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

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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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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 HelyXOS?

Open Source Field Operation and Manipulation (OpenFOAM) C++ Library

- Pre-processing
- Solving
- Post-processing

Utilities | Meshing Tools
User Applications | Standard Applications
ParaView | Others e.g. EnSight

HelyXOS

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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 **but** HELYX-OS provides solutions
Current Key Features

- 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
HelyxOS | Layout Overview

Menu Bar

Toolbar

Data Panel

3D Viewport

Standard Output Panel

Memory Panel

Info Bar

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

Mesh Tab

Case Setup Tab
HelyxOS | Workflow

Mesh Tab

Case Setup Tab

Solver Tab
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Achievements

- 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
HelyxOS | 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
Improved Output Panel:

- Hard/Soft Kill Scroll Lock (Stop Button)
- Log to clipboard and log files
- Scroll lock
• 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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• Feature lines visualisation in the GUI created via external utilities (e.g. \texttt{surfaceFeatureExtract})

• Feature line distance-based refinement
• 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
Future Developments

- 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
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• 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!
THANK YOU VERY MUCH!

Questions?