

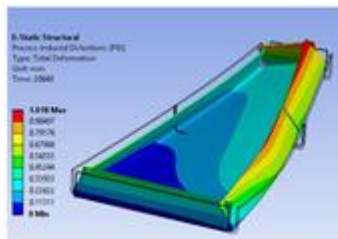
# ANSYS 19.1 Update

## Structural Mechanics

- Extended possibilities in Mechanical Pro: Bilinear plastic material behavior (eg determination of permanent deformation, load bearing behavior) [19.1]
- Advanced Possibilities in Mechanical Premium: [19.1]
- nonlinear transient dynamic analyzes [19.1]
- Process simulation with Element Birth & Death (EKILL / EALIVE) [19.1]
- Backward-Euler time integration method (eg as an alternative for quasistatic analysis in complex stability analyzes) [19.1]
- 3D-Druck Simulation (Additive Manufacturing): Simulation of the thermomechanical behavior of metallic structures during the printing process (heating, distortion, residual stresses) [19.1]

## Composites

- Mapping spatially distributed properties down to Ply level
- Mapping composite layer definitions to solid structures
- Composite cure simulation: new curing kinetics, viscous material behavior



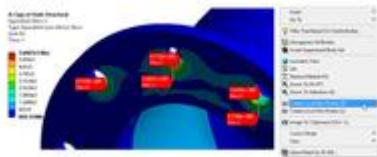
*Warpage of a CFRP structure after curing*

## External model

- Import of boundary conditions and loads
- Import from LS-DYNA \* .k-files
- Inclusion of include files from Nastran input decks [19.1]

## Handling

- Clipboard for efficient geometry selection
- Enable and disable items for process simulation
- Graphical representation of distributed material properties as a contour plot
- Automatic detection and display of local maxima / minima
- New object "Material" in the specification tree for displaying and assigning material properties [19.1]
- Definition of rod elements [19.1]
- Direct import of STL geometries [19.1]
- Additional material library by Granta Design with more than 100 materials to choose from [19.1]
- Networked Models Reflect [19.1]
- Import of workbench projects (archive), eg for assembling submodels [19.1]
- Presentation of results during the solution [19.1]
- Export animations in MP4, WMV format [19.1]



*Automatic search of local maxima and minima*

## Topology Optimization

- Consideration of inertial loads (dead weights, acceleration) and thermal loads

- Distributed computing in the network possible (via RSM)
- Multiple combination of production restrictions

## Transient dynamics

- Drop test wizards for quick analysis setup for Workbench LS-DYNA systems
- Multi-body simulation: Export of models as a co-simulation Functional Mock-Up Unit (FMU) for integration into any system simulator



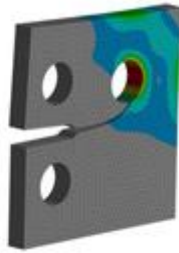
*Drop Test Wizard*

## Acoustics

- Irregular Perfectly Matched Layer as efficient radiation boundary condition for arbitrarily shaped structures
- Microphone evaluation outside the model range in the far field
- Prestressed modal and harmonic analyzes with subsequent airborne sound analysis (FSI, eg for containers under internal pressure, membrane structures, ...) [19.1]
- Structure-borne noise assessment based on harmonic analysis ("Harmonic Acoustic Analysis") [19.1]

## Fracture Mechanics

- SMART - Separating, Morphing, Adaptive and Re-meshing Technology:  
Adaptive remeshing for the static and cyclic crack propagation simulation of arbitrary three-dimensional structures



Crack progress analysis with SMART

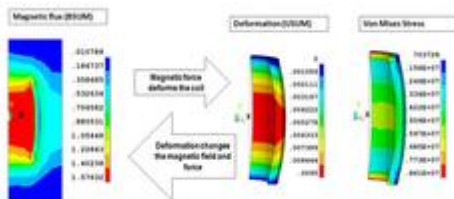
- Definition of temperature-dependent Wöhler lines [19.1]

### Nonlinear Adaptive Networking

- Support of the standard elements SOLID187 / 227
- Consideration of fluid pressure penetration in contact zones

### Coupled fields

- New mapping routine for the efficient transfer of pressures, temperatures, heat transfer coefficients from CFD analyzes to mechanical
- Mapping of force densities from transient Maxwell analysis into harmonic structure-mechanical analysis
- Efficient simulation of strongly coupled electro-magnetic-thermal-mechanical phenomena with 22X elements
- Consideration of temperature-dependent BH courses



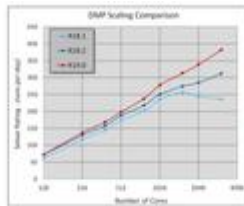
Strong interaction between magnetic fields and mechanical deformation.

## Solver technology

- Small-sliding contact as standard option for composite contact in linear analysis for efficient simulation
- Power Law Debonding Model for Mixed-Mode Delamination Analyzes
- Orthotropic coefficients of friction with fixed directions
- Backward-Euler time integration method as aid for stability tasks (bumps, kinks)

## Distributed computing

- DMP (distributed memory parallel) for block lancets in buckling analyzes
- DMP for the Substructure Generation Pass
- DMP scalable for over 3000 cores



*Use of more than 3,000 cores for structural mechanics analyzes*

## System coupling (fluid-structure interaction) [19.1]

- Command line driven workflow for setup of FSI analyzes [19.1]
- Focus on definition in the Linux environment [19.1]
- Based on new Systems Coupling 2.0 engine [19.1]
- Setup and start of the analysis outside the Workbench environment Command lines based (cmd, shell) [19.1]
- Definition of the Mechanical / CFD setups from the respective simulation environments [19.1]

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Coupled Solution

Resolving connections from coupling participants... done

Participant Build Information
-----
Participant: Flow (Flow)
  ANSYS Fluent 19.2.0, Build Year: Feb 19 2018 15:28:37, Build ID: 191, OS:
  Windows-x64
  ANSYS Workbench-Update Thread:
  Professional ANSI Software 19.2.0/1918/19181918/19181918/19181918 and
  Windows
  CPU:
  ANSYS CFX solver build: Tue Feb 20 01:14:37 2018 Release:
  solver-build-cx30-serial-optim-serial-serial-serial
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COUPLING PARAM = 1
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COUPLING PARAMETER = 1
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COUPLING PARAMETER
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Participant 1
  Model Name (N)      100      100
  Participant Elements (E) 100      75
  Participant Nodes (N) 100      100
Participant 2
  Model Name (N)      100      100
  Participant Elements (E) 95      100
  Participant Nodes (N) 100      100
Participant 3
  Model Name (N)      100      100
  Participant Elements (E) 95      100
  Participant Nodes (N) 100      100
  
```

System Coupling Console [19.1]

All information has been prepared to the best of our knowledge.  
 Information provided without guarantee.