

CONVERGE™ CFD software was developed to increase both accuracy and productivity for internal combustion engine analysis

CONVERGE™ automatically generates a high quality orthogonal mesh at runtime using a patented cut cell technique, thus eliminating all user meshing time

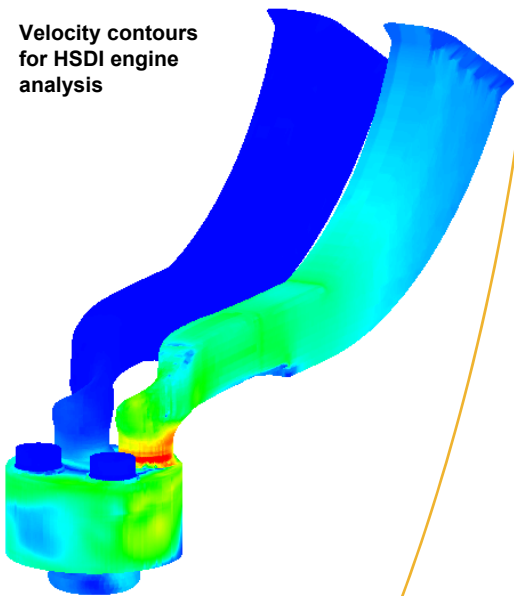
CONVERGE™ provides many options to assure that mesh resolution is added when and where it is needed

CONVERGE™ is loaded with the physical models needed to accurately simulate Diesel, spark ignited and HCCI engines

CONVERGE™ runs great in parallel

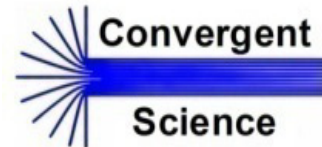
Call Convergent Science today to learn how you can increase your accuracy and productivity using CONVERGE™

Velocity contours for HSDI engine analysis

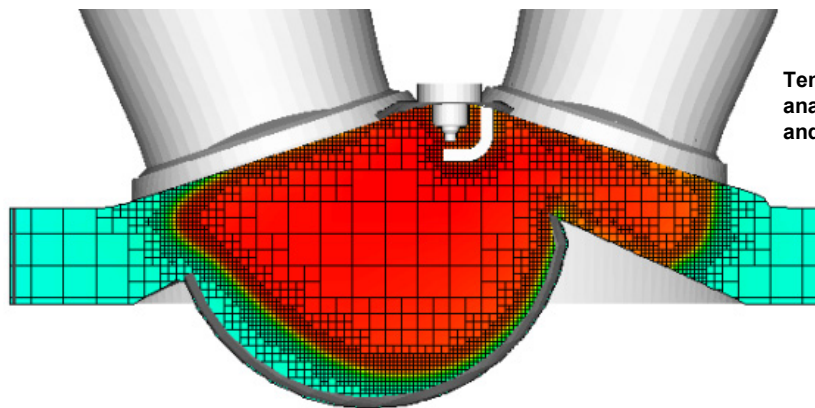


Convergent Science Inc.

CFD Software and Consulting Services
Experts in Engine CFD Analysis



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Temperature contours for SI engine analysis using detailed chemistry and adaptive mesh refinement (AMR)

Use CONVERGE™ CFD Software for In-Cylinder Spray and Combustion Analysis and Never Make a Mesh Again

Convergent Science has developed the next generation CFD code, CONVERGE™, to increase both productivity and accuracy of engine analysis. Convergent Science sells and supports CONVERGE™ to engine manufacturers and also utilizes this tool for consulting endeavors.

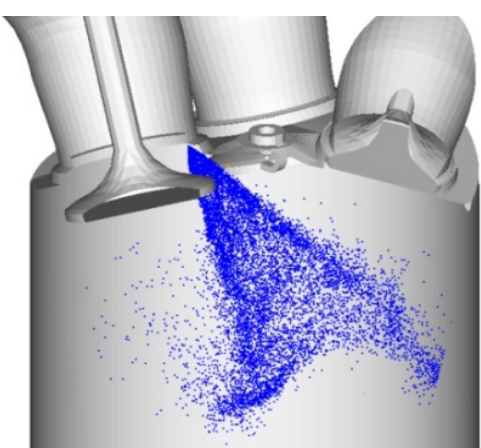
If you're thinking engine CFD, think Convergent Science, the experts in engine CFD analysis.

CONVERGE™ PREPROCESSOR

With the CONVERGE™ CFD toolkit, the engine surface is imported into the preprocessor. Here, any CAD problems are repaired and unique boundaries are flagged. The surface definition is then exported. At no point does the user spend any time creating a mesh.

Removing the meshing bottleneck allows for improved productivity, grid refinement studies, and quick and easy geometry changes.

CONVERGE™ is the code of choice for engine CFD.



In-Cylinder Spray and Combustion CFD Analysis Has Never Been Faster, Easier and More Accurate

The CONVERGE™ Advantage

CONVERGE™ was written with the specific goal of making engine CFD analysis quick, easy and accurate. There are many technology advantages of the CONVERGE™ approach:

- No user meshing time
- Internal cells remain stationary
- Orthogonal mesh elements
- Base grid size is specified in an input file allowing for quick and easy grid refinement studies
- Adaptive mesh refinement (AMR) automatically enhances the mesh resolution based on gradients
- Grid embedding allows the user to specify the appropriate mesh density when and where it is needed
- Original surface definition is always maintained
- Meshes are made automatically at runtime for any geometry of interest including irregular piston bowls, spark plugs, closely spaced valves, pre-chambers, etc.

Other CFD codes boast *semi-automated* meshing. With CONVERGE™, there is *no meshing*.

Traditional CFD codes require the mesh to be made prior to the CFD analysis. This approach has many disadvantages:

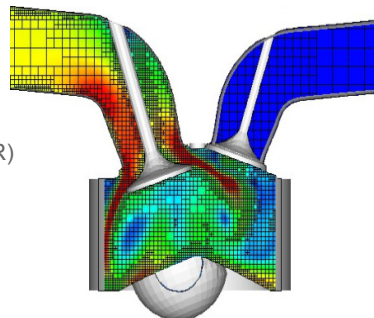
- Meshing requires significant levels of time and expertise
- The appropriate mesh density has to be assumed
- Moving zones often result in low quality skewed mesh elements and solver crashes
- Numerical errors are intrinsically associated with a moving mesh
- Grid independence studies are difficult to accomplish

The meshing technology breakthroughs available in CONVERGE™ eliminate the above drawbacks plaguing traditional CFD codes.

With the meshing bottleneck removed, engineers can spend time designing engines instead of making grids

An Arsenal of Physical Models at Your Disposal

CONVERGE™ comes standard with a rich set of physical models which can be used to simulate any IC engine of interest. CONVERGE™ is fully customizable and user models can be implemented if desired.



The SAGE detailed chemistry solver, developed by Convergent Science, allows for kinetically limited phenomena such as ignition, knock and pollution formation, to be predicted with astonishing accuracy and speed. SAGE is ideally suited for HCCI analysis.

“ What took days or even weeks in traditional CFD codes can now be done in hours with CONVERGE. By eliminating the use of a moving and deforming tet mesh, accuracy has increased as well.”



Increase Productivity

- No user meshing time
- Parallel speedup
- Handle all geometry types
- Handle moving parts automatically



Increase Accuracy

- Orthogonal mesh
- Adaptive mesh refinement
- Grid scaling & embedding
- Perform grid resolution studies without making any meshes



Key Physical Models

- SAGE detailed chemistry solver
- Advanced turbulence (including LES)
- Spray break-up
- Droplet collision and coalescence
- Ignition
- Combustion suite
- Wall film
- Genetic algorithm for optimization studies
- User routines for custom model implementation

