

GE Infrastructure  
Water & Process Technologies

# global

research and development  
the woodlands center of excellence



# a global mindset

Some people see GE as a conglomerate of unrelated businesses. We see it as the door to possibility. By cross-pollinating technology from different disciplines, GE increases the probability for discovery.

Through our global research centers in the United States, India, China and Germany, we share the research, knowledge, innovation and imaginations of over 2,000 GE researchers and thousands of their customers. In a style that traces its heritage to Thomas Edison, breakthrough technology is pushed to new limits — impacting return on investment, the environment, competitive advantage, quality and more.

Welcome to the global mindset. What we discover together can change the world.



# magnifying excellence

The Woodlands Global Research Center focuses on finding solutions to problems for all GE Infrastructure Water & Process Technologies customers.

Our scientists collaborate with the top researchers in the world at the GE Global Research Centers. We combine the knowledge gained with our technical expertise in metallurgy, chemistry, membranes, corrosion detection and more. Then, we put it to work for you.

# forward focus



## Predict. Detect. Assure.

We focus on these capabilities at The Woodlands Global Research Center and fundamentally change the industries we serve.

## Corrosion & fouling detection

Our experts work to keep corrosion from affecting operation and profitability using key technologies:

- **Predator™** – detects hot, inaccessible assets for corrosion, predicts corrosion using our experiential Knowledge Base, and assures it is controlled with our patented, proven chemistry. Predator allows refiners to take advantage of discounted crudes without a significant risk increase.
- **Resistant Corrosion Monitoring** – provides early, on-line detection of naphthenic acid corrosion and measures actual wall loss of hot, inaccessible pipes without plant shutdown.
- **Digital Radiography** – creates images detecting corrosion, fouling and cracking and measures pipe wall thickness as clearly as if the operator viewed the actual inner pipe itself.

## Process applications technology

This team was created to deliver membrane separation applications to the chemical and refining industries. The team pools input from customers and the GE team, uses Six Sigma methodology and produces new-to-market applications by quickly moving ideas through research to feasibility testing and into the marketplace.

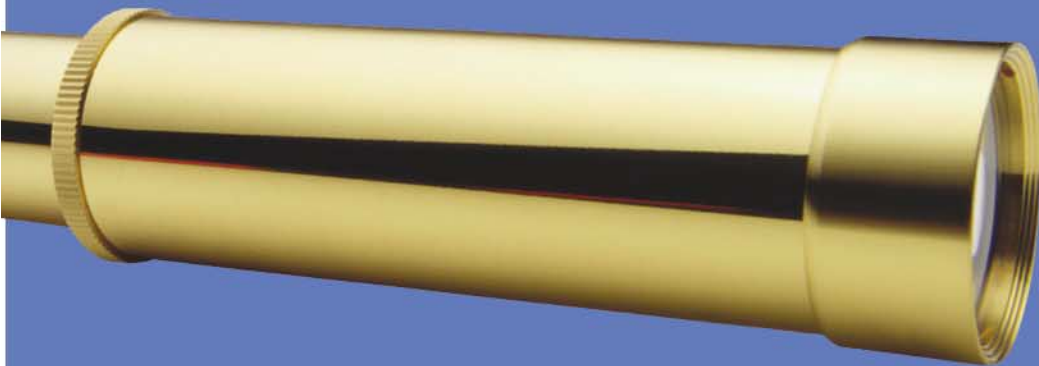
## Organic analysis

Equipped with state-of-the-art technology and experienced technicians, the organic analysis laboratory focuses on three analytical areas:

- **Hydrocarbon Process** – performs standard to technically complex characterization of fouling and corrosion products and contaminants for all refinery process applications.
- **Petroleum** – identifies potential problems from emulsion, corrosion and fouling in a wide variety of petroleum oils using standard and proprietary methodologies.
- **Scanning Electron Microscopy** – provides morphological and semi-quantitative elemental surface characterization for a multitude of different samples.

## Metallurgical analysis

Working in conjunction with engineering, sales and other tech groups within GE, degreed metallurgical engineers conduct failure analysis to arrive at probable root causes behind corrosion and/or metal fracture. A high volume operation, with 1,000 cases processed annually, the metallurgical lab provides customers 24-hour turn-around testing, failure analysis, on-site inspections and training. The staff draws on 15-20 years experience to identify boiler, cooling and process problems and offers solutions to those problems. This positively impacts our customers' operation efficiency, safety and cost reduction.



## Petrochemical process research

These experts develop treatment programs for controlling undesired side reactions and deposit formations that lead to fouling during chemical production and processing. By controlling fouling, we increase reboiler and distillation column run-length and throughput capacity while decreasing maintenance costs and reducing downtime. The solutions provided are tailored to specific customer needs and may include polymerization inhibitors, dispersants, antioxidants and/or metal deactivators. This team works closely with our analytical groups to detect potential fouling mechanisms and develop monitoring methods for our inhibitors.

## Finished product additives & new product development

Finished product additives increase the downstream performance of fuel products by increasing fuel economy, lubricity and stability while decreasing engine wear and emissions. The team examines better ways to prevent corrosion and improve cold flow, high temperature stability and low temperature lubricity to benefit our customers who produce, transport, market or rely on quality fuel in their businesses.

## Refinery process additives research & new product development

This research group emphasizes new product development and research in three key areas for the refining industry:

- **Antifoulants** – GE has developed chemical additives that increase heat transfer and throughput, enhance reliability, and lower maintenance costs.

- **Corrosion inhibitors** – through experience these scientists understand the fundamental mechanisms driving deposition in heat exchangers, reboilers, condensers and other equipment and develop new technologies to combat it.
- **Phase separation** – GE researchers have invented new technology to solve refining difficulties involving multiple phases including emulsion breaking, foam elimination and solids separation.

## Customer analytical service

As the largest of three Customer Analytical Service Laboratories within Water & Process Technologies, this group is able to produce over 2 million analytical results each year. The ISO-certified lab is equipped with the latest analytical instrumentation. Comprised of dedicated, individual labs, key services offered include:

- Water analysis
- Inorganic deposit analysis
- Microbiological service
- Resin analysis
- Reverse osmosis autopsy
- Corrosion coupon laboratory



# imagination breakthroughs

The power and resources of the best minds in the business are poured into everything we create through our research and analysis. We pool multiple layers of expertise to bring you innovative, dynamic imagination breakthroughs that increase your operation's performance, protect the environment, reduce costs and make your business more competitive.

From the cutting edge GE Global Research Centers to the innovative experts in The Woodlands laboratories, you can depend on us to provide the dynamic solutions for operational challenges today and in the future.

What we can imagine together, we can make happen.

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imagination at work