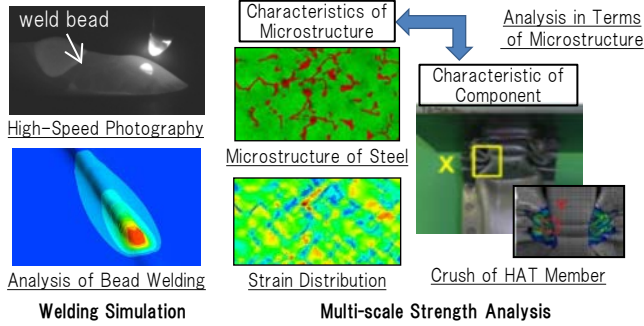


Mechanical Engineering Research Laboratory

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.

Strength & Structural Engineering

- Prediction technology of material/structure mechanical properties
- Metal flow/solidification analysis
- Development of technologies for product reliability such as design rationalization, strength evaluation as well as process improvement and design in the field of materials.

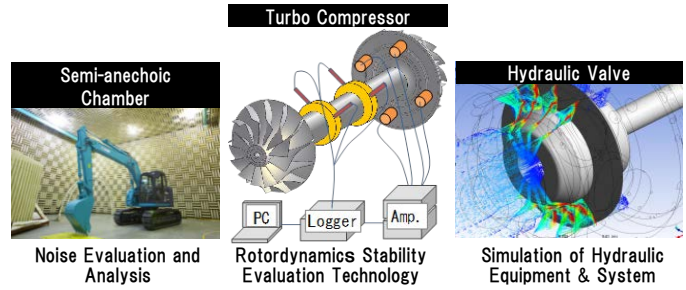


Applications to Products and Processes

- Material manufacturing process design/optimization
- Mechanical product design/production technology
- Cast and forged steel products

Dynamics & Acoustics

- Evaluation/analysis of machine dynamic behavior/noise
- Power system control/design technology
- Improved performance such as Vibration, Noise and Energy Consumption of machine products (Compressors, Construction equipment), and commercialized soundproof products, and achieved stable plant operation.



Applications to Products and Processes

- Vibration/noise reduction and energy saving
- Predictive maintenance of factory equipment
- Solution proposals for customers

Fluid & Thermal Engineering

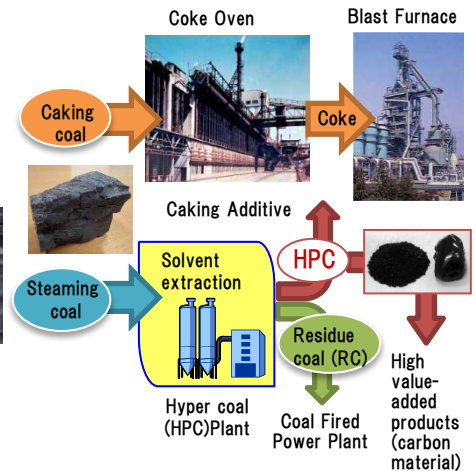
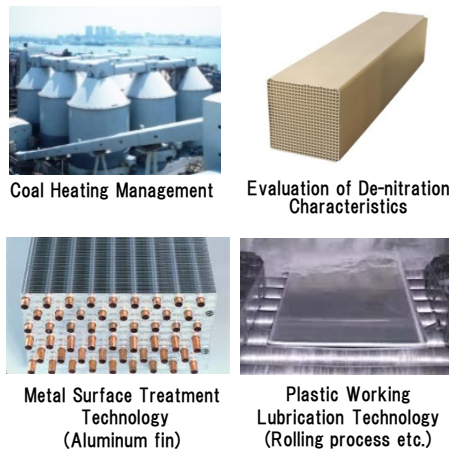
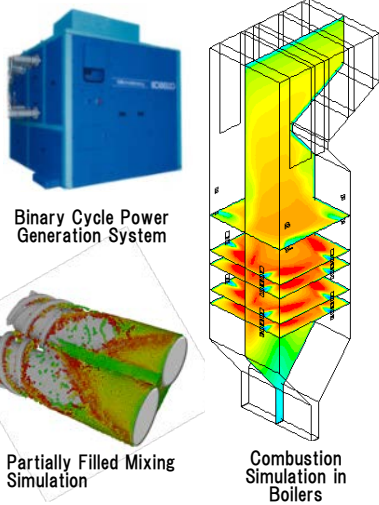
- Analysis of thermal fluid/combustion/high temperature reaction
- Thermal cycle design technology
- Development and improved performance of energy-saving/low-carbon equipment systems and efficiency of material manufacturing/powder processes.

Chemical Technology

- Chemical engineering (catalyst/adsorption/separation)
- Control technology of organic/polymeric materials for the interface/structure
- Improved efficiency/operation stabilization of plant/equipment, improved performance/productivity of our products by applying chemistry.

Energy Resource Process

- Reaction analysis/physical property evaluation of energy resources (Biomass/fossil fuel/unused waste, etc.)
- Coke compound design/physical property evaluation
- Development of processes/products for steel manufacturing through technologies on upgrading and evaluating various energy resources (biomass/fossil fuels/unused waste/etc.) and coke blending.



Applications to Products and Processes

- Higher performance of energy saving systems/mechanical products
- Efficiency improvement of material manufacturing/powder processes
- Operation stabilization of power plants

Applications to Products and Processes

- High efficiency/stable operation of plants/equipment
- Value-added/productivity improvement for our materials/machine products

Applications to Products and Processes

- Development of low-quality resource reforming process
- Cost reduction of steel-making upper process