

ANSYS Release 19.2 - Structures Update

Structural Mechanics

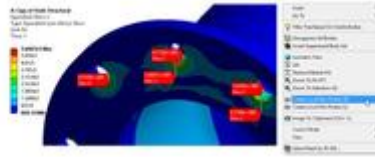
- Extended possibilities in Mechanical Pro: Bilinear plastic material behavior (eg determination of permanent deformation, load bearing behavior) [19.1]
- Advanced Possibilities in Mechanical Premium: [19.1]
- nonlinear transient dynamic analyzes [19.1]
- Process simulation with Element Birth & Death (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]

Material

- Material Designer for the simple and rapid determination of homogenized material properties for simulation at macro level [19.2]
- Kinematic hardening model for cyclic plastic material behavior in cast iron materials [19.2]
- Viscoelastic heating by cyclic loading, eg with rubber components [19.2]

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



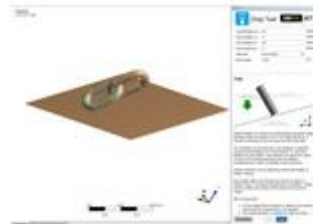
Automatic search of local maxima and minima

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
- Production restrictions with special focus on additive manufacturing processes [19.2]
- Lattice optimization for the design of lightweight structures inside components [19.2]

Transient dynamics

- Drop test wizards for quick analysis setup for Workbench LS-DYNA systems
- Support of contact definition for Workbench LS-DYNA [19.2]
- APIs for direct interaction for customization of WB LS-DYNA processes [19.2]
- Multi-body simulation: Export of models as a co-simulation Functional Mock-Up Unit (FMU) for integration into any system simulator



Drop Test Wizzard

Linear dynamics

- Component Mode Synthesis for Modal Analysis Integrated in ANSYS Mechanical Environment [19.2]

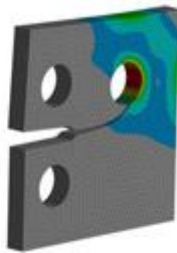
- Import of force densities from ANSYS-Maxwell over a defined frequency range [19.2]

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 new networking for the static and cyclic crack propagation simulation of arbitrary three-dimensional structures



Crack progress analysis with SMART

Fatigue [19.1]

- Definition of temperature-dependent Wöhler lines [19.1]

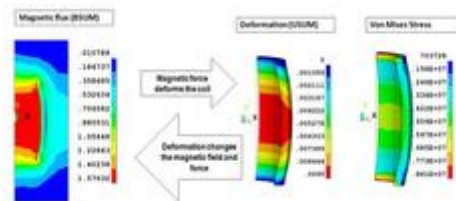
Nonlinear Adaptive Networking

- 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



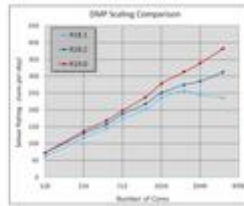
Strong interaction between magnetic fields and mechanical deformation.

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)
- Inverse analysis to determine initial states based on the deformed geometry [19.2]

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

Smoothing connections from coupling participants... done

Participant Build Information
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Fluid Flow (Fluent)
ANSYS Fluent 19.1.0, Build Year: Feb 19 2019 15:28:37, Build Id: 01, 64
Platform: Linux
SMP: Memory Mode: Thermal
Mechanical APDL Release 19.0.0SMP: 02/11/2019 11:00:00 AM
SMP
ANSYS CFX solver Build: Tue Feb 20 01:14:07 2019 02:00 64bit/64
c:\p191-14332-2019\fluent\opt\bin\win64\bin\

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| Coupling Form = 3
|
| | Source | Target |
|-----|-----|-----|
| Coupling Formulation = 3
|
|-----|-----|-----|
| PARTIAL SUMMARY
|-----|-----|-----|
| Substructure | | |
| Mesh Sets | | |
| Region Sets (N) | 100 | 100 |
| Region Elements (E) | 100 | 97 |
| Region Nodes (N) | 100 | 100 |
| Substructure | | |
| Properties | | |
| Region Sets (N) | 100 | 100 |
| Region Elements (E) | 95 | 100 |
| Region Nodes (N) | 100 | 100 |
| Substructure | | |
| Mesh Sets | | |
| Region Sets (N) | 100 | 100 |
  
```

System Coupling Console [19.1]

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