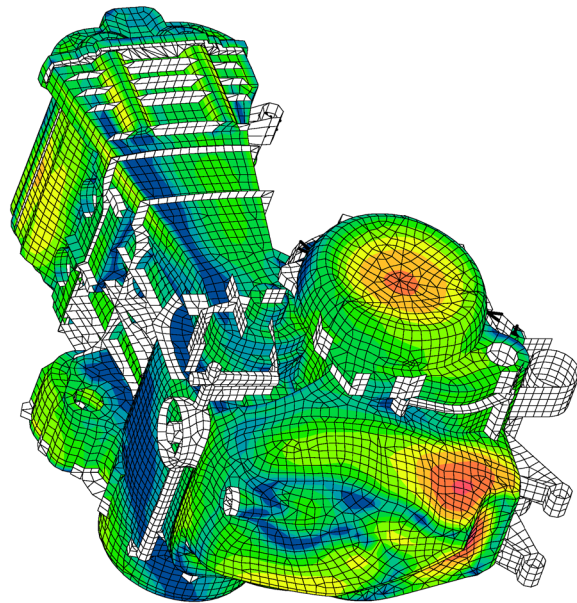




# Getting Ready for the Industry – 2000s

Noise Engineering & Audio Simulations

- Noise engineering
- Audio simulations



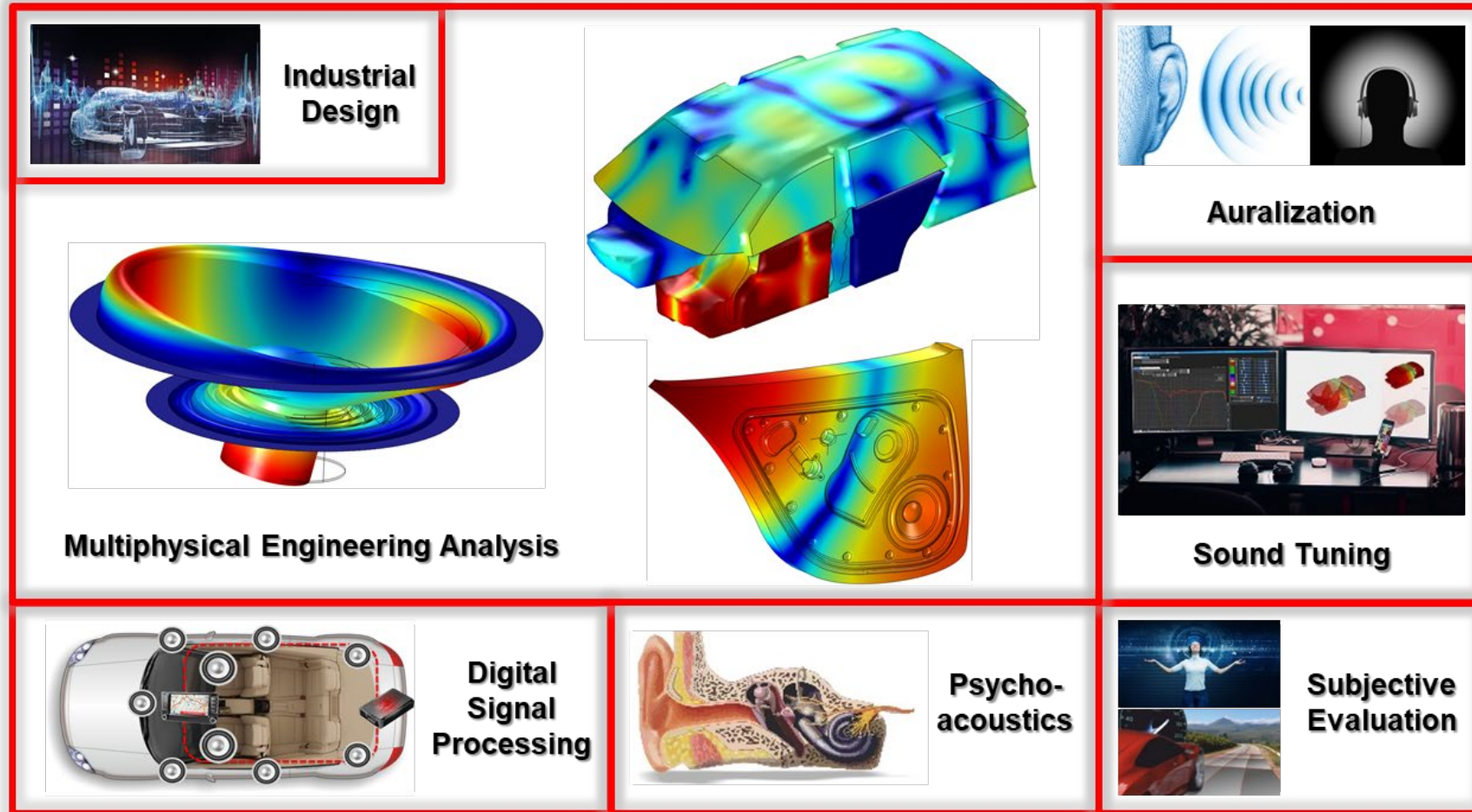




# Increasing Maturity – 2010s

The Mvoid<sup>®</sup> Simulation Process Technology

# The Mvoid® Simulation Process Technology

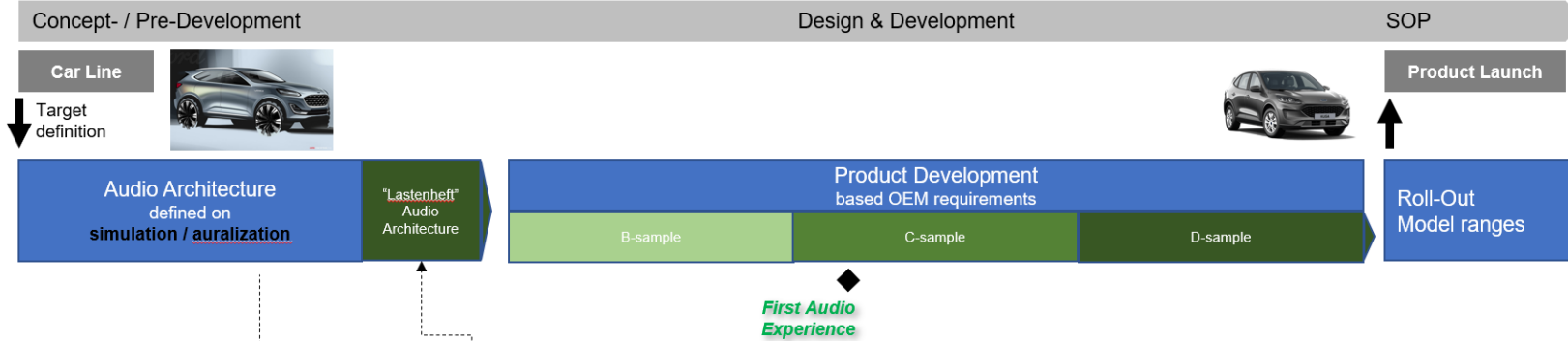




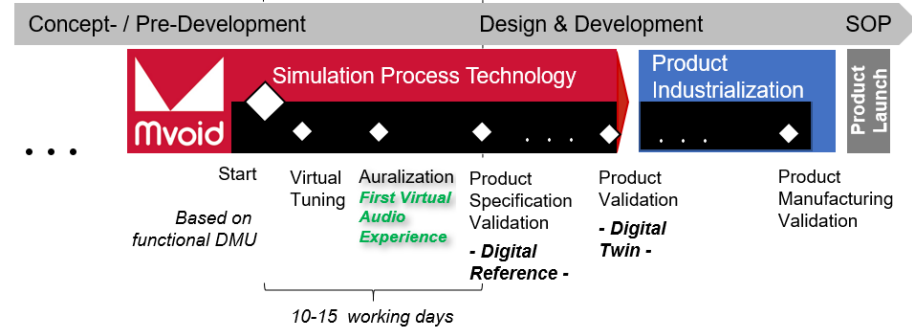
## Commercial Roll-out and Dissemination – 2020s

## Mvoid Virtual Product Development Process

### PEP based on conventional Product-Development



### PEP based on Virtual-Product-Development



#### Vision:

- Prototype free (physical) product development
- Virtual instead of physical prototypes

#### Strategy:

- Reduced prototype (physical) product development

#### Business Plan 2021

- ...

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# The Next Big Thing



# 25 Years of Industrial Multiphysical Applications

The Journey of Evolution