Connected Facility Solutions

Innovative solutions for a more connected, sustainable world

Photo courtesy of NASA
Enabling digital transformation is the focus of the Jacobs Connected Enterprise (JCE). Our JCE approach delivers better business outcomes for our clients through the application of decades of functional expertise and experience, enabled by integrated digital capabilities and solutions that seamlessly fuse Information Technology (IT) and Operational Technology (OT) environments. The core components of our Jacobs Connected Enterprise solutions include the capability to connect, protect, analyze, and optimize operational systems and data.

**Jacobs Connected Facility Solutions**

Our Connected Facility Solution includes a mix of networked and physical data acquisition, national security grade cybersecurity, and analytics at the edge. The solution is deployed across a broad range of industrial domains including energy management, storm water/sewage management, mechanical systems instrumentation, and remote HVAC operations. This award winning program includes significant client validated savings, increased safety, uptime, and overall asset reliability.

**Featured Benefits:**

- **Condition Based Maintenance (CBM)** – Jacobs CBM approach emphasizes holistic integration of solutions that span across the full facility lifecycle to manage the challenges of operational and maintenance programs while generating greater value in terms of time and cost savings. We ensure CBM program sustainability and continuously improve our client’s operations by leveraging relationships with global professional organizations and our structured training and certification programs.

- **Cost Savings** – Jacobs CBM program increases our customer’s savings by providing Preventive Maintenance that identifies potential system failures before they occur, resulting in reduced maintenance action and costs. Plant availability is increased which allows more time for executing the mission and less downtime for maintenance.

- **Safety** – A comprehensive CBM program delivers an inherently safer facility that is a result of scheduled and better planned maintenance actions and the identification of potential catastrophic equipment failures that elevate the risk to workers in the facility. At Jacobs, we look for ways to recognize and mitigate risks – on and off the job – and extend BeyondZero safety culture to our business partners, clients, and families.

- **Certified Maintenance & Reliability Professionals** – Jacobs adheres to the principles and standards of the Society for Maintenance & Reliability Professionals (SMRP), a nonprofit professional society formed by practitioners to develop and promote excellence in maintenance, reliability, and physical asset management. We pride ourselves on employing large pools of qualified Maintenance and Reliability professionals to ensure the best level of resource management possible. Continuous Process Improvement is fundamental to our Whole Life Asset Management Program. Our asset managers also take strong leadership roles to ensure continuous development and improvement of training and certification for managers and technicians.
Our Connected Facility Solution drives collaboration to improve both asset and business performance for our customers.

<table>
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<th>Condition Based Maintenance of Different Asset Classes and Benefits</th>
<th>Asset Class</th>
<th>Technology</th>
<th>Benefit</th>
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| | Air Handlers | Differential pressure switches and transmitters on filters | • Indicates pressure drop across filter banks potentially increasing the time between filter changes  
• reducing material spend and avoiding unnecessary downtime |
| | Cooling Towers | Accelerometers on pumps and gear boxes | • Provides for real-time data collection and eliminates technician routes  
• Increases reliability and reduces cost of repairs as gear boxes replacements and cooling tower downtime are both costly and disruptive |
| | Motors | Motor insulation quality, motor system performance monitoring | • Provides for real-time data collections and eliminates technician routes  
• Increases reliability of critical motor systems |
| | Online Oil Monitoring | Monitoring of oil viscosity, water content, particulate content, temperature | • Provides for real-time data collections and eliminates technician routes  
• Increases reliability of critical lubrication systems |
| | UPS and Substation Battery Monitoring | UPS, and battery status and health | • Provides for real-time data collections and eliminates technician routes  
• Increases reliability of critical battery systems |
| | General Monitoring | Generator status and health | • Provides for real-time data collections and eliminates technician routes  
• Increases reliability of critical generator systems |
| | Other Critical Systems | Leverage existing Facility Automation Systems to collect and trend data | • Infrastructure already in place to collect data  
• Provides the largest potential Return on Investment (ROI) due to high dollar value and revenue generation of research systems  
• Provides maintenance engineers and technicians greater insight into the historical operation of the equipment |

Applying CBM as part of our overall asset management program, Jacobs achieves outstanding results for our clients. As a result, our programs have been recognized as best-in-class by a 2014 rating of “Excellent” by LifeCycle Engineering, a leading asset management consulting firm chartered by the U.S. Air Force. In 2008 and 2010, *Uptime* Magazine selected our CBM program as Predictive Test and Inspection (PT&I) Program of the Year, and in 2017, Jacobs NASA Langley Research Center was honored to receive *Uptime* Magazine’s 2017 Best Reliability Program of the Year Award.
Our vision is to serve as the best value Condition Based Maintenance Provider in the world, delivering premier solutions for the highest overall Return on Investment (ROI) for our clients' physical assets.

The Jacobs Approach to Asset Management

Asset management is about maximizing returns on asset investments. Whether building reliability into capital plans for growth or extending the life of aging assets, Jacobs works in partnership with our customers to create tailored asset management programs that safely and dependably maximize and sustain their ROI of high-valued assets, throughout their full life cycle. Our proven approach has demonstrated decreased downtime, increased system availability and reliability, and reduced total maintenance costs. Key to this is our application of a disciplined Condition Based Maintenance Program combined with the application of new technology.
“A well-established CBM program can eliminate or reduce asset failures cost-effectively and helps in scheduling maintenance activities to minimize costs.”

Ramesh Gulati, Jacobs SMRP
Maintenance and Reliability Best practices, 2017
NetexpressUSA dba Reliabilityweb.com

Condition Based Maintenance is an integral part of the Reliability Centered Engineering spoke of the Jacobs Asset Management Delivery Framework.
Our approach to CBM has been developed and refined with over 50 years in the O&M business of large industrial facilities. While others are talking about what they can do to improve a client’s operation with new technology and a comprehensive CBM program, Jacobs is actually delivering new levels of ROI to our NASA, DOD, and commercial clients.

Maximizing the Return on Investment of Langley Research Center’s Critical Assets

As the operations and maintenance (O&M) contractor for the Center Maintenance Operations and Engineering (CMOE) contract at NASA Langley Research Center (LaRC), Jacobs’ primary goal is to continually seek ways to gain operational efficiencies. Through partnership with LaRC and internal collaboration with our Jacobs Connected Enterprise (JCE) team, we deployed technologies to enable real-time monitoring and analytics of LaRC’s critical assets, improving efficiency, reliability, and availability.

Jacobs Asset Management Deployment Strategies for Langley Research Center:

- Instrumented ~555 assets using ~5,000 discrete points to measure vibration data through a wireless network
- Applied data analytics capabilities to measure and analyze the data
- Introduced Building Automation and combined 11 disparate systems (primarily HVAC) into a single integrated system, now monitoring more than 100,000 points
- Designed and implemented the hardware and software to enable real-time asset monitoring and data capture in the Center’s control room (Integration Operations Center)
- Leveraged our JCE cybersecurity experts to ensure the safety and integrity of data transfer and capture
- Linked floor plans using Geographic Information Systems (GIS) and attached control drawings to facilitate troubleshooting and quickly identify problem areas

Benefits to NASA Langley Research Center since rollout of our Asset Management Delivery Framework in October 2015:

- No failures or unplanned outages of instrumented assets
- Cost savings of 2-3% of the LaRC monthly budget equating to a 2-year return on investment
- LaRC program is now touted as a possible enterprise solution for all of NASA
- Recognition by Uptime Magazine as the Reliability Program of the Year for 2017
WHO WE ARE

Who Is Jacobs?

Jacobs is one of the world’s largest and most reputable providers of professional and technical services, including all aspects of planning, architecture, engineering, construction, asset management, reliability, Operations & Maintenance (O&M), and consulting. In 2017, Jacobs was ranked the #3 Most Admired Company in the World among engineering and construction companies by FORTUNE magazine. We have held a top-5 spot on this coveted list since 1999.

Jacobs at a Glance

1947
Founded by Joseph J. Jacobs

$15B
2017 Revenues

$7.8B
2017 Client Savings

74,000
Employees

400+
Locations

40+
Countries

For over 75 years, Jacobs has provided government and commercial customers access to unrivaled, multidisciplinary skills across the globe. Drawing on a wide range of experience across industry sectors and global markets, Jacobs offers clients the best value for managing and maintaining the assets they own and operate. We deliver scalable solutions to meet individual customer needs, ranging from a comprehensive integrated services model to discrete, tailored services.
For more information visit Jacobs.com/JCE or email JCE@jacobs.com

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