# CENTRE OF EXCELLENCE IN "COMPUTER AIDED ENGINEERING"

## OUR MISSION

- Provide Technical support to Research Scholars.
- Organize informational webinars on Tools used during Researches
- Assist in the conduct of research work related to Composite Materials, Forming, Forging, Analysis etc
- Aid in the conduct of project work for UG/PG

## ABOUT THE CENTRE:

The objective of this centre of excellence is to promote research activities among Research Scholars. The Center of Excellence is designed to provide the Research Scholars, the tools required during their work virtually by giving them access to software via cloud. Thus the scholars can sit at their places and access world class tools for their research.

The center will strive to provide 24/7 technical support to the Research Scholars with the help of our Partners in the COE, DHIO Research & Development Bengaluru.

## OBJECTIVES:

- Providing the platform for the Ph.D Research Scholars to use the software online
- Encouraging the research scholar to combine multi disciplinary work & publish good research articles.
- He COE will help scholars to bridge the gap between the industry and academics.
- Enable scholars to use advances simulation tools used in industry for their Research.
- To serve as a role model for University-Industry-Government collaboration by developing skills and Industry focused, mission driven training

## PEOPLE INVOLVED WITH CENTER OF EXCELLENCE: DETAILS OF FACULTY, STAFF, VISITING FACULTY, STUDENTS

| Name | Project and Nodel Coordinator | Contact details |
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| Mr.Nagaraj Nandihalli | Application Engineer | |
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## SOFTWARE OFFERED:

- AFDEX- INTELLIGENT METAL FORMING SIMULATOR
- FLOWNEX
- FLOWVISION
- J-OCTA
- KHIMERA
- SIMULIA-ABACUS
- SIMULIA – FE-SAFE
- SIMULIA- ISIGHT
- Z-CAST PRO
- CHEMICAL WORKBENCH
- MECHANISM WORKBENCH

## SOFTWARE OFFERED (WITH DETAILS):

### 1. AFDEX- INTELLIGENT METAL FORMING SIMULATOR

- Material Identification
- Forging Simulation
- Deep Piercing
- Die Structural Analysis
- Radial Forging
- Cross Wedge Rolling
- Extrusion And Drawing
- Sheet Forming
- Multi-Stage Forging

### 2. FLOWNEX

- Thermal Fluid Flow Simulation
- Design of Fire Protection Systems
- Calculation of Gas Consumption Rates
- Integrated System Analyses
- Steady State & dynamic Analyses
- Water Hammer Analyses
- Simultaneously solve multirole gas and liquid networks that are connected through heat exchangers
- Heat transfer through solid structures
- Ability to perform real time simulations
- Monte-Carlo sensitivity Analyses
- Standard interface with 3rd party softwares

### 3. FLOWVISION

- To overcome time consuming traditional CFD Approach
- Faster and Automatic Grid Generation and adaptation to Geometry, moving bodies and solutions
- Intelligent and Automatic Generation Gap Cell for smaller Clearance
- One solver for all MACH NUMBERS
- Advanced VOF Method
- Seamless integrated Fluid Structure Interaction and multi physic

## 4. J-OCTA

- Molecular Dynamic Simulation ( COGNAC, VSOP)
- Interface, Phase Separation Simulation ( SUSHI, DPD)
- Rheology Simulation (PASTA, NAPLES)
- Multi Phase Material Simulation (MUFFIN)
- Quantitative Structure Property
- Zooming Function, Reverse Mapping

## 5. KHIMERA

- Thermal chemical gas-phase reactions of different types
- Thermal ion-molecular reactions in gases
- Thermal gas–surface reactions
- Thermal chemical reactions on surfaces
- Surface diffusion
- Diffusion-controlled chemical reactions in polar and nonpolar liquids
- Kinetically controlled chemical reactions in liquids
- Processes of vibrational and electronic energy exchange in heavy particle collisions in gases
- Processes of electronic excitation transfer in liquids
- Photo excitation and photo dissociation processes in gases
- Plasma chemical processes involving electrons
- Binary and multi component diffusion in gases

## 6. SIMULIA-ABACUS

- FEA and Multiphysics
- Complex Materials
- Flexible multibody dynamics, controls, and joint behavior
- Contact, Fracture & Failure
- Scaling from 4 to 256 cores for rapid turnaround and large-scale analyses
- Automation tools for customization of standard workflows

## 7. SIMULIA – FE-SAFE


- **Optimize designs to use less material**
- **Reduce product recalls and warranty costs**
- **Optimize and validate design and test programs**
- **Improve correlation between test and analysis within a single user interface**
- **Reduce prototype test times**
- **Speed up analysis times, thereby reducing man-time hours**
- **Increase confidence that your product designs pass their test schedules as "right first time"**

## 8. SIMULIA- ISIGHT


- Design of Experiments
- Optimization
- Data Matching
- Approximations and the Visual Design Driver
- Quality Methods

## 9. Z-CAST PRO

- **Fluid Flow Simulation**
- **Solidification Simulation**
- **Cycle Analysis**
- **Thermal Stress Analysis**
- **Heat Treatment Simulation**

## 10. CHEMICAL WORKBENCH

**CHEMICAL WORKBENCH**

- Comprehensive library of basic physical-chemical models – reactors – for simulation of multi-phase thermodynamic equilibriums, homogeneous gas phase, heterogeneous and non equilibrium chemical active plasma kinetics
- Interactive Model explorer for building multi-stage process flow as a chain of reactors with recycles, automatic data transfer between reactors
- Extensive set of tools for manipulation and analysis of kinetic mechanisms: comparison, analysis and basic reduction techniques
- Multiple options for reaction-rate approximations in kinetic simulations including user-defined expressions
- Customizable and flexible post-processing tools: user-defined manipulation of simulation results, templates for data post processing and plots
- Automated parametric simulations with multi-core CPU support
- Integration with databases on thermodynamic properties of substances, kinetic data, individual chemical mechanisms
- Export/import of the chemical kinetic mechanisms to/from CHEMKIN file format

## 11. MECHANISM WORKBENCH

**MECHANISM WORKBENCH**

- General chemical kinetics
- Catalysis/chemical engineering
- Combustion, detonation and pollution control
- Thin films growth for microelectronics
- Plasma light sources and plasma chemistry

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