

VECTIS 2017.1 New Features

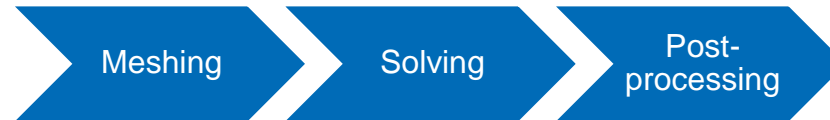


What is VECTIS?

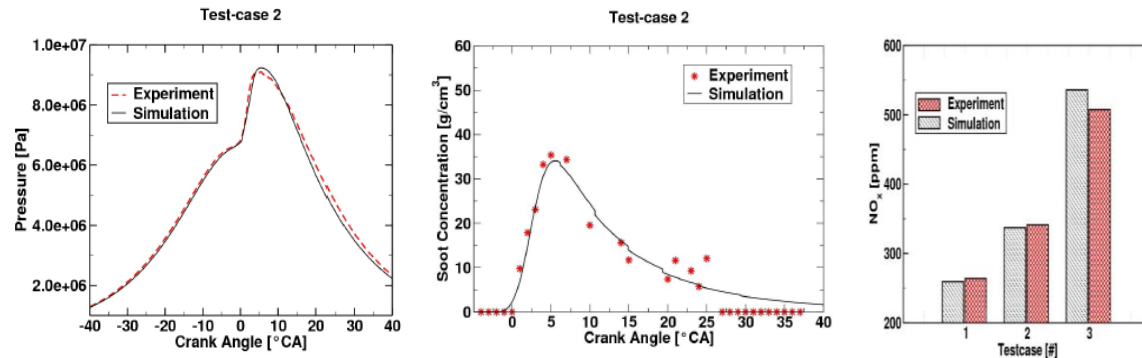


VECTIS is a three-dimensional fluid dynamics software for the analysis of internal combustion engines and vehicle applications

- Is a complete toolset designed for the engineer, to provide a robust process from beginning to end of the simulation process



- Advanced engineering knowledge built-in, with validation on hundreds of Ricardo programmes



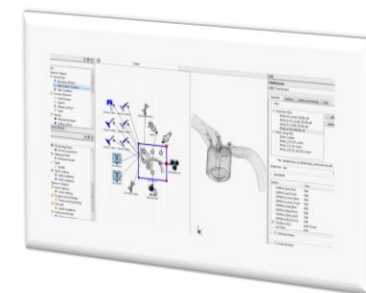
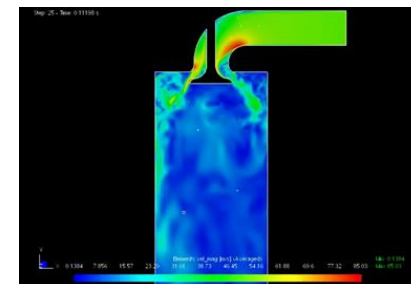
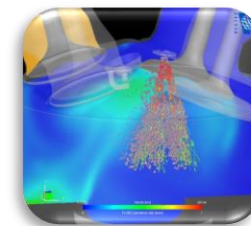
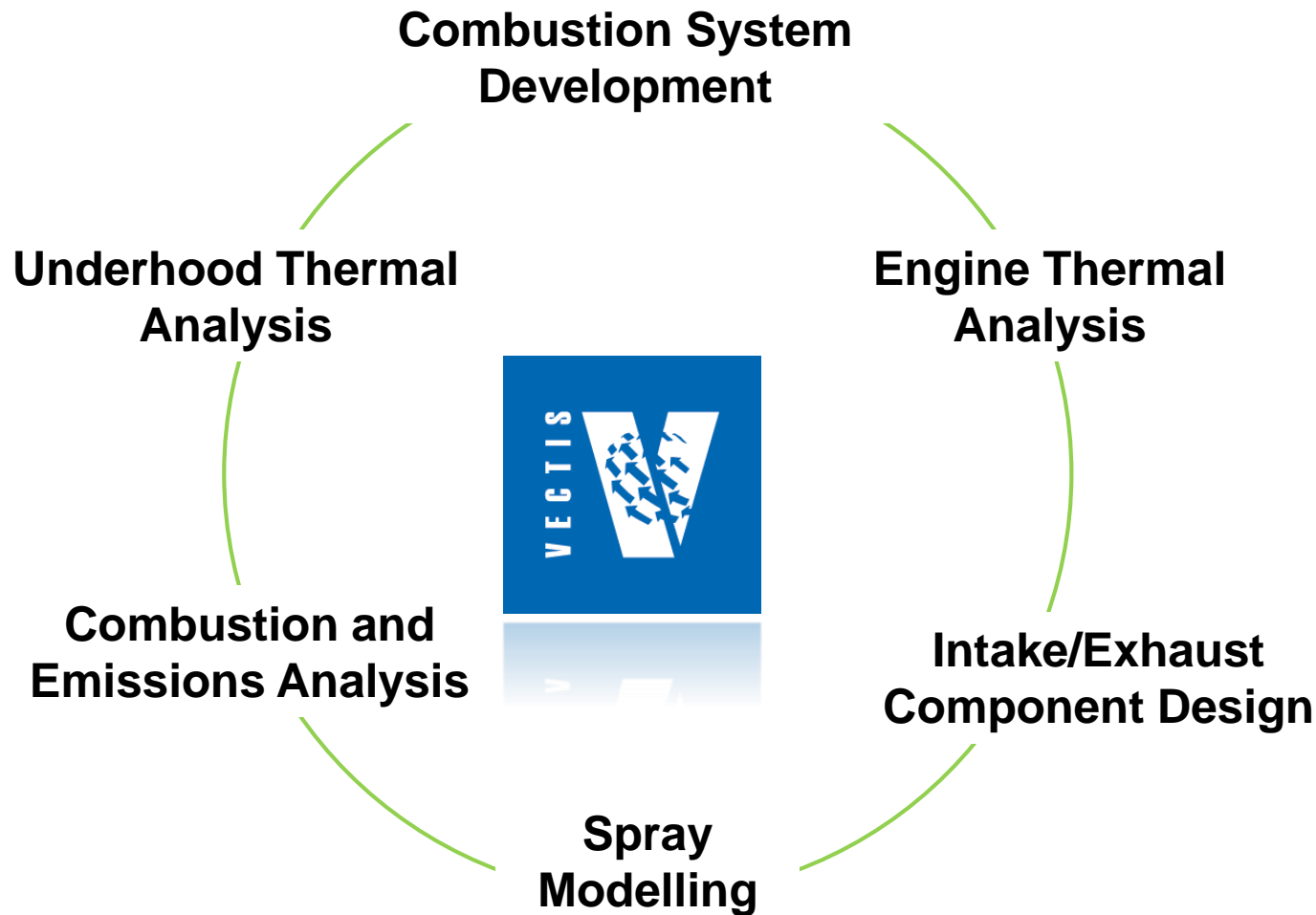
Process Efficiency

Robustness

Speed

Engineering Expertise Built In

VECTIS is our 3D CFD analysis tool for in-cylinder combustion and emissions analysis and underhood thermal performance

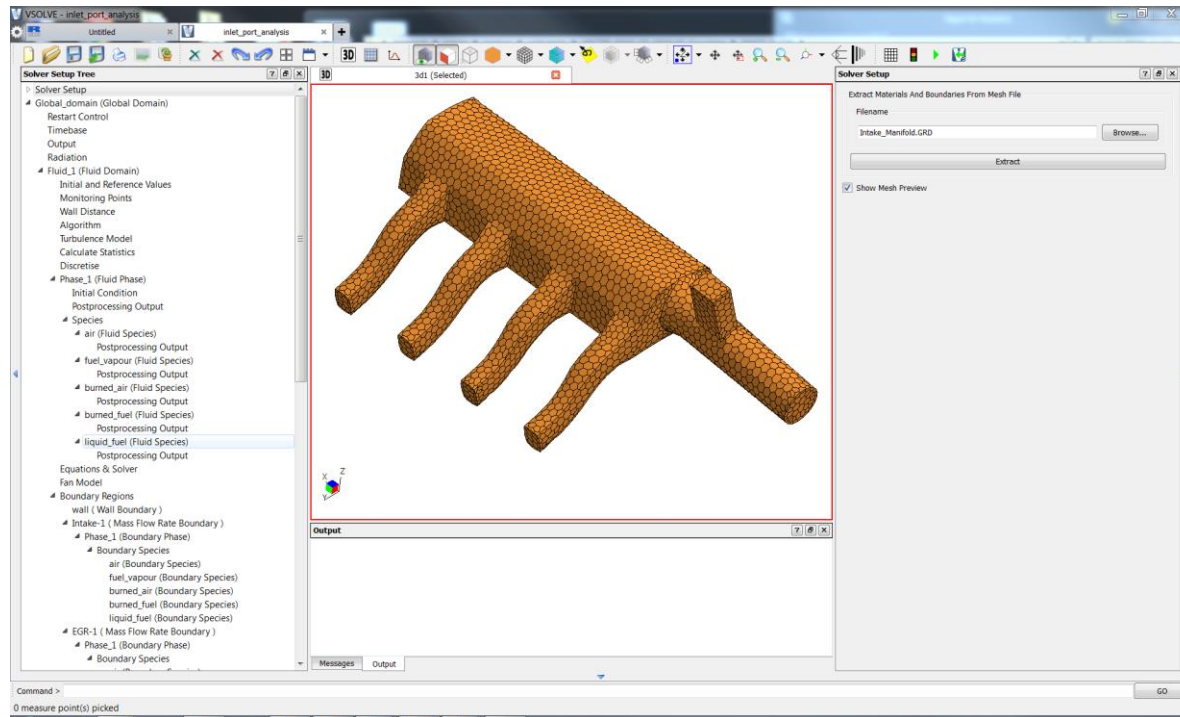


Coupling VSOLVE with GT-Power

flexibility



- First release of VSOLVE-GT – Power coupling
- New tutorial included with the release.

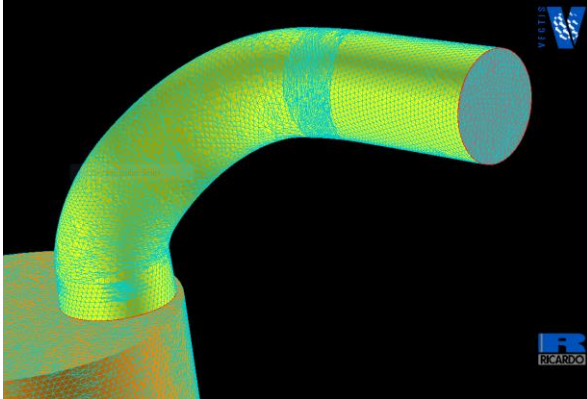


Improvements to geometry auto-stitching and hole capping

usability and speed



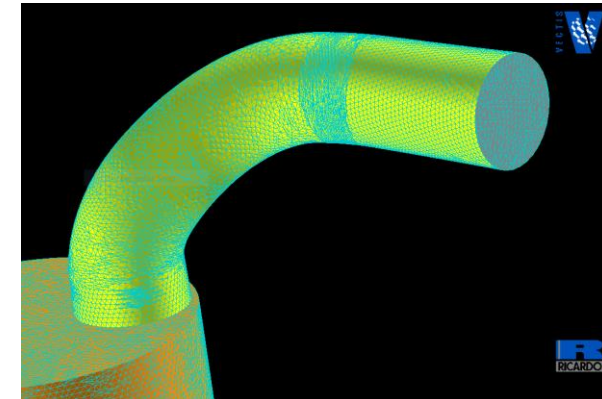
- Applied to PHASE1 and also available via batch mode in VMESH



```
E:\VEC_CAD\STL_Export_NX>vmesh -autostitch Complete.tri
----- VMESH 2018.1b1 Build 116739 -----
AUTOSTITCH TOOL
- try to read file Complete.tri ... successfully read
- detect unstitched edges and try to stitch them
  256 actions were proposed by AutoStitch tool to stitch edges
- apply proposed actions
  Used tolerance: 0.002200
  Number of proposed merges of vertices: 256
  Number of proposed moves of vertices: 0
  Number of proposed splits of triangles: 0
- file Complete_autostitch.tri has been successfully written

Total time elapsed: 0.8 seconds

SUCCESSFULLY DONE
```



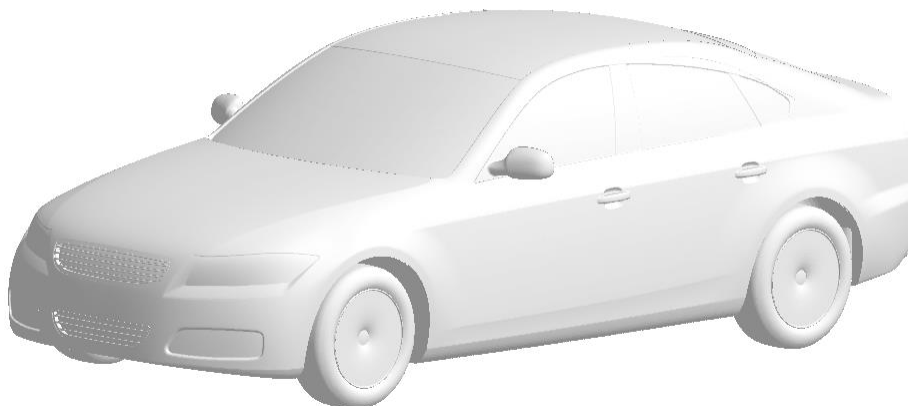
- Allows Automation CAD to meshing via batch.

Improvements for under-hood simulations

flexibility, usability and speed



- Memory allocation for large model (>100 million cells)
- Meshing speed improvements
- Improved CGNS file import
- Improve surface sensor in VSOLVE – Faster, more accurate

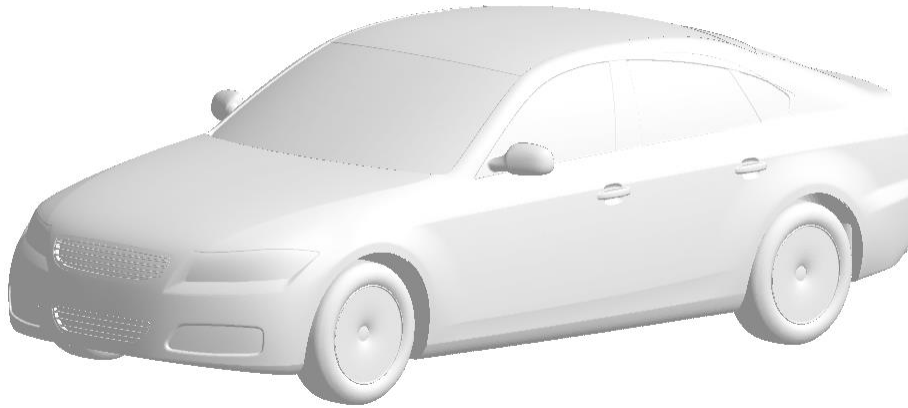


Improvements for under-hood simulations

usability and speed



- Improve surface sensor in VSOLVE – Faster, more accurate
- VSOLVE user function
 - Access functions for
 - Sub-domains
 - Sub-models
 - Fans
 - Run Control

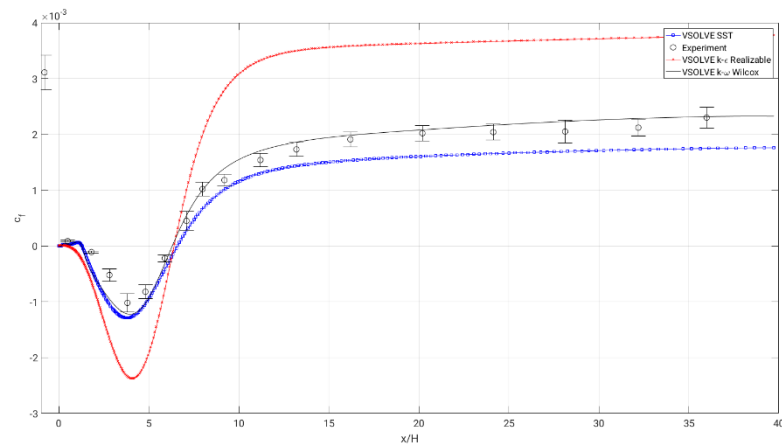
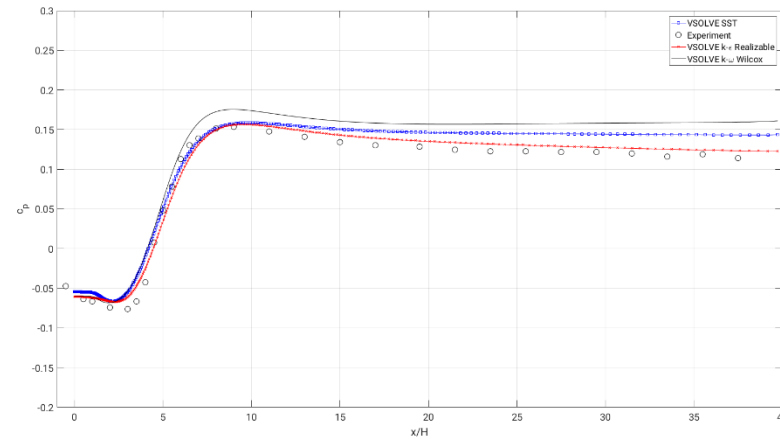


VSOLVE improvements

usability and capability



- New Turbulence models in VSOLVE
 - K-Omega and K-Omega SST implemented
- Mass flow ramped boundary condition in VSOLVE
 - Ramp up boundary conditions over a user defined time period or number of iterations



In-cylinder analysis

Combustion model improvements

usability and capability



- User defined turbulent Schmidt number
- Re-initialization mechanism for G-Equation
- Enhance Livengood-Wu model for multi-injection combustion
- Maly's strain-correction for turbulent flame speed added to the DDPIK spark model
- Blending of Dynamic DPIK model between high temperature plasma and thermodynamic values

In-cylinder analysis

Combustion model improvements

usability and capability



- Flame generator tool enhancements
- Extended species output from LOGE libraries
- Enhancements to data output
 - Additional scalars to post file
- Laminar flame speed from input tables (Need LOGE flame generator for this)
- User access for Turbulent flame speed (Kolla example)
- Post Flame combustion model for quenched gases
- Improved Non-Isothermal wall functions
 - User defined Non-Isothermal wall function
 - Angelberger Non-Isothermal wall function

In-cylinder analysis

Spray model improvements

- Improved stability of port injection flows with wall film deposition
 - User friendly spray diagnostics
 - New Spray data output file
-
- Enhance arbitrary surfaces to extract droplet data
 - Liquid mass flow rate (total/step)
 - Evaporated mass flow rate (total/step)
 - Data written to new output file

usability and capability



User-defined spray penetration ☒

Liquid mass fraction

Resolution

Hole-specific values ☒

User-defined vapour penetration ☒

Vapour fraction

Hole-specific values ☒

Edit

Label Surface Droplet Sensor_1

Properties

Surface file

Variables

☒ Droplet number per step

☒ Droplet number total

☒ Evaporation mass flow rate per step

☒ Evaporation mass flow rate total

☒ Evaporation mass fraction per step

☒ Evaporation mass fraction total

☒ Liquid surface per step

☒ Liquid surface total

☒ Mass flow rate per step

☒ Mass flow rate total

☒ Parcel number per step

☒ Parcel number total

☒ Sauter Mean Diameter per step

☒ Sauter Mean Diameter total

☒ Droplet Size Distribution Per Step

☐ Single fuel

D_{min}

Width

Number of Bins

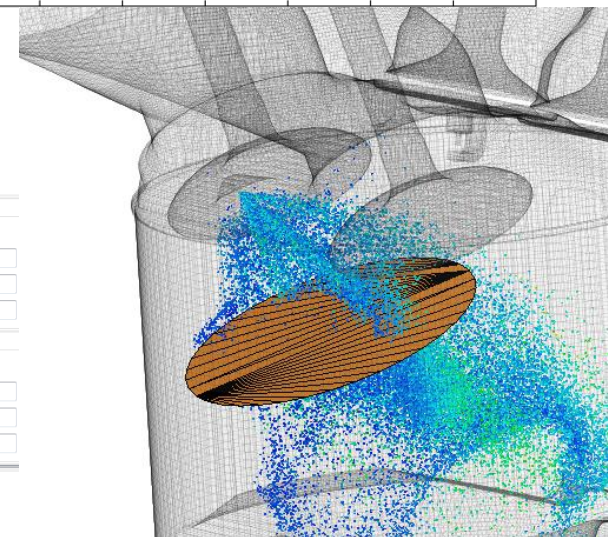
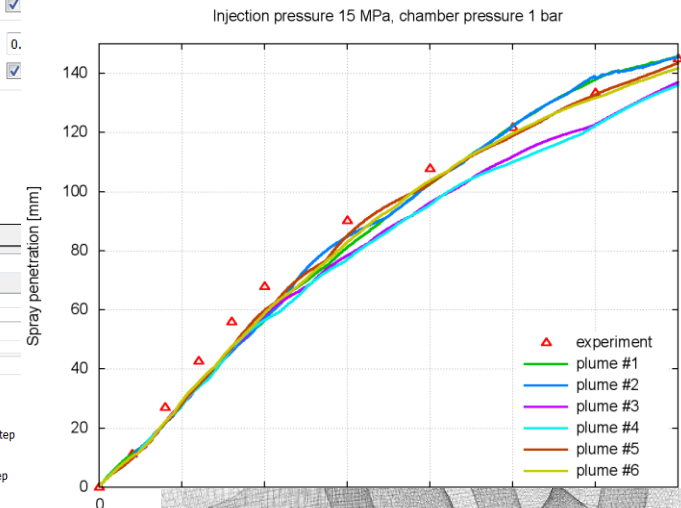
☒ Droplet Size Distribution Total

☐ Single fuel

D_{min}

Width

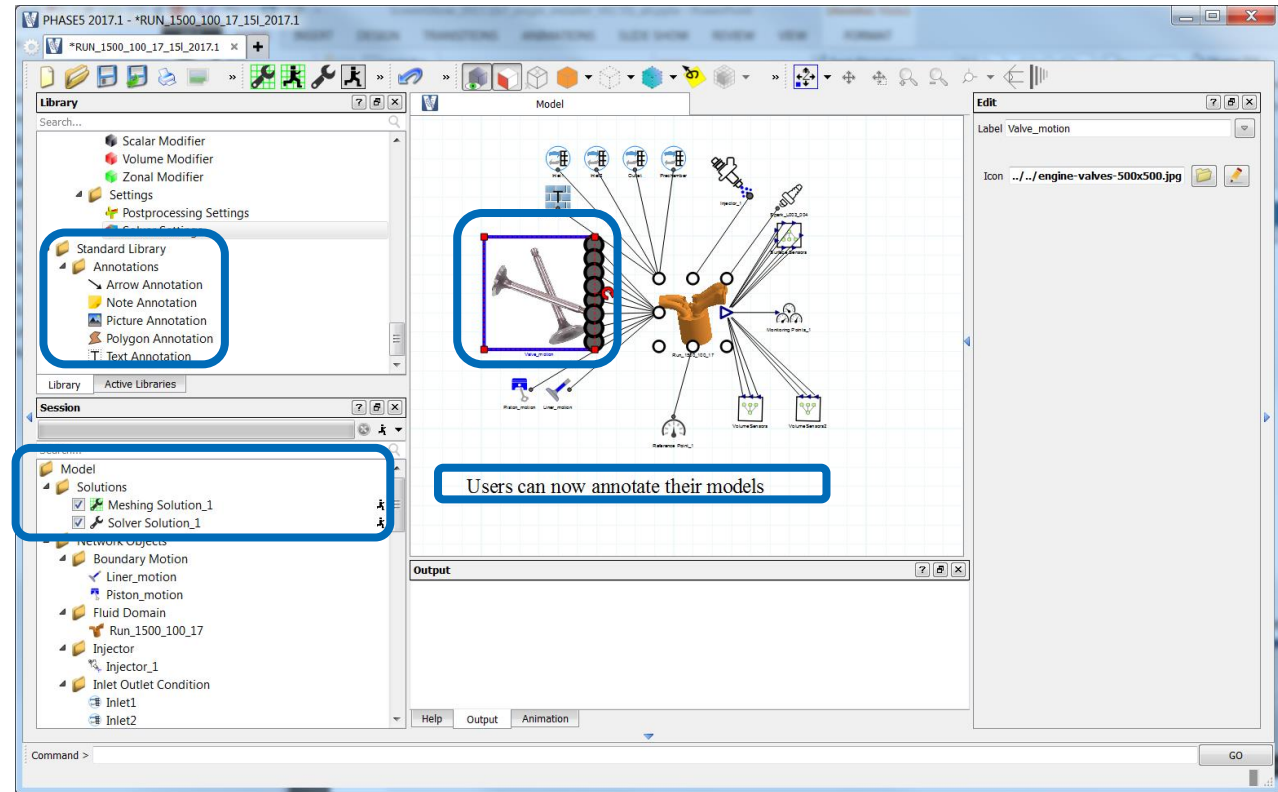
Number of Bins



usability



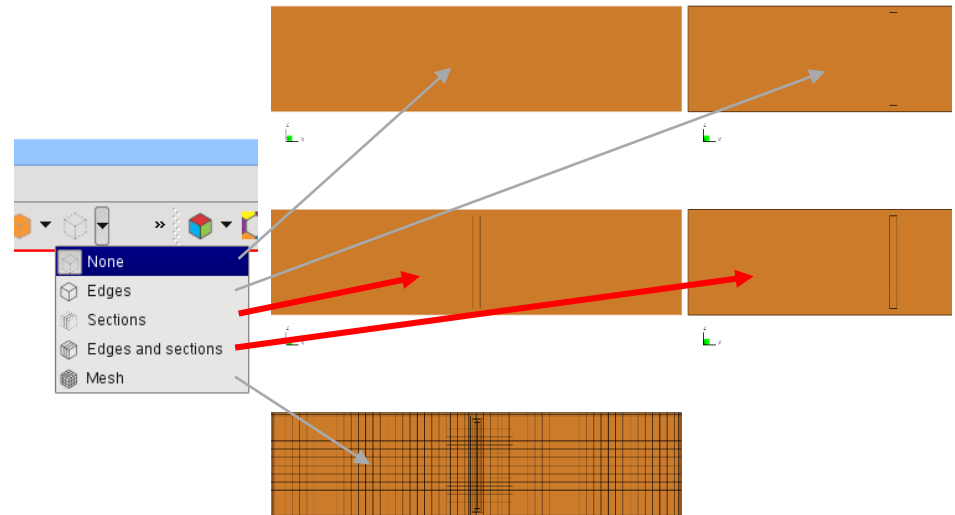
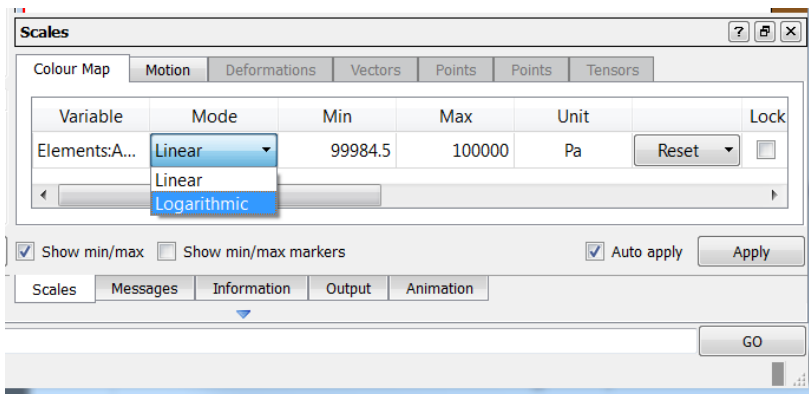
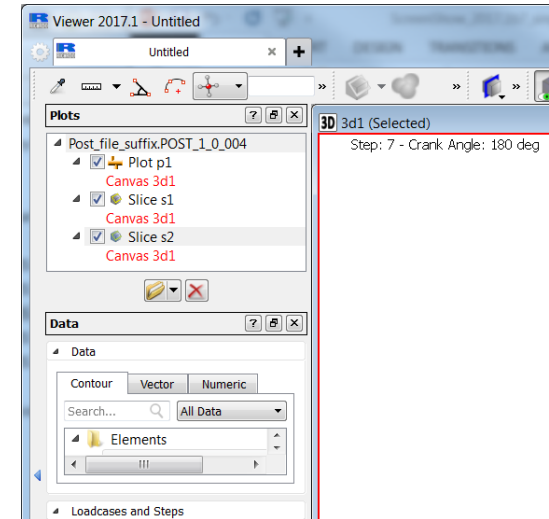
- Solution objects in the model tree
- Annotations on the canvas
- Submodel images
- Table manipulation speed improvements
- Improved icons for look and feel



usability



- Improved usability
 - Show and hide plots from tick box in plot tree
- Improved visualisation
 - Log plot of Scalar values
 - New sections and edges visualisation
 - Edges of heat exchangers can now be visualised.



Documentation updates

documentation



- New tutorials and examples
 - VSOLVE - GT-POWER
 - DDPIK spark tuning
- VECTIS Examples
 - Spray matching with HEEDS MDO
 - Improved VSOLVE underhood example
- Improved user guidelines
 - Spray matching