Mechanical Engineering Research Laboratory

We contribute to the business divisions by the production of high-performance products, improvement of manufacturing processes, rationalization of various designs, and development of new products and technologies. These are in the areas of machinery, materials, environment, energy, automobiles, and aircraft. Our advanced core technologies in structure/energy, vibration/sound, flow/heat transfer, combustion, chemistry, coal/coke as well as advanced simulation technologies and experiment/measurement technologies, all provide a firm base for these contributions.

Strength & Structural Engineering
- Strength Analysis of Mechanical Products
- Structural Design (Large Structure, Refractory, High-temperature Environment)
- Simulations for Casting, Heat Treatment & Welding
- Strength & Reliability Evaluation

Dynamics & Acoustics
- Vibration and Acoustic Analysis & Control
- Multidisciplinary System Dynamics
- Acoustic Analysis & Control
- Sound Insulation
- Measurements Using Sound & Vibration

Fluid Thermal & Chemical Technology
- Fluid and Heat Transfer Analysis & Control
- Advanced Fluid Measurements
- Waste Energy Recovery
- Organic Coatings
- Tribology & Cleaning
- Polymer Reaction
- Control of High Temperature Reaction & Combustion
- Design of Chemical Processes
- Effective Utilization of Various Resources
- Material Process Simulation
- Separation & Purification
- High Pressure & Temperature Slurry Control

Energy & Environmental Process

Structure Design & Strength Evaluation Technologies

Applications to Products
- Construction machinery components, Compressor components, Steel Forging

Improved performance of various machines using flow/heat conduction control and simulation technologies. Developed raw material products and their production technologies using organic coatings and lubrication technology.

Fluid/Heat Transfer Control

Chemical Reaction Control

Applications to Products
- Quality maintenance for compressors, micro-binaries, air—pressure batteries, rubber kneaders, and rolled/forged materials

Highly Efficient and Stable Operation of Power Plants

Applications to Products
- Technological assistance for environmental regulations applying to hydrogen stations, micro—channel reactors, and power stations

Coal Usage Processes

Applications to Products
- Coke for iron production, bio—mass fuels, and porous carbons

- Development of technologies for product reliability such as design rationalization, strength evaluation as well as process improvement/design in the field of materials.

- Established proprietary advanced simulation technology and measurement technology for low vibration, low noise, and energy saving. These are applicable to various categories of machinery and are utilized in R&D for new sound—shield components.

- Developed Hyper—Coal (HPC; extracted from coal) production process as well as HPC application technologies for coking coal in steel production and for producing new carbon materials.