

Asset Reliability Services

Smart Turnarounds™ and Outages



TURNAROUNDS: A SMART APPROACH

You plan for turnarounds. Now plan for a better return.

Turnarounds play a critical role in the plant's life cycle. It's a time to repair, renew, replace, and revitalize your key assets to maximize your plant's true potential. And, because turnaround costs are high, it's important to get the job done right.

Poor planning can result in unidentified issues with critical assets or overlooked processes, while insufficient workmanship can cause delayed startup and even worse – safety and environmental mishaps. Poorly executed turnarounds can cause extended downtime, resulting in lost production, possible fines, and decreased profitability – ultimately impacting the longevity of your plant and the life of your equipment.

When your available time for maintenance is short, how can you be sure to get the most out of your turnaround?

Predictive diagnostics from key production assets are the drivers for a successful and efficient turnaround. Information obtained about the health and condition of your assets

enables you to determine the scope of the turnaround and allows you to work smarter, more targeted, and cost-effectively.

When it comes to turnarounds, no one is more qualified to service your plant than Emerson.

Our asset reliability services experts use predictive diagnostics to assess the condition of your electrical, mechanical, process equipment, instruments, and valves. With predictive maintenance technologies, we can know in advance which assets will need work, what work should be done, and in what order we should do it for maximum efficiency.

With Emerson's proven turnaround process, you'll be assured that the planned maintenance is executed smoothly and efficiently, in the shortest amount of time.

For your next turnaround, make it a Smart Turnaround with Emerson. We'll be there every step of the way – in whatever role you need us. Together, we'll plan for a successful turnaround and build long-term life cycle efficiency for your plant.





A PROVEN PROCESS FOR RELIABLE RESULTS

Plant turnarounds constitute the single largest identifiable maintenance expense – and controlling turnaround costs and duration represents a definite challenge. The most critical objectives are:

- **To complete the turnaround in the shortest possible time and at the lowest possible cost**
- **To achieve the best quality of workmanship**
- **To execute the turnaround with the highest possible safety record**

To meet these objectives, Emerson has developed a proven process that ensures your turnaround is done right, on schedule, and within budget. The steps of our turnaround process include:

Asset Review

An effective turnaround strategy begins with effective planning. During this step, Emerson will conduct a plant walk-through and equipment assessment to identify the project objectives. We will develop a comprehensive inventory of your assets, including nameplate information, service cycles, and age and criticality of system components. This information provides the foundation for asset planning.

Asset Planning

Emerson will conduct pre-outage online diagnostic testing to assess the condition of your assets, determining which assets will need work and what work is required. We'll establish the details of the project, prioritize needs, and examine the impact on the overall process.

Resource Planning & Allocation

Once the scope of work has been clearly defined and a schedule has been developed, we'll create a plan for each element of the execution and allocate test equipment, parts, materials, and labor resources.

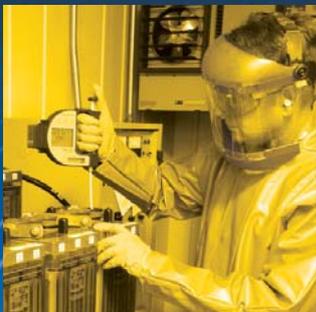
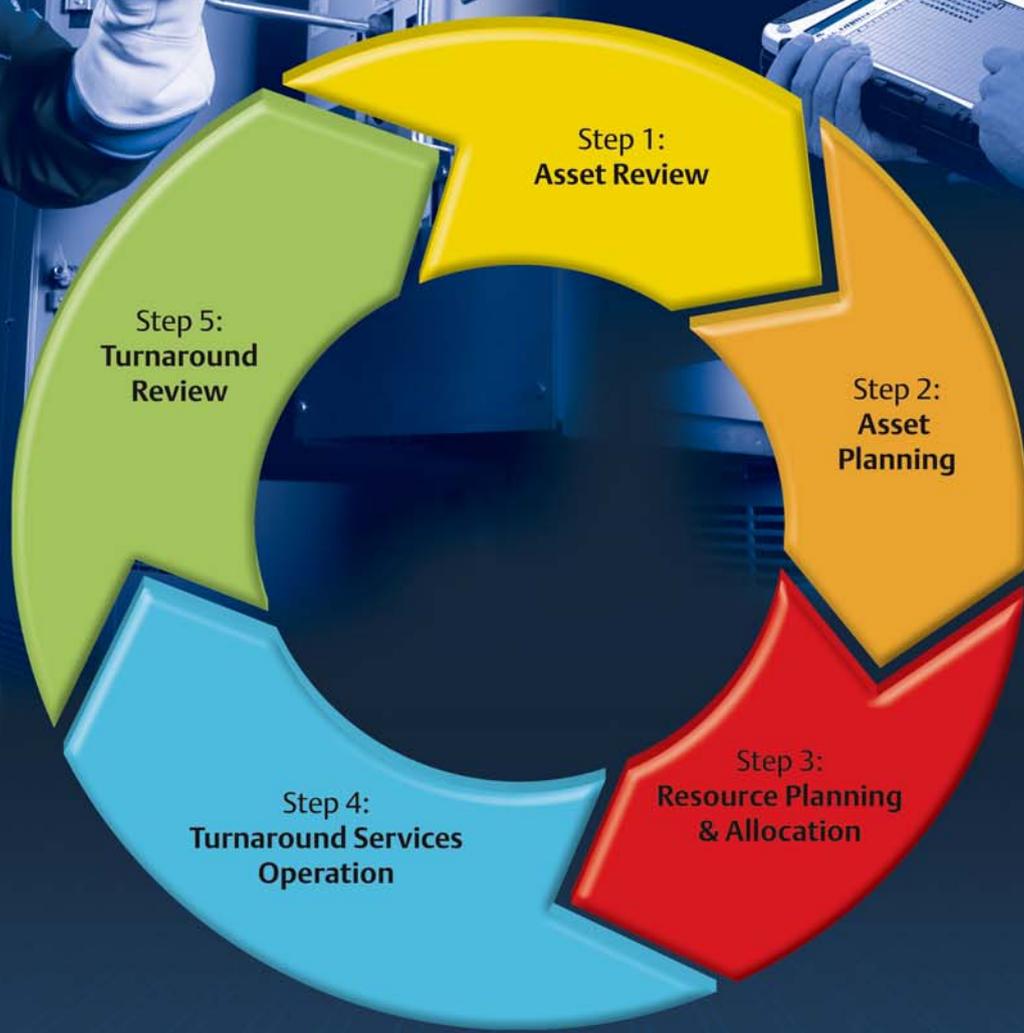
Turnaround Services Operation

When it's time to execute your turnaround, we'll be there with the right people, processes, and technology to ensure that your turnaround is done right, on schedule, within budget, and to your satisfaction.

Turnaround Review

After your turnaround is completed and your process is successfully online, we'll review the turnaround process with you and provide a final comprehensive report detailing the tasks performed, equipment serviced, and personnel involved. The report includes testing results and a summary of recommendations for future maintenance.







EMERSON
Process Management

Job No: XXXXXXXX Bill No: XXXXXXXX
 Phone: XXXXXXXX Equipment: FLIR P6077
 Engineer: Dennis Jeffrey Asset No: NA

Identification

Equipment: DIST PNL MELO
 CAT # : NA
 Rating: 125
 Class: 6.10.12
 Date: 6/20/01
 Time: 8:02:59 AM

Note: AFTER CORRECTION

Thermal Image

40.0°C
 30.0°C
 20.0°C
 10.0°C
 0.0°C
 -10.0°C
 -20.0°C
 -30.0°C
 -40.0°C

SP01	37.0°C	Phase A
SP02	33.0°C	Phase B
SP03	32.4°C	Phase C

Ambient Temperature: 21.0°C

Results and Recommendations

Measurements	Phase A	Phase B	Phase C	Notes
Load Current	65	70	68	
Multislot Temp	99	70	75	

Fault: CORRECTED Priority: 0

Recommendations: CORRECTED

Priority levels are determined by the temperature difference between adjacent like components.

Infrared inspection findings are carefully documented in a comprehensive report that includes high-resolution color digitized photographs and thermograms, and recommendations for correction or repair prior to the next scheduled maintenance shutdown.

THE POWER OF PREDICTIVE DIAGNOSTICS

Production assets today are more sophisticated than ever before.

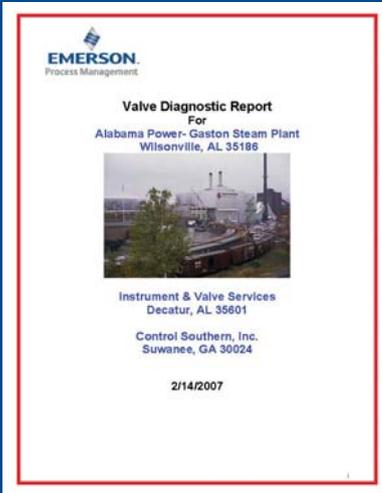
It is impossible to fully optimize your assets without an advanced predictive maintenance program that enables an efficient maintenance strategy and continuous performance improvement.

Emerson's Smart Turnaround program utilizes advanced technologies to diagnose, monitor, and protect your most critical assets.

AMS® Suite, a family of best-in-class predictive maintenance applications, helps you detect equipment problems before they occur. Before, during, or after a turnaround, AMS Suite can help you save time and money by delivering valuable diagnostic information already contained in your smart devices. At any time in your plant life cycle, online diagnostics can be utilized for control valves and field instruments.

With AMS Suite, you can:

- Fully implement predictive diagnostics from field devices to improve plant availability and reduce maintenance costs
- Identify, troubleshoot, and resolve device issues remotely and efficiently
- Streamline calibration procedures and permanently store the calibration records



FlowScanner diagnostic reports detail valve assets that need repair or replacement. This results in a 20% - 40% reduction in valve pulls, depending on the condition of the valves.



Emerson's **FlowScanner™ 6000** is a valve diagnostic system that conducts inline testing of valves, eliminating the need to remove and reinstall, to save you time and money. Valves are tested to manufacturing specifications, ensuring maximum performance and efficiency.

Efficient data collection is made possible with Emerson's **QC³ Outage Tracking Tool**. Before your turnaround, Emerson technicians electronically capture

information on all assets included in the work scope. Once the turnaround begins, QC³ enables project status updates, including percent of completion, man-hours worked, and asset discrepancies.

Emerson's **advanced partial discharge testing technology** plays a critical role in determining the health of your electrical assets and ensuring maximum uptime. It also provides asset managers with critical information needed to target maintenance resources

for the areas that require the most attention.

With predictive diagnostics, you will know in advance which assets need attention so you can optimize your maintenance plan for maximum efficiency during your turnaround.

EMERSON'S SERVICE EXPERTS PROVIDE THE SUPPORT YOU NEED

When it's turnaround time, take advantage of Emerson's range of industry-leading services and expertise.

Predictive Diagnostics

Assess the condition of your aging assets prior to your next turnaround with Emerson's predictive diagnostic services and technologies. Emerson's advanced diagnostics for valves include valve leak testing and leak detection using AMS Suite and FlowScanner.

For your electrical assets, we'll conduct partial discharge testing, oil analysis, infrared inspections, and ultrasonic testing. Conducting diagnostic testing in advance of your next turnaround will assist in prioritizing those assets that need immediate repair – making the best use of your maintenance work.

Onsite Repair Center

Our mobile service trailers provide a portable maintenance facility at

your site. Equipped with lathes, mills, welders, workbenches, and parts, we're prepared to diagnose, calibrate, remove, repair, and replace your instruments and valves onsite – saving time and money. Our "workbench on wheels" provides 24/7 availability throughout the duration of your turnaround.

Encore® Program for Valves

Repair or replace obsolete and hard to find valves in a matter of hours with Emerson's Encore program. Encore products are units remanufactured to original factory specifications and assembled by expert valve technicians. Our strict quality control process ensures that every Encore part meets industry and factory standards – guaranteed.

Electrical Testing and Maintenance

Conduct electrical testing and maintenance on all your electrical

assets to ensure their efficient, reliable and safe operation. Our expert technicians will clean, inspect, and test your entire electrical distribution system and identify areas for improvement. Our life-extension services provide repair, retrofit, and/or replacement for obsolete and defective equipment in order to maximize the value of your existing equipment while improving overall system performance.

Asset Planning and Management Services

Asset Planning and Management Services provide daily technical and around-the-clock emergency support for your electrical, valve, and instrument applications and maintenance. Our asset managers deliver best-practice solutions during your turnarounds and throughout your plant's life cycle.

When it's turnaround time, turn to Emerson for proven technologies and services to help your plant succeed today, tomorrow, and beyond.



TECHNOLOGY ALONE DOESN'T GET THE JOB DONE – PEOPLE DO

From the moment they arrive onsite from one of our conveniently-located service centers in North America, our technicians and engineers offer you the highest standards of professionalism and safety.

- Emerson's Asset Reliability Services team is comprised of more than 700 of the industry's premier engineers, PEs, technicians, and support professionals. Through the InterNational Electrical Testing Association (NETA), Instrument Society of America (ISA) CCST Certification, and Emerson's Rosemount®, Fisher®, and Micro Motion® Certification programs, our technicians have the expertise and experience to accomplish the most complex projects safely and reliably.
- Every technician is trained to Occupational Safety and Health Administration (OSHA) standards for personal and environmental

safety, including training in more than 60 Environment, Safety, and Health (ESH) procedures.

- Our technicians are trained and certified by the PHMSA (US Department of Transportation Pipeline and Hazardous Materials Safety Administration) to work on pipelines.
- Emerson has a history of working safely. Our Experience Modifier Rate (EMR) is one of the lowest in the industry.

Finally, when the job is complete, our technicians leave something valuable behind – expertise. Through our training programs, your in-house personnel learn about operation, troubleshooting, diagnosis, and resolution. As a result, your plant staff can benefit from Emerson's expertise long after the turnaround is over.





TURNAROUNDS ARE JUST THE BEGINNING

Leverage Emerson's services to create and run a more profitable plant.

Emerson project managers are available to deliver valuable insight during turnarounds and startups. Between turnarounds, keep your processes running at peak efficiency through scheduled maintenance of your electrical systems, valves, and instrumentation.

Emerson's asset optimization technology can help raise the productivity of aging plants.

Our AMS Suite predictive maintenance software is a core component of the PlantWeb® digital plant architecture, improving availability and performance of mechanical equipment, electrical systems, process equipment, instruments, and valves. Through asset optimization, customers have increased production from 2%-5% and decreased their energy costs by 15%-20%.

Every Emerson product and service is backed by people who are committed to meeting your needs and exceeding your expectations. Maybe that's why Emerson's technologies and services are routinely recognized as superior by both customers and industry peers. So, the next time you schedule a turnaround, call Emerson's Asset Reliability Services team. We can be there before, during, and after your next turnaround to help you maximize the potential of every asset in your plant.



www.assetweb.com

©2009, Emerson Process Management.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.

All rights reserved. AMS, Smart Turnarounds, Fisher, Micro Motion, Rosemount, FlowScanner and Encore are marks of one of the Emerson Process Management group of companies. The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their respective owners.

D351034X012/MT-01-0209/printed in USA/7-2009

Emerson Process Management – Asset Optimization – Asset Reliability Services

Instrument & Valve Services

205 South Center Street
Marshalltown, IA 50158

Electrical Reliability Services

8760 Orion Place, Suite 110
Columbus, OH 43240

Machinery Health Management

835 Innovation Drive
Knoxville, TN 37932

www.assetweb.com

