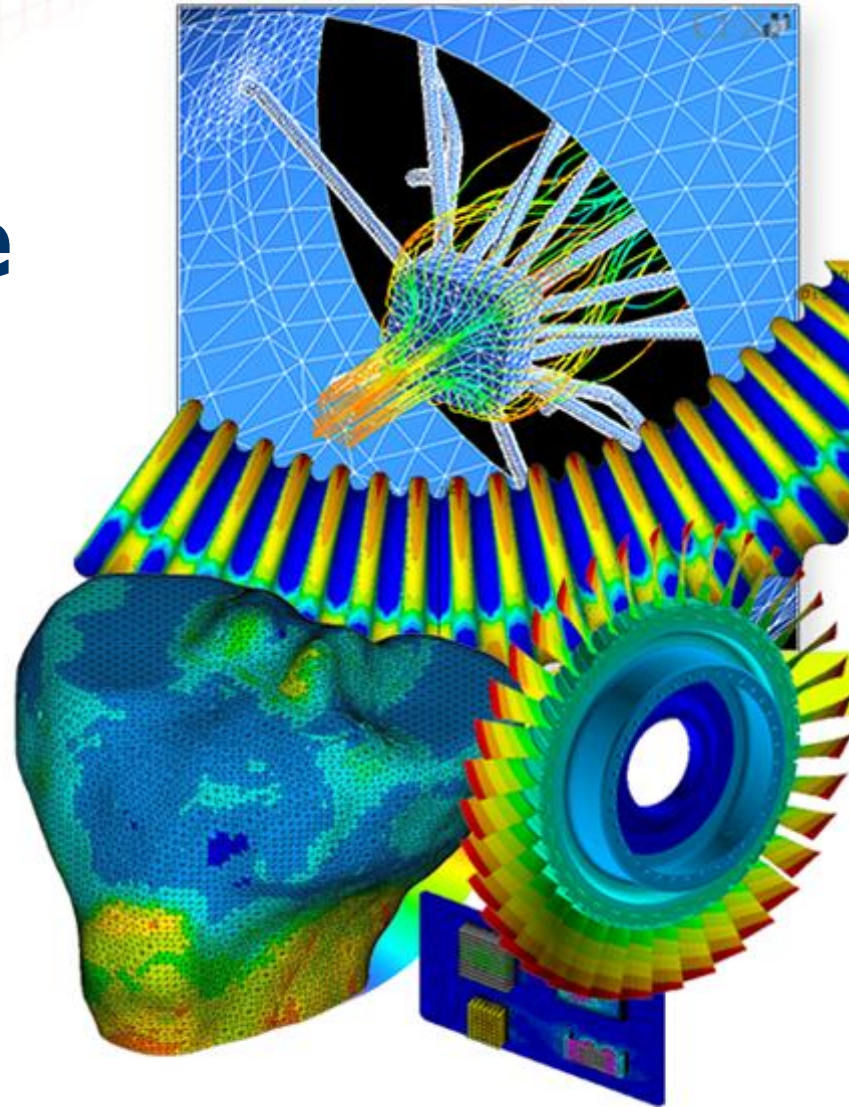


# High Performance Computing in v17.0

*Jim Kosloski*



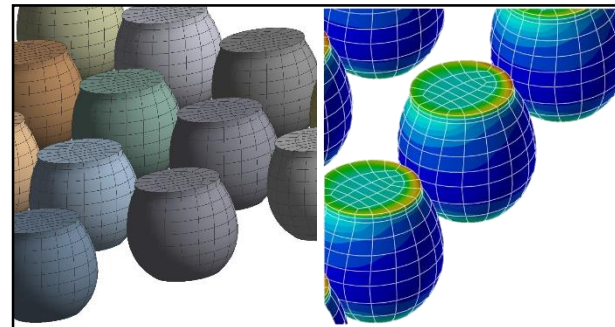
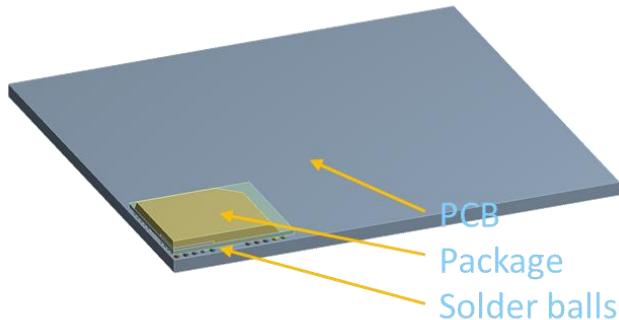
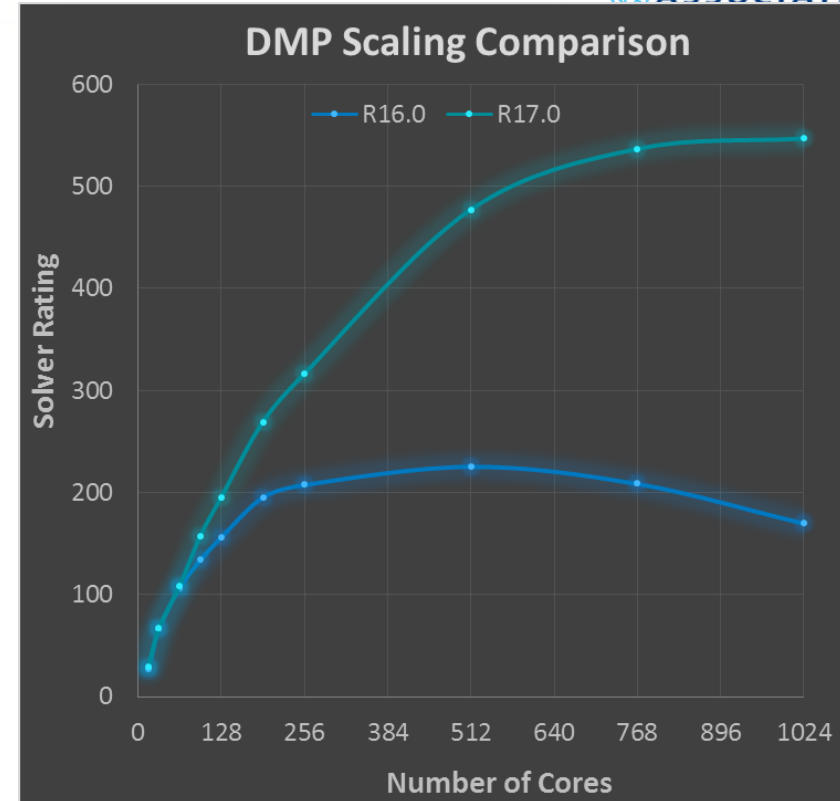
- Long analysis times means that fewer cases are run and smaller models are used
  - Hardware not fully utilized
  - Fewer design iterations
  - Less detailed investigations
- Why bother having a computer with dozens of cores if they are not utilized!
- HPC allow you to take full advantage of today's high end workstations



*Leverage all your compute resource for faster simulations*

**R17 brings faster solvers, new analysis methods and productive workflow**

- Distributed ANSYS can now leverage very large core counts >1000
- Static and transient both see unmatched performance
- Intel MPI now default

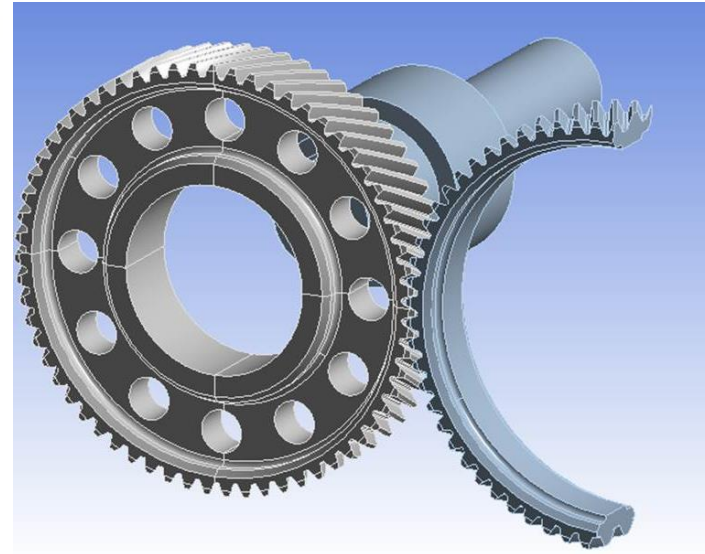


Solder balls from BGA package

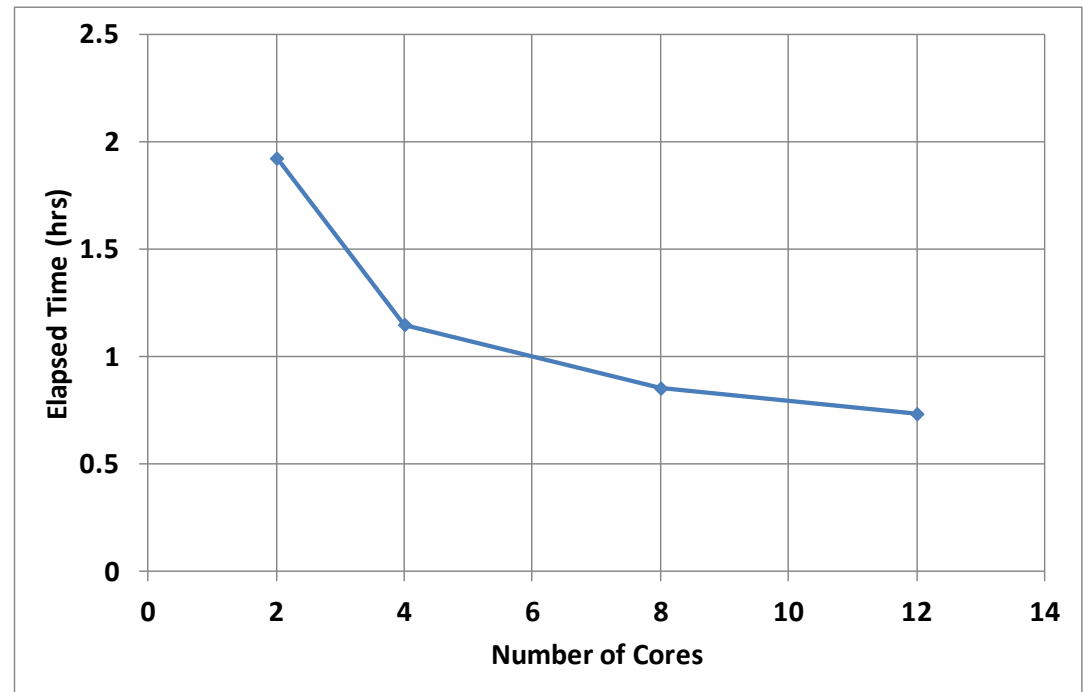
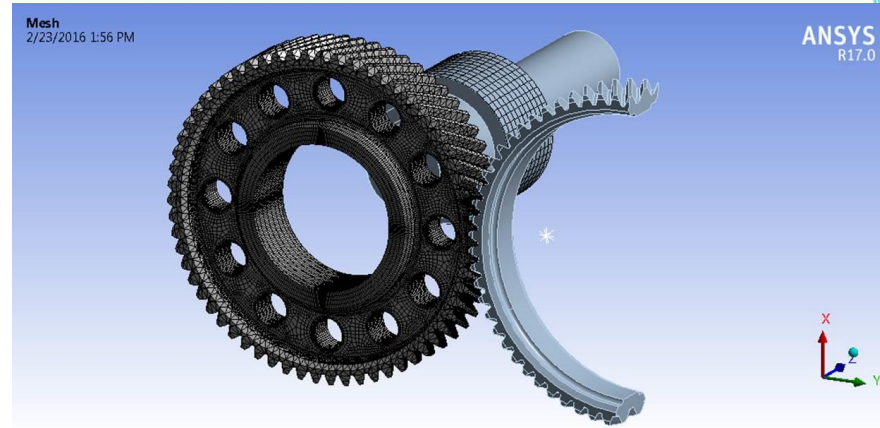
## Ball Grid Array (BGA) model

4 Million DOF  
Non linear transient  
Creep material data

- Lets look at running our demo model.
- Run on one of our desktops:
  - 32GB DDR4 RAM
  - 1 x Xeon E5-2680V3 12 core processor (2.50 Ghz)
  - Supermicro X10 Motherboard
  - 1-SSD 240GB OS Disk, 1-SSD 1TB Scratch Disk
  - Nvidia Quadro K4200 Graphics
  - \$6.6k

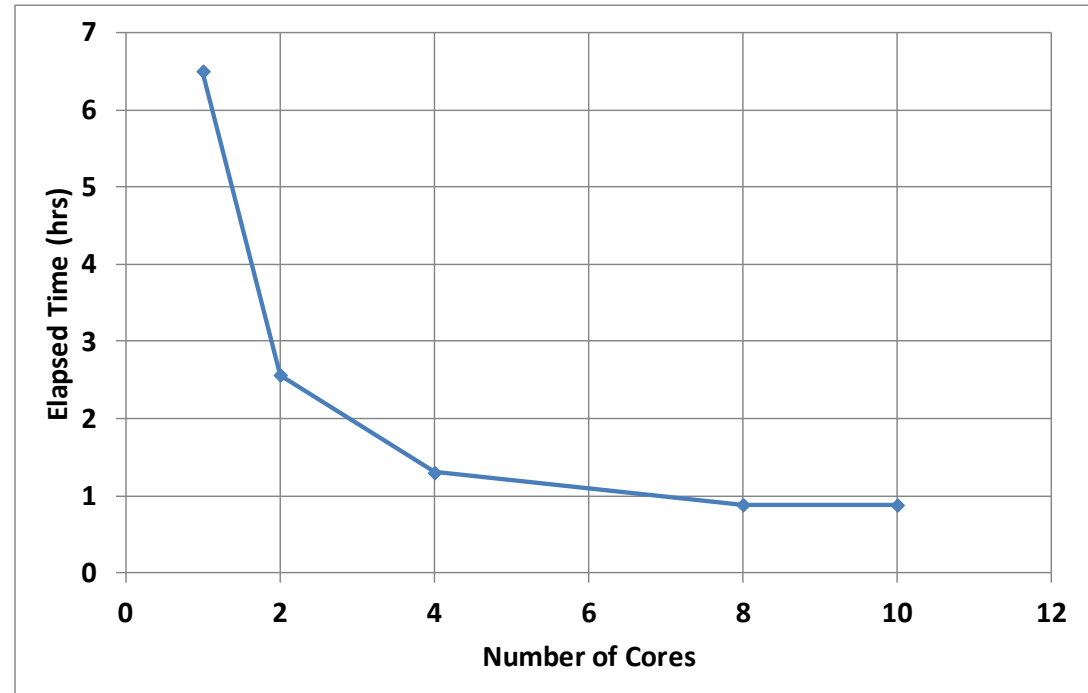


- Structural Analysis:
  - 421,057 Nodes
    - 1.25M DOF
  - 196,173 Elements
  - Contact, Large Deflection, Joints, MPC, Rigid Bodies  
  - Run distributed on 2, 4, 8 and 12 processors



- ANSYS Fluent Conjugate Heat Transfer CFD Analysis:

- 4.5M elements
- Overset mesh method, steady state, natural convection
- Run shared memory parallel on 1, 2, 4, 8, 10 processors

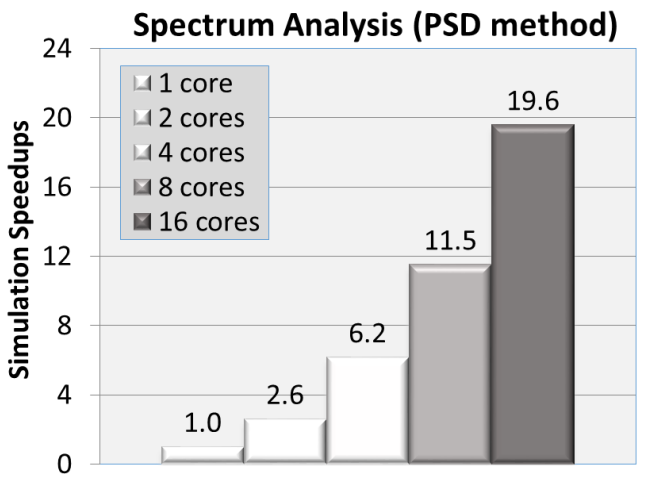
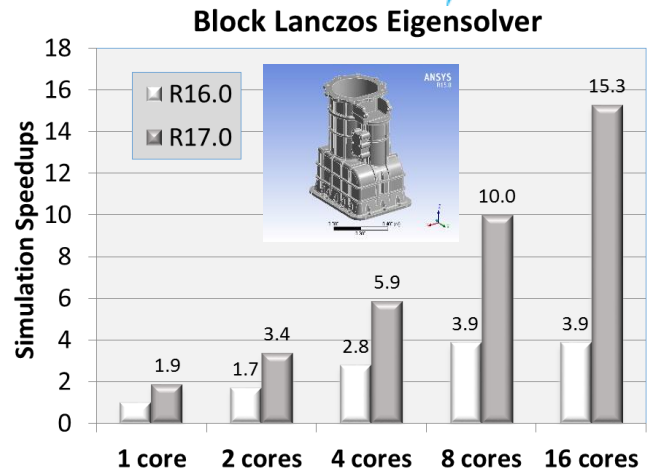
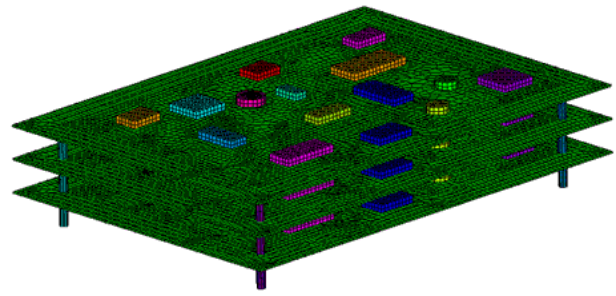


# More Solution Types Parallelized



- **NEW** Distributed Block Lanczos Solver
  - Builds on work done for R16
- PSD/Spectrum Analyses Fully Parallelized
- Entire Linear Dynamics Workflow now fully parallelized
  - All distributed solves, no SMP

- Greater than 10x speed-up



- The following cards are supported:
  - NVIDIA Tesla series (any model)
  - NVIDIA Quadro K5000
  - NVIDIA Quadro K5200\*
  - NVIDIA Quadro K6000
  - NVIDIA Quadro M6000\*
  - Intel Xeon Phi 7120
  - Intel Xeon Phi 5110
  - Intel Xeon Phi 3120
  
- \* New at v17.0!



- **Sparse Solver Enhancements**

- The performance of the shared memory sparse solver has been enhanced.
- For analyses that include unsymmetric matrices, the solver performance can be up to 60 percent faster than the previous release regardless of the processor hardware used.
- The scalability of the sparse solver has been significantly improved when used in Distributed ANSYS. For solutions that use eight or more cores, the solver performance can be up to 50 percent faster than in the previous release.

- **PCG Solver Enhancements**

- The PCG solver now supports unsymmetric matrices when solving single-field thermal analyses. Both static and full transient analyses are supported in this situation.
- Also, the PCG solver now supports thermal transient analyses involving the Quasi method (THOPT,QUASI).