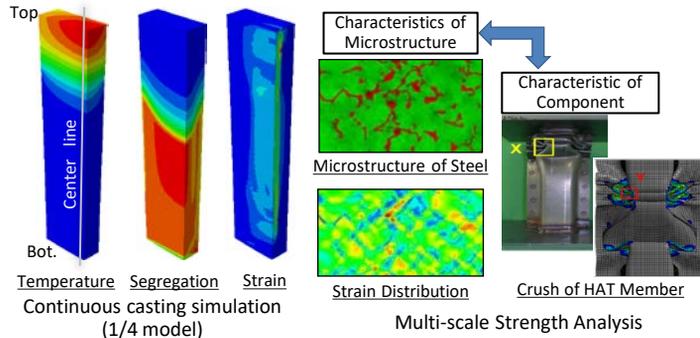


Mechanical Engineering Research Laboratory

We contribute to our business divisions by improving their performance, quality and processes, rationalizing various designs, and developing new products and technologies. These are in the three main areas of materials, machinery, and electric power.

Strength & Structural Engineering

- Prediction technology for 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.

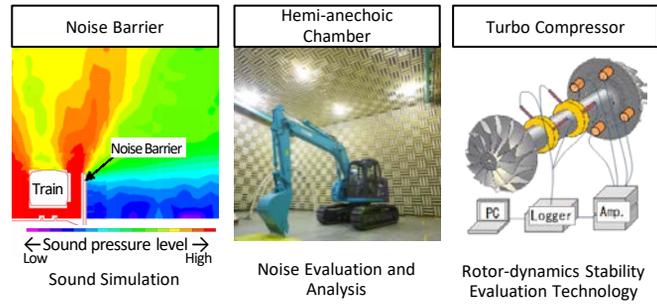


Applications to Products and Processes

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

Dynamics & Acoustics

- Evaluation/analysis of machine dynamic behavior/noise
- Diagnostic/Predictive maintenance technology for machinery
- Improved performance such as vibration, noise and energy consumption of machine products (compressors, construction equipment); commercialized soundproof products; and achieved stable plant operation.

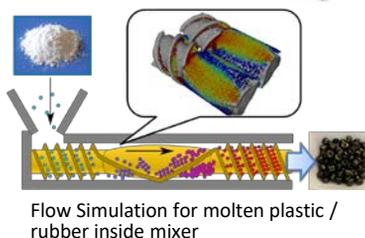
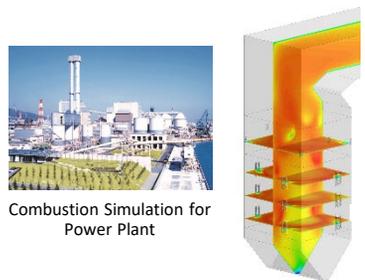


Applications to Products and Processes

- 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.

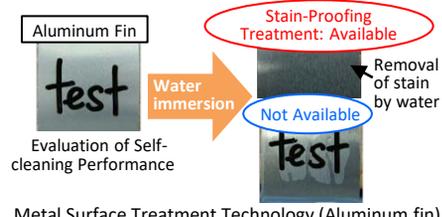
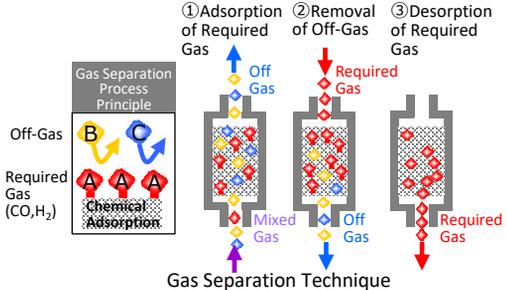


Applications to Products and Processes

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

Chemical Technology

- Chemical process control (Reaction/Separation/Carbon neutral fuel (H₂, Biomass) utilization, etc.)
- Organic/polymer material quality control
- Plastic working lubrication control
- Improved efficiency/operation stabilization of plant/equipment, creating new products, improved performance/productivity of our products by applying chemistry.

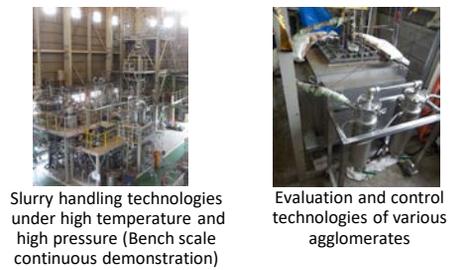


Applications to Products and Processes

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

Energy Resource Process

- Reaction analysis/physical properties evaluation of energy resources (Biomass/fossil fuel/unused waste, etc.)
- Design of carbon materials / physical properties evaluation
- Contributing to creating new businesses and the development of products and processes in the fields of environment, energy and resources, that includes CO₂ reduction.



Applications to Products and Processes

- Carbon neutral/resource circulation process technology development
- Reform of low rank carbon resources/adding value