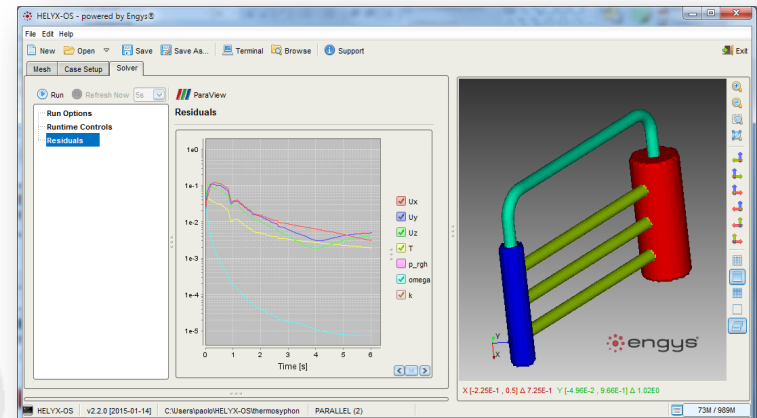# Introducing HELYX-OS, an Open-Source Graphical User Interface for OpenFOAM®

Paolo Geremia

Workshop HPC enabling of OpenFOAM for CFD applications@Cineca
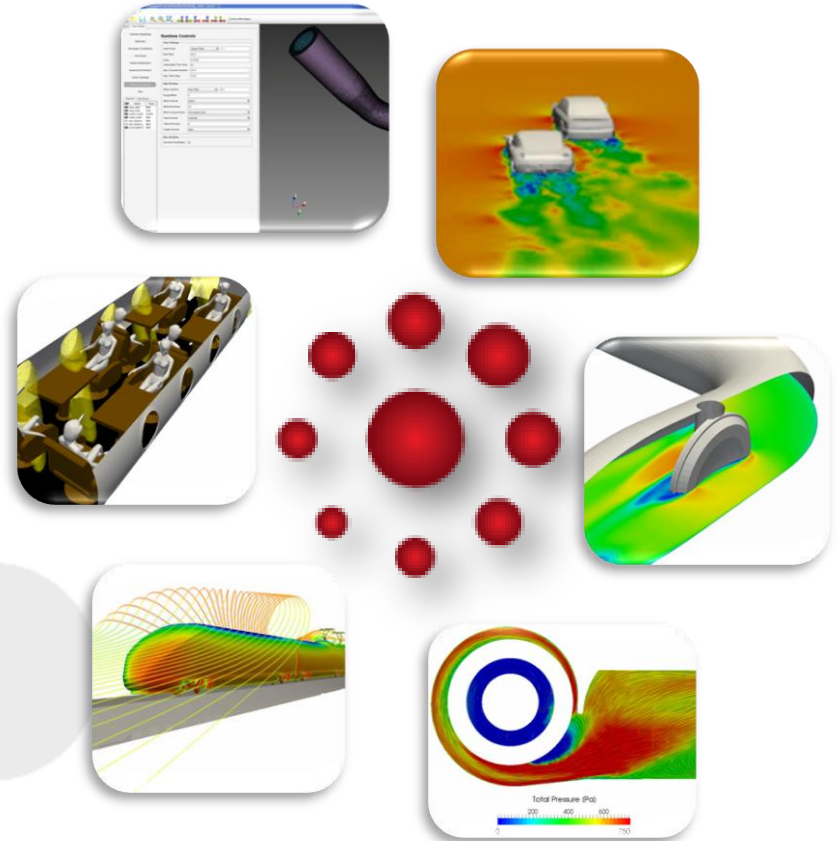25-27 March 2015
Cineca - Casalecchio di Reno (BO)

info@engys.com | Tel: +39 040 8320483 | Fax: +39 040 3491012 | www.engys.com

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- Introducing HELYX-OS

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ENGYS | Company Details

- CAE products and services

- Focus on Open Source solutions

- Technology platforms:
  - CFD → OPENFOAM®
  - Optimisation → DAKOTA
  - GUI → HELYX®

- History:
  - 2009 → founded in the UK
  - 2010 – present → 5 offices worldwide
  - 2012 → Joint Venture with ARC (Streamline Solutions)
  - 2013 → resellers Japan and Benelux

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ENGYS | Products & Services

PRODUCTS

HELYX
Advanced CFD Software
based on 'OPENFOAM'

HELYX-OS
Opensource Native GUI
downloadable for 'OPENFOAM'

ELEMENTS
CAE Vehicle Application
powered by Helyx

SERVICES

Analysis, Design, Consultancy
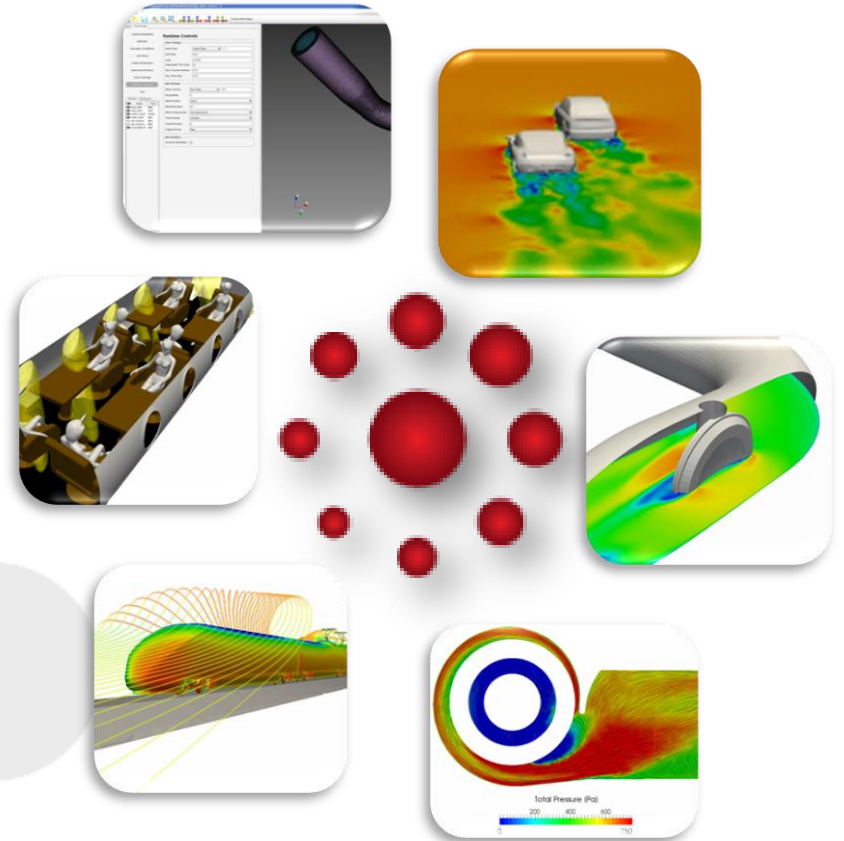
HPC On Demand

OPENFOAM® & HELYX Support & Training

OPENFOAM® & HELYX Development & Customization

Adjoint CFD Optimisation Development & Consultancy
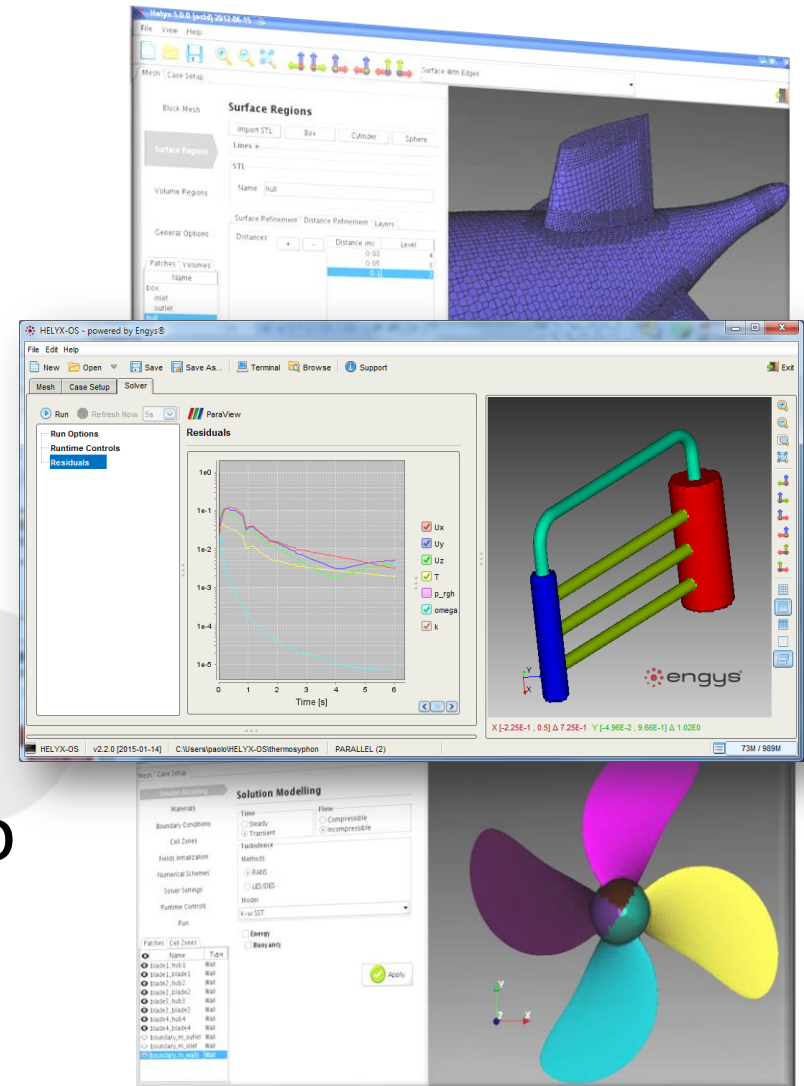
DAKOTA Optimisation Support & Training

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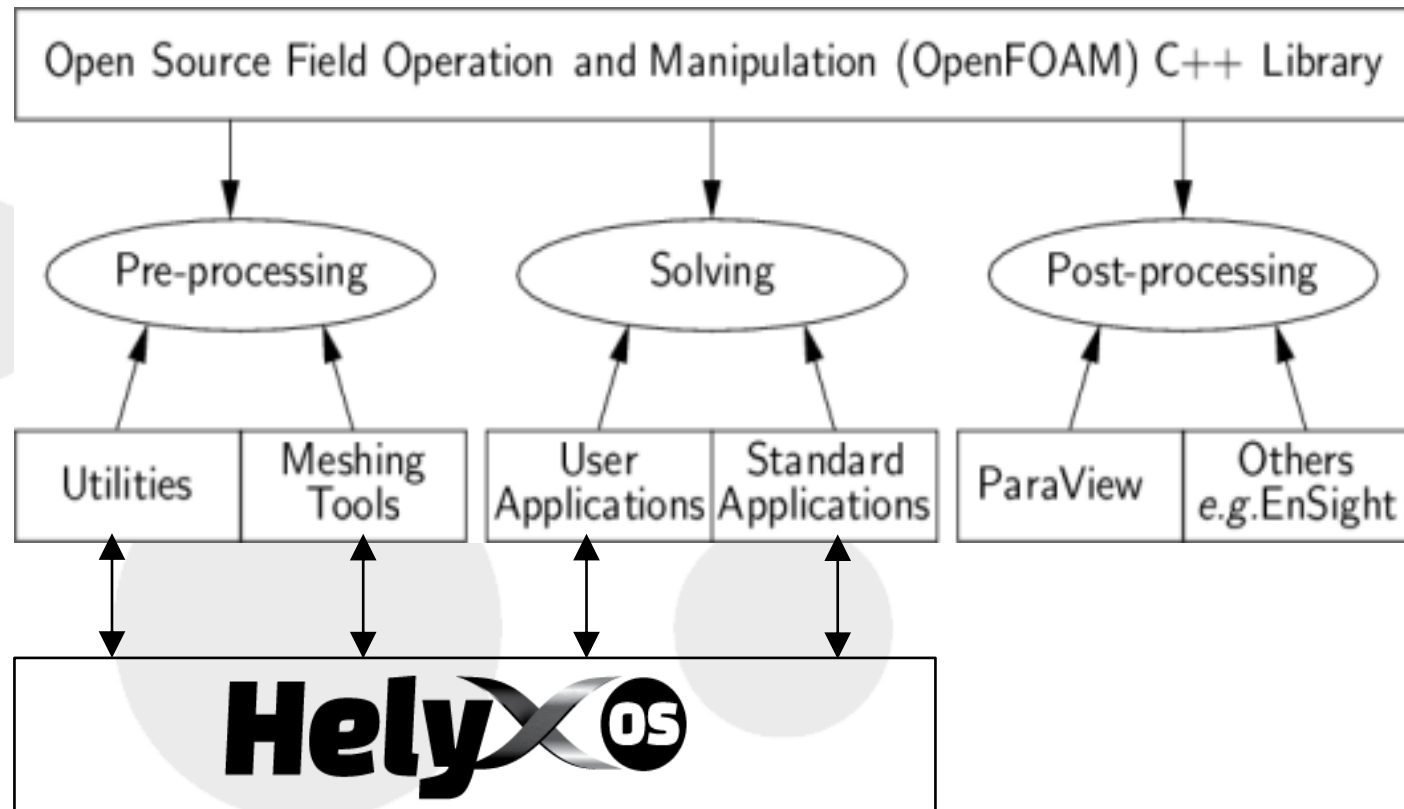- Work in Progress
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What is **Helyx OS** ?

- Open Source GUI for easy pre-processing of cases in OpenFOAM v2.3.x

- Developed and maintain by Engys (Java + VTK)

- Free to download via SourceForge
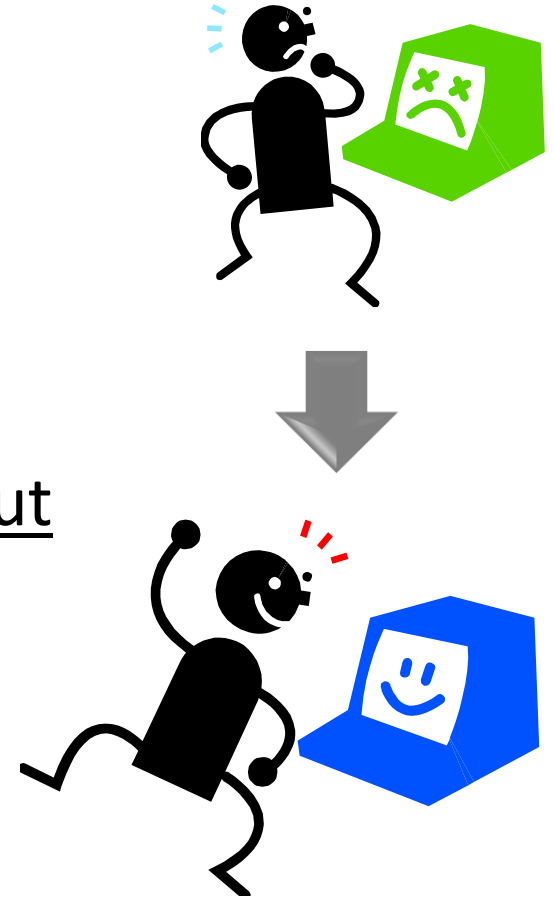
- Over 80,000 downloads to date worldwide

What is **HelyX·OS** ?

Why do we need **HelyX os** ?

- "**;**" → small mistakes can be fatal
- User centric product
  - Good software + Bad interface = Bad experience
- Fit for application
  - Freely available code provides tools <u>but</u> HELYX-OS provides solutions

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- Native read/write of OpenFOAM® files
- Geometry and mesh interactive 3D visualisation
- Mesh tab → controls for *snappyHexMeshDict*
- Setup tab → controls *system* and *constant* files
- Solver tab → allows execution and monitoring of solver run
- Solvers
  - Single phase incompressible flows + MRF + porous
  - Single phase compressible flows + MRF + porous
  - Single phase buoyancy based solvers
  - Multiphase VOF solver
- Direct Mesh and Solver execution within GUI

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HelyX OS | Layout Overview

Menu Bar

Toolbar

3D Viewport

Data Panel

Standard Output Panel

Memory Panel

Info Bar

- The **Data Panel** consists of the Mesh tab, the Case Setup and the Solver tab:

  - The Mesh tab controls all the steps required for creating a hexa-dominant mesh

  - The Case Setup tab controls all the settings and parameters needed to complete the definition of the CFD run

  - The Solver Tab allows the user to execute a specific solver, monitor the solution and export the results for visualisation via third-party software.
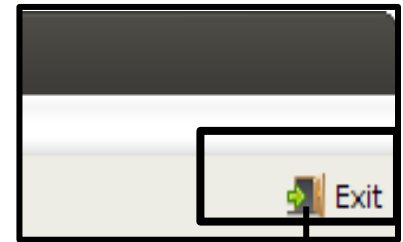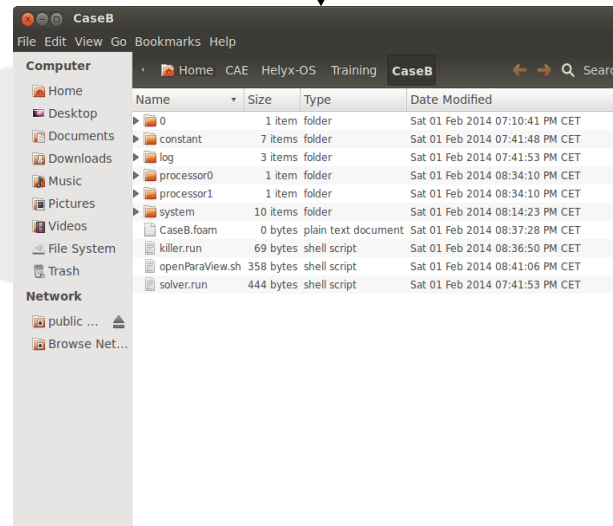
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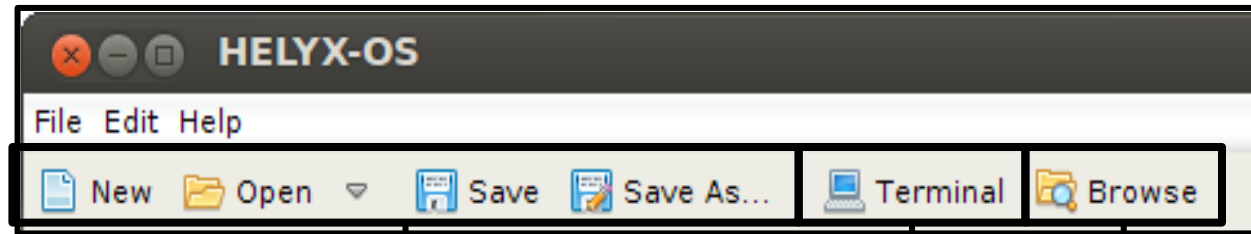
Main Toolbar

File commands
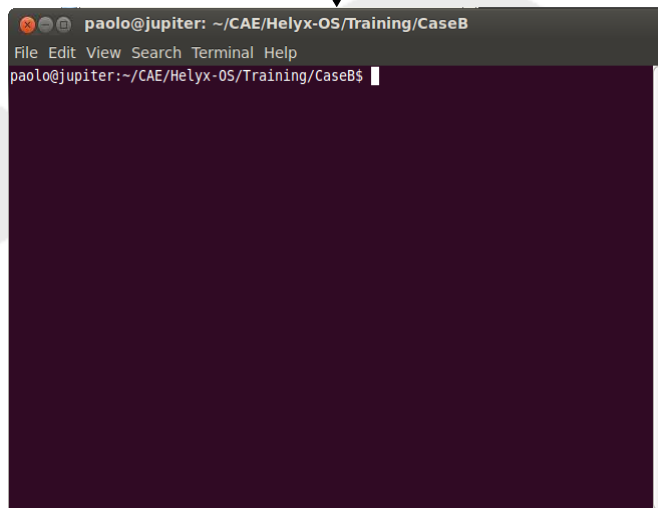
Open OPENFOAM® terminal
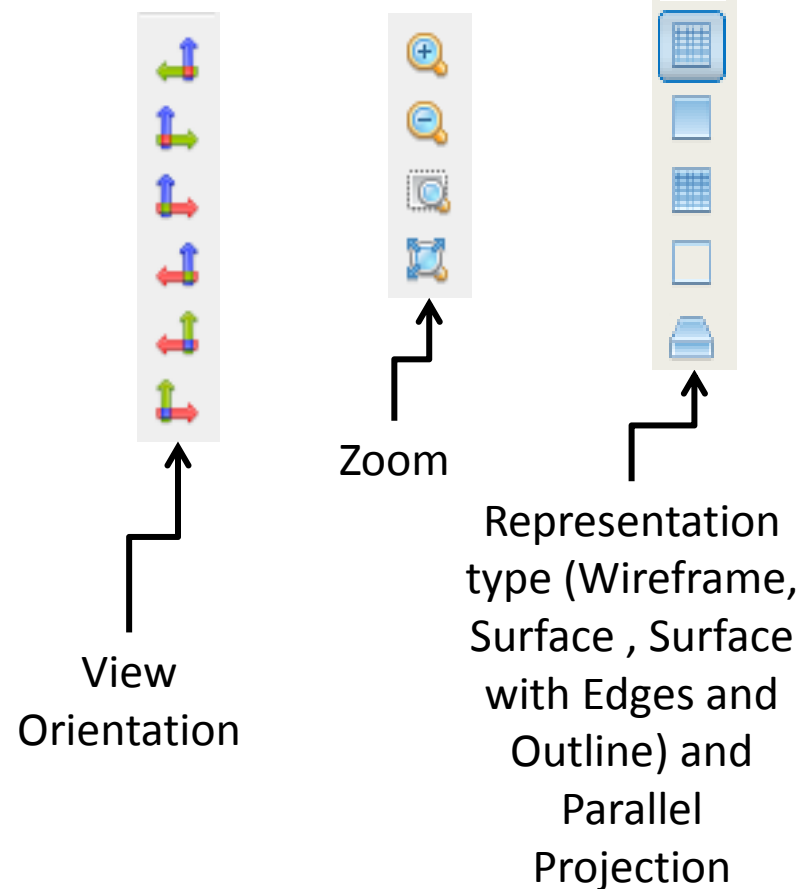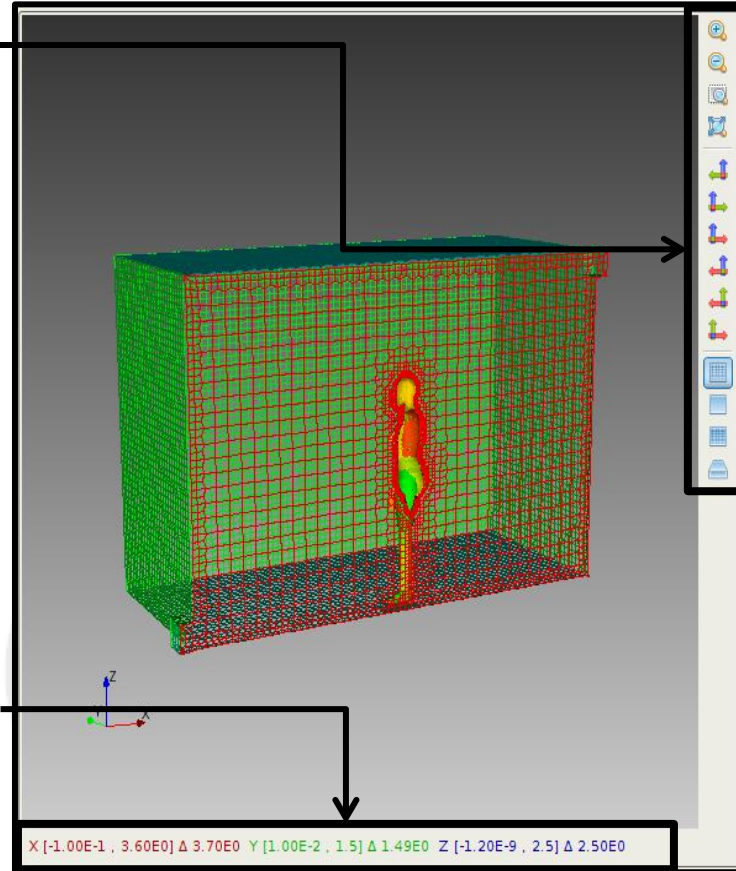
Open case folder

Exit HELYX

HelyX OS | Viewport

Visualisation Toolbar

Bounding Box Coordinates

X [-1.00E-1 , 3.60E0] Δ 3.70E0 Y [1.00E-2 , 1.5] Δ 1.49E0 Z [-1.20E-9 , 2.5] Δ 2.50E0

View Orientation

Zoom

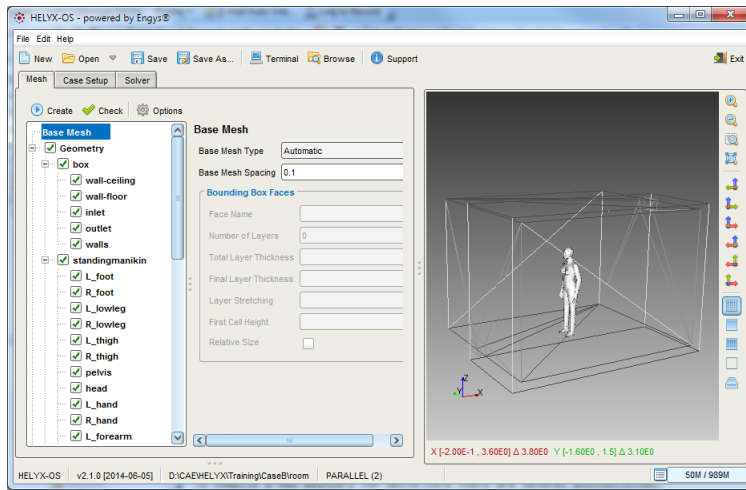Representation type (Wireframe, Surface , Surface with Edges and Outline) and Parallel Projection

- The **Viewport** is a 3D window based on VTK library capable of displaying geometry surfaces, wire-frame or surface with edges representations.
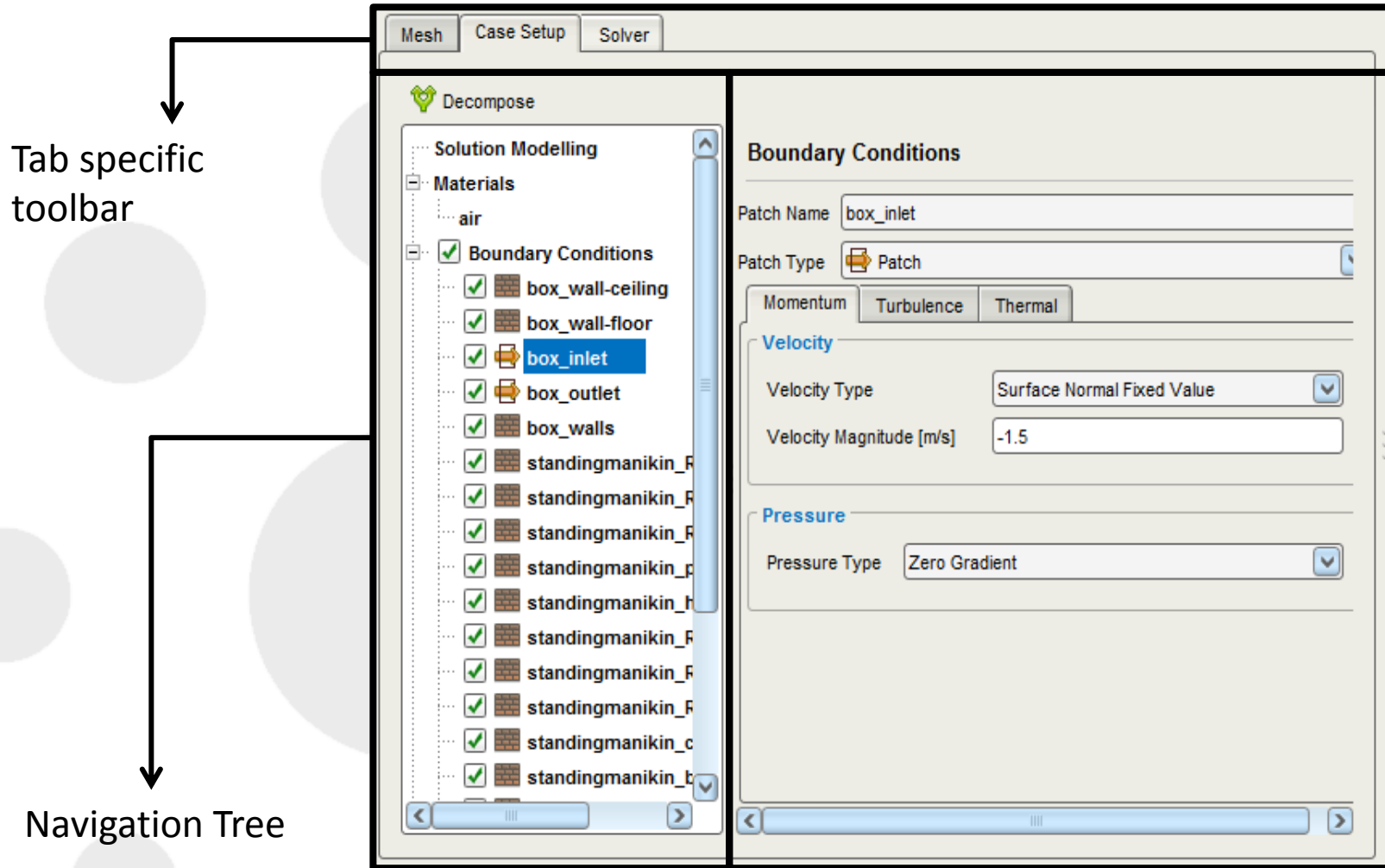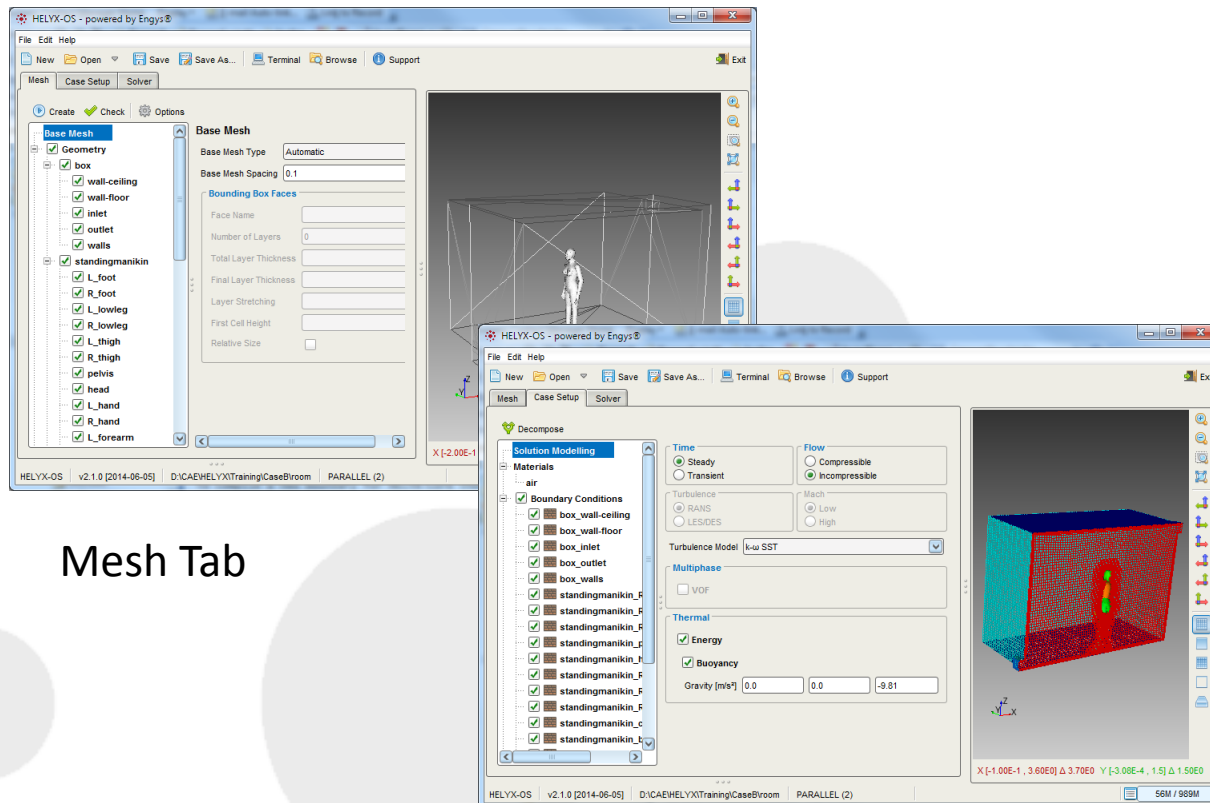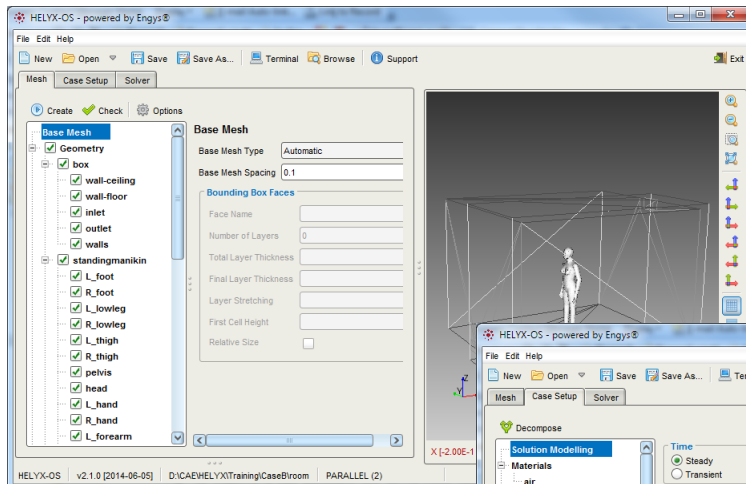
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Data Panel

Tab specific toolbar

Navigation Tree
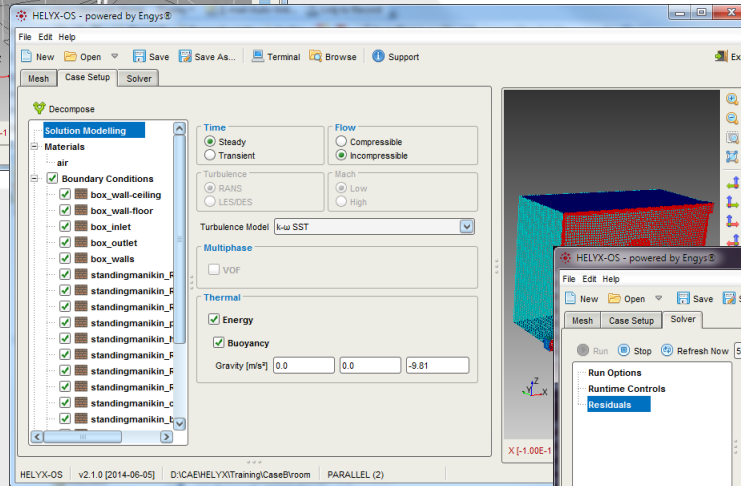
Setup Panel
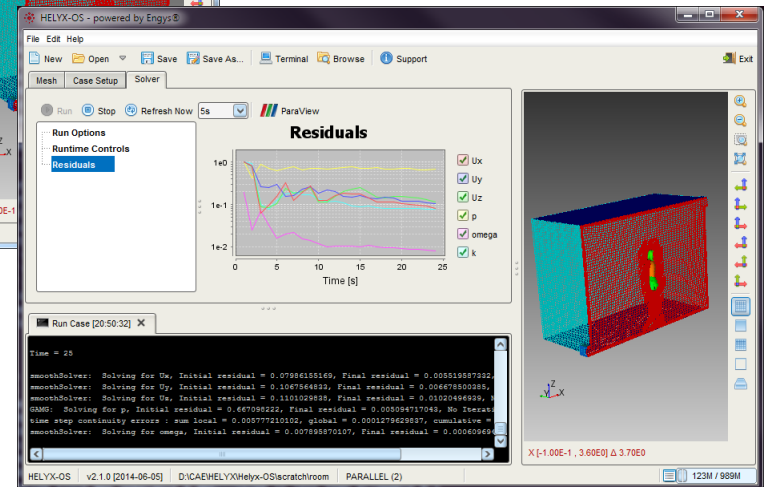
Mesh Tab

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HelyX OS | Workflow

Mesh Tab

Case Setup Tab

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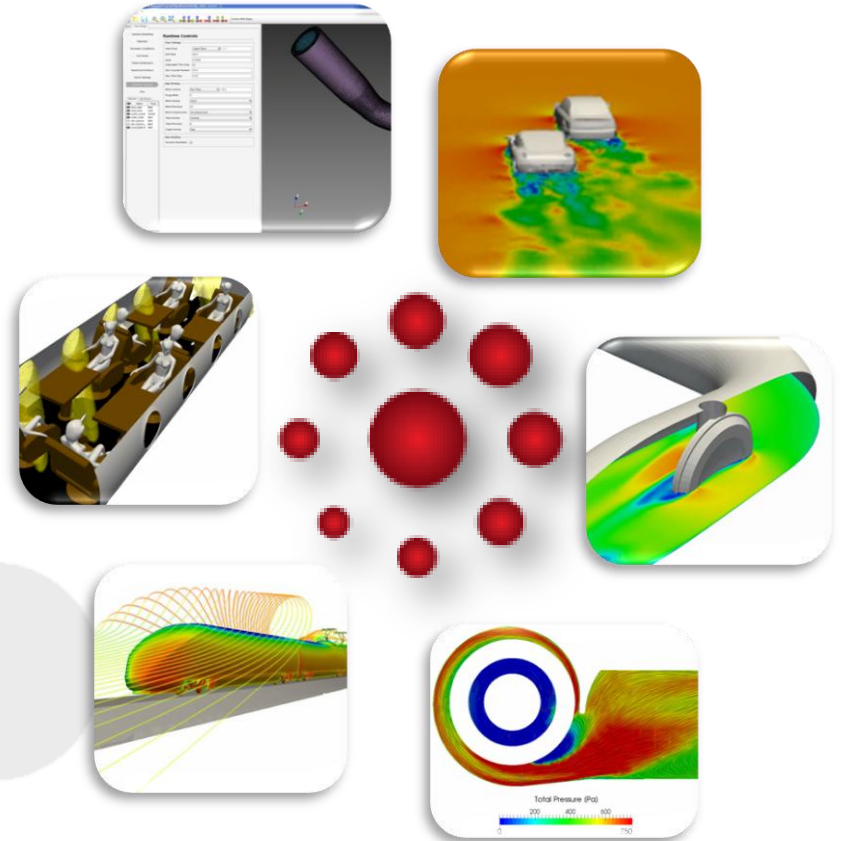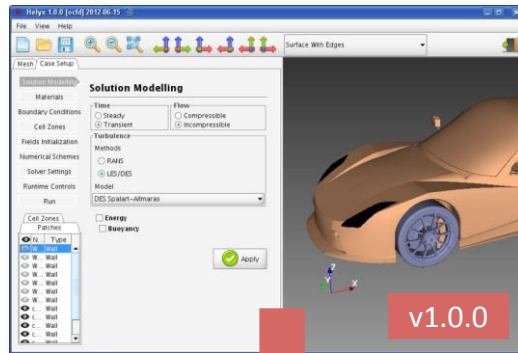# HelyX OS | Workflow

Mesh Tab

Case Setup Tab

Solver Tab

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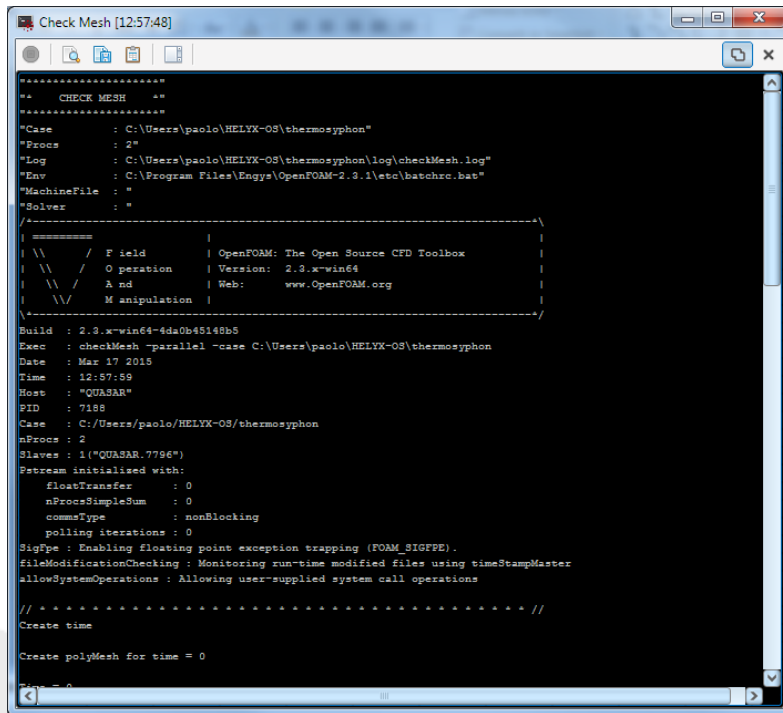- Work in Progress
- Closing

HelyxOS | Achievements

v1.0.0

v1.0.1

v1.0.2

- **v1.0.0**
  - Initial Beta release
  - Basic functionalities
- **v1.0.1**
  - Maintenance release
  - Better geometry and mesh creation
  - Improved Setup and visualisation
- **v1.0.2 – v1.0.3**
  - Added support for OpenFOAM v2.2.x
  - New custom run scripts
  - New turbulence models and discretisation schemes

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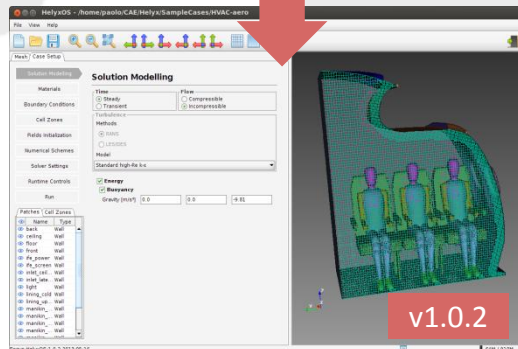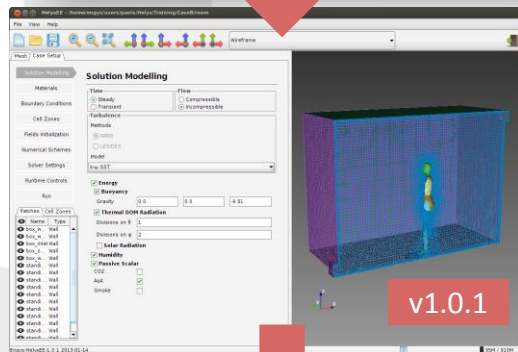
HelyX OS | Achievements
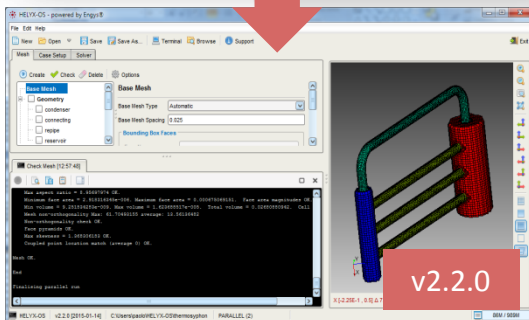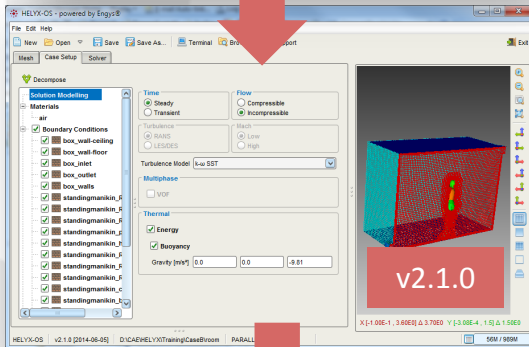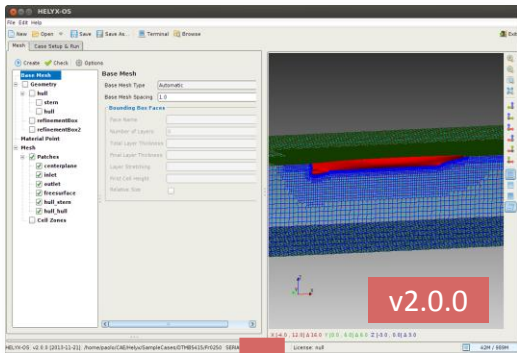
- **v2.0.x**
  - New tree layout
  - Enhanced GUI
  - VOF solver support

- **v2.1.x**
  - Support for OPENFOAM® v2.3.x
  - New solver tab
  - Windows portability
  - New highly compressible solvers support

- **v2.2.x**
  - Minor release with enhanced functionalities

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HelyX OS | Available in v2.2.0

- **Improved Output Panel:**

    - Hard/Soft Kill Scroll Lock (Stop Button)

    - Log to clipboard and log files

    - Scroll lock

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HelyX OS | Release Roadmap

v1.0.0   v1.0.2   v2.0.0   v2.1.0   v2.2.0   v3.0.0

v1.0.1   v1.0.3   v2.0.1   v2.1.1   v2.3.0

2013   2014   2015   2016
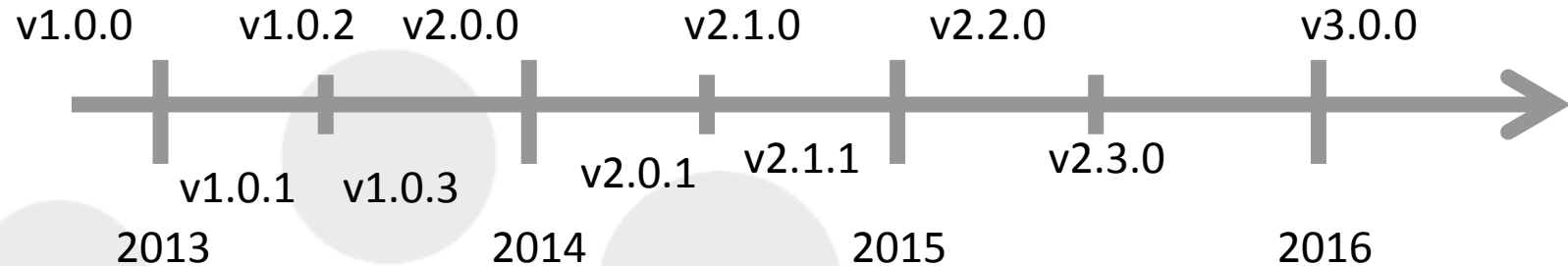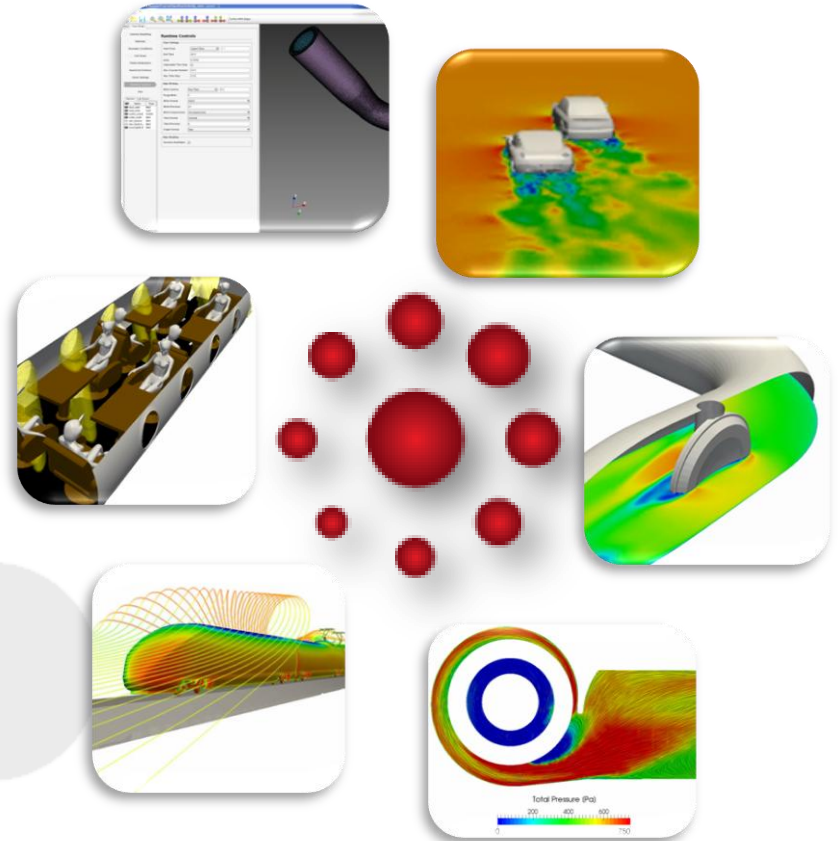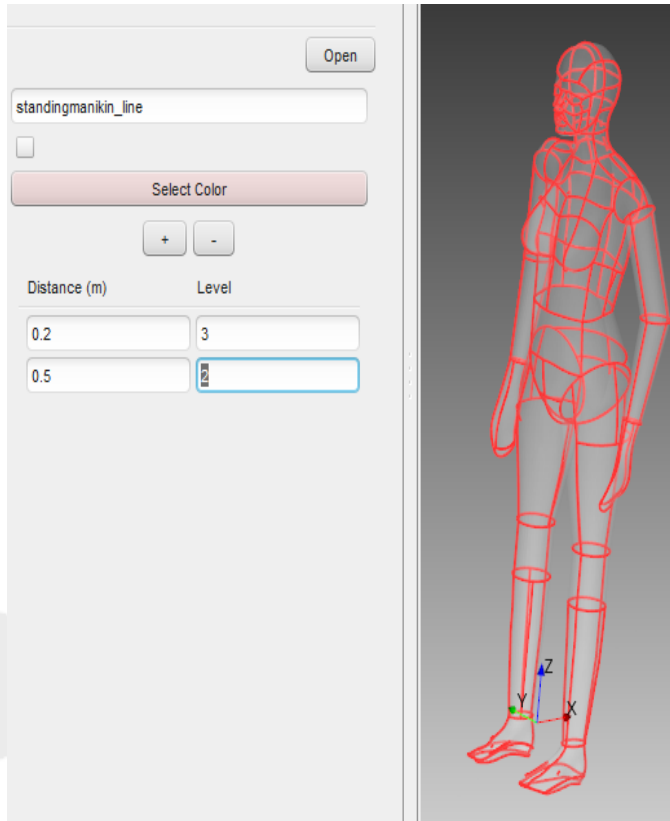
- **Short term targets**
  - Improved mesh interface
  - Custom section for advanced editing of dictionaries
- **Mid-term targets**
  - Support for HPC systems
  - Support for new solvers and physical models
  - Extended functionalities

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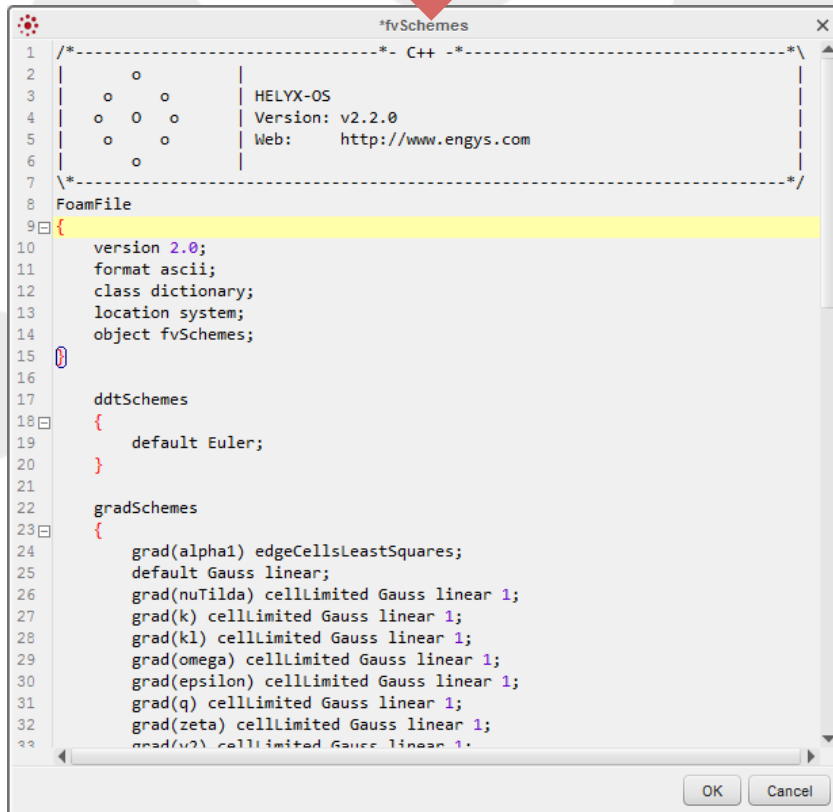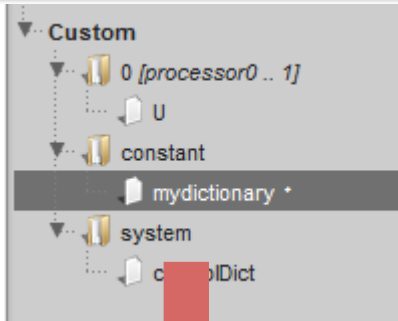- History and Future Plans
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- Feature lines visualisation in the GUI created via external utilities (e.g. `surfaceFeatureExtract`)

- Feature line distance-based refinement

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HelyX OS | Under Development

- Custom base mesh option to allow import of user-defined blockMeshDict dictionary file
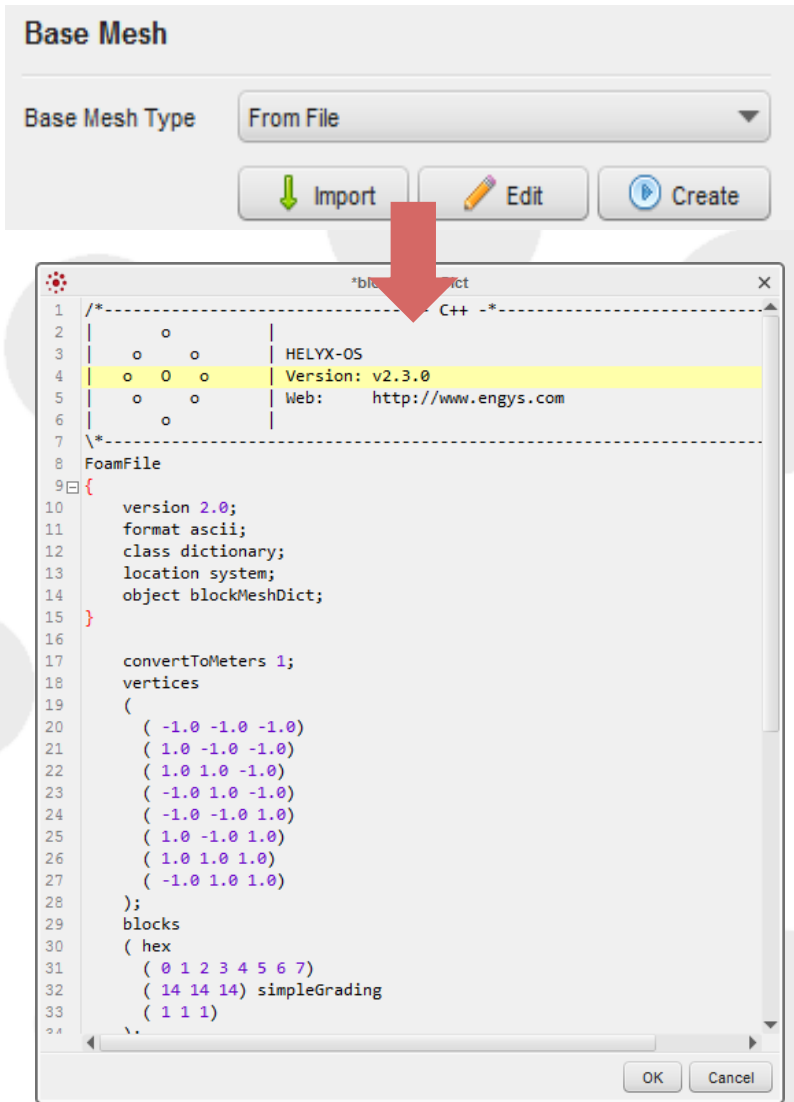
- New Custom section in Case Setup tab:
  - Edit new/existing dictionaries inside *constant* and *system*
  - Edit new/existing fields inside the *0* time folder (parallel and serial)
  - Merge or raw file options

- New cloud interface for parallel execution:
  - Execution of HELYX-Core on a local and/or remote cluster
  - Support queue system for job scheduling
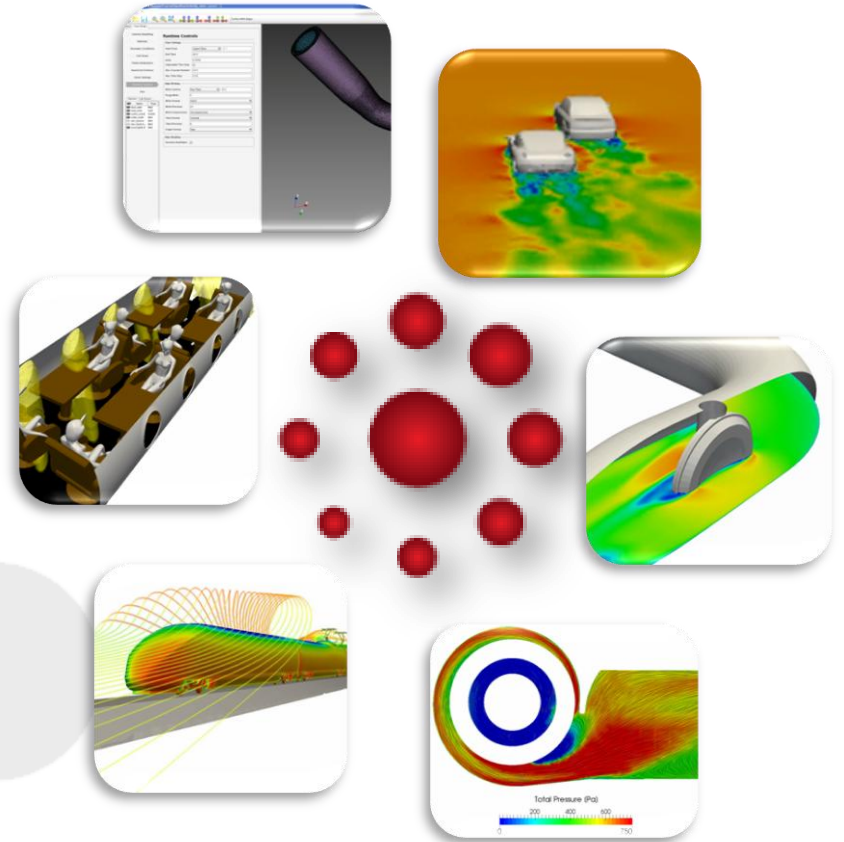 - Remote monitoring job log, residuals and monitoring functions
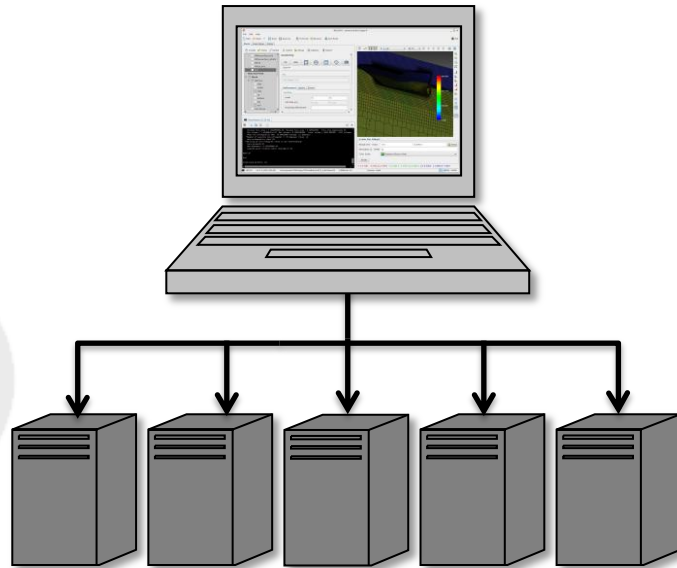
Execution Machines
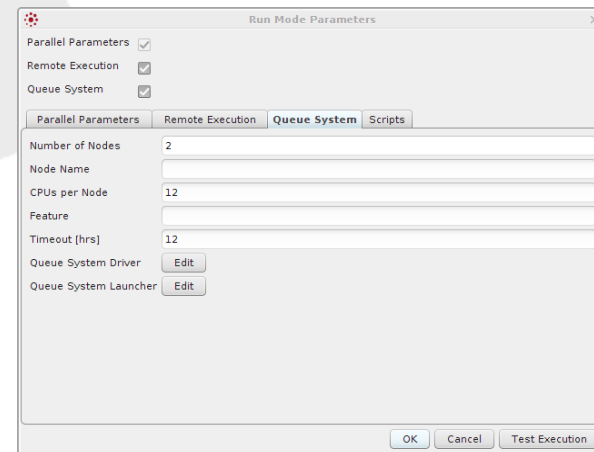
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Closing

- ## Why using HELYX-OS?

  - Interface designed by users, for users

  - Maintained by FOAM/OpenFOAM® experts (developing FOAM since 1999)

  - Linux and Windows ports (both GUI and core)

  - Open to 3rd party developers (plug-ins)

  - Best value!

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THANK YOU VERY MUCH!

Questions?

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