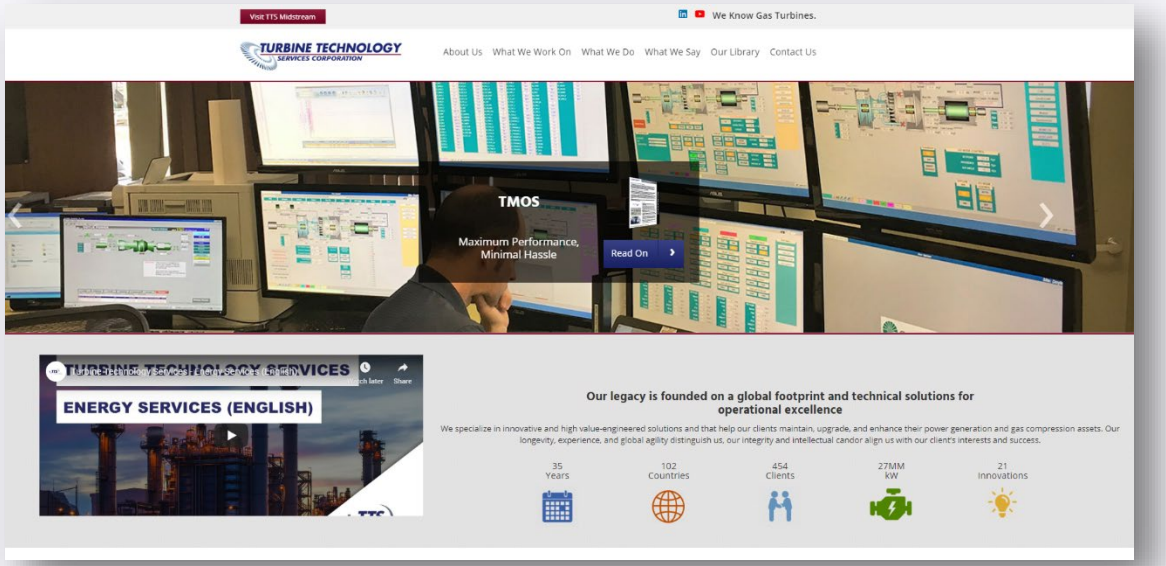
SCOTT MUSTER

PORTFOLIO

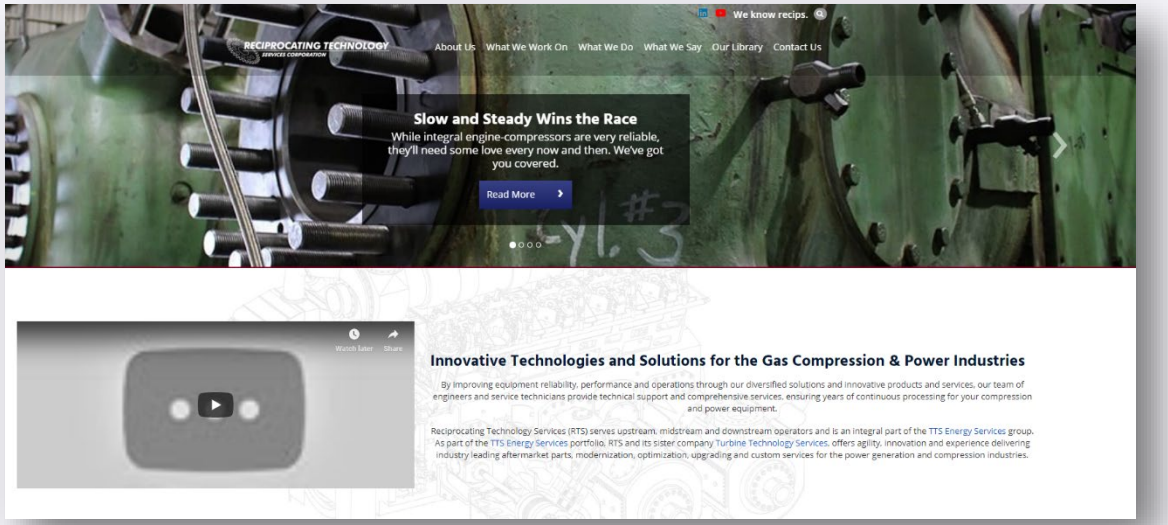
2020

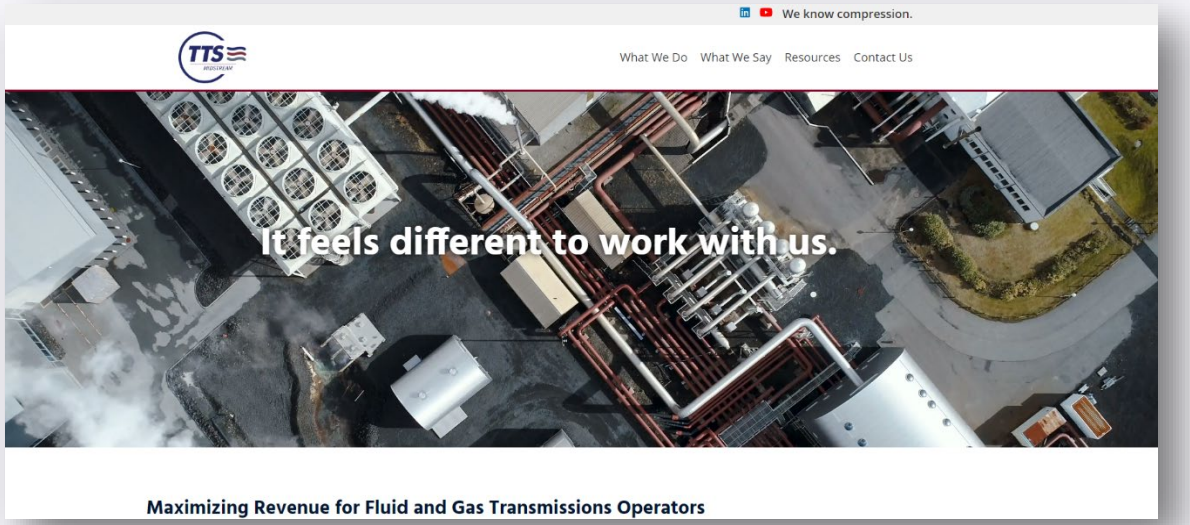
- Websites
- Landing Pages
- Videos
- Branding
- Advertising
- Print
- Trade Show
- Presentations
- Photography

WEBSITES

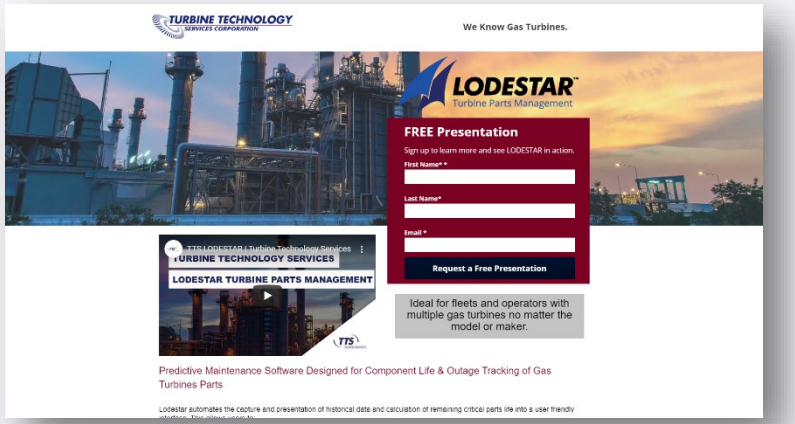


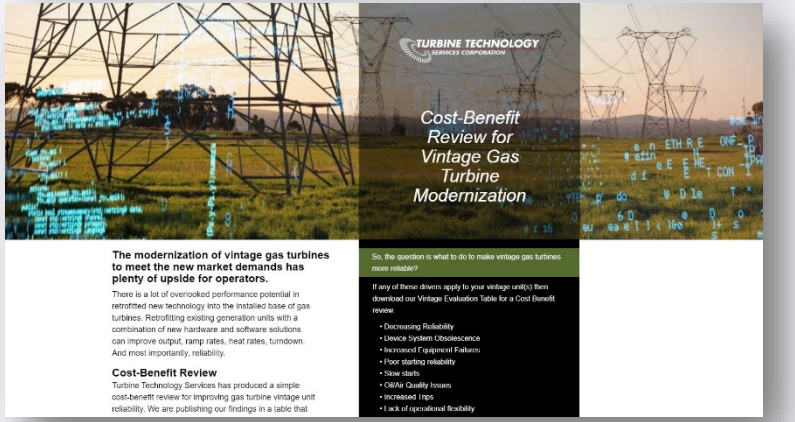
TurbineTech.com
RecipTech.com
TTSMidstream.com

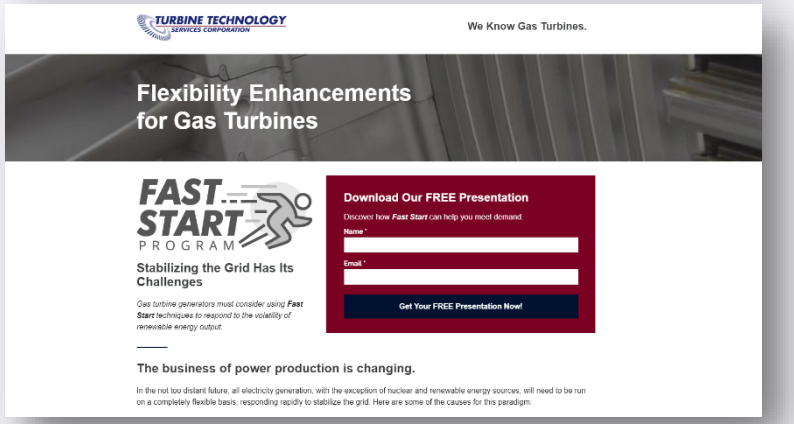


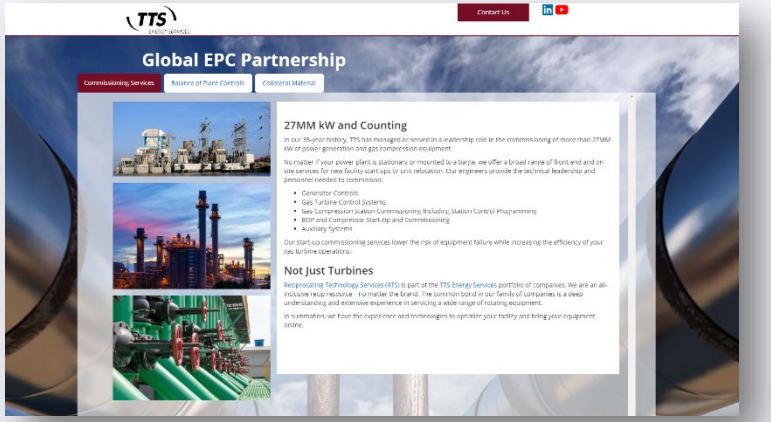


LANDING PAGES









TTSLodestar.com
VintageTurbineReliability.com
TTSFastStart.com
EPCGlobalPartner.com
TMOSUsers.group

Web pages dedicated to specialty products and services.

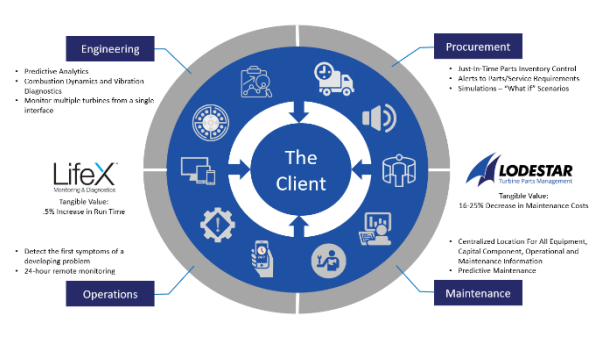
VIDEOS

https://www.youtube.com/channel/UC7DIpO80L9o1bI9XN2ZvZwQ

BRANDING

DYNAFLEX™ PERFORMANCE

LODESTAR™ Turbine Parts Management

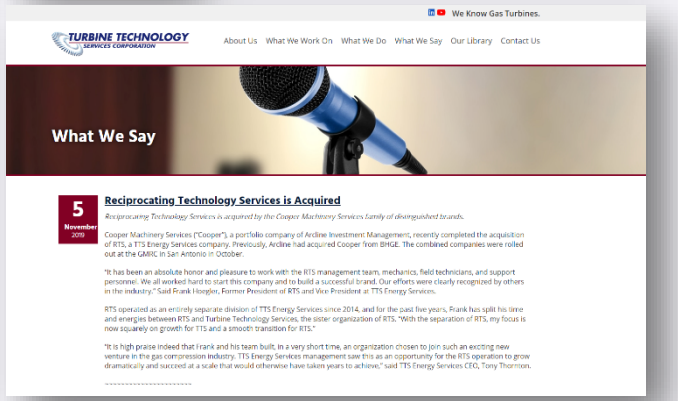


Trademarked Sub-Brands for Specialty Products
Infographics
Messaging/Tagline

Strategic Rationale: TTS Energy Services Stands By You™

- **TTS/ES is a service company; the brand should feel like it.**
- **Focused on the new demographics. 57%+ Millennials.**
- **Open to trademark.**

ADVERTISING

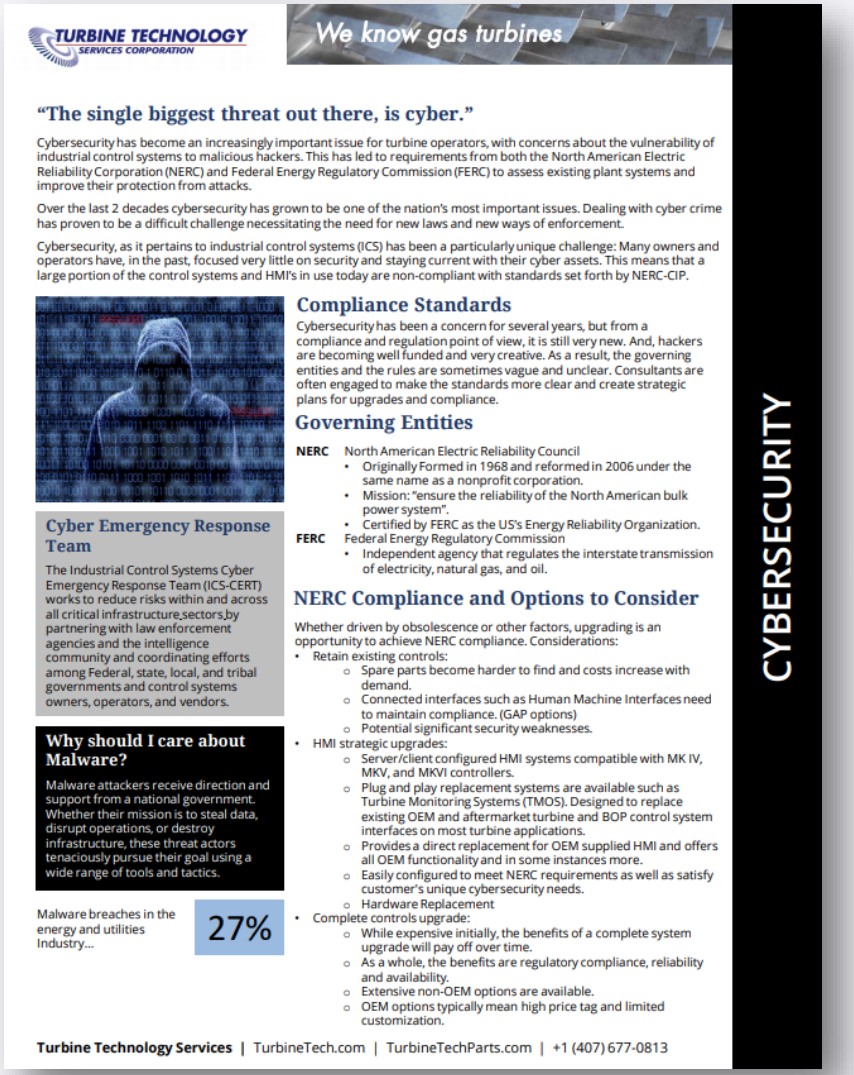


Trade Publications
Online Magazine
Internal Communications
Email Marketing
LinkedIn Advertising
Blogs/Articles

https://fliphtml5.com/lmht/jfpj

https://turbinetech.com/blog/

PRINT



TURBINE TECHNOLOGY SERVICES CORPORATION

We know gas turbines

CYBERSECURITY

"The single biggest threat out there, is cyber."

Cybersecurity has become an increasingly important issue for turbine operators, with concerns about the vulnerability of industrial control systems to malicious hackers. This has led to requirements from both the North American Electric Reliability Corporation (NERC) and Federal Energy Regulatory Commission (FERC) to assess existing plant systems and improve their protection from attacks.

Over the last 2 decades cybersecurity has grown to be one of the nation's most important issues. Dealing with cyber crime has proven to be a difficult challenge necessitating the need for new laws and new ways of enforcement.

Cybersecurity, as it pertains to industrial control systems (ICS) has been a particularly unique challenge: Many owners and operators have, in the past, focused very little on security and staying current with their cyber assets. This means that a large portion of the control systems and HMI's in use today are non-compliant with standards set forth by NERC-CIP.

Cyber Emergency Response Team

The Industrial Control Systems Cyber Emergency Response Team (ICS-CERT) works to reduce risks within and across all critical infrastructure sectors by partnering with law enforcement agencies and the intelligence community and coordinating efforts among Federal, state, local, and tribal governments and control systems owners, operators, and vendors.

Why should I care about Malware?

Malware attackers receive direction and support from a national government. Whether their mission is to steal data, disrupt operations, or destroy infrastructure, these threat actors tenaciously pursue their goal using a wide range of tools and tactics.

Malware breaches in the energy and utilities Industry...

27%

Compliance Standards

Cybersecurity has been a concern for several years, but from a compliance and regulation point of view, it is still very new. And, hackers are becoming well funded and very creative. As a result, the governing entities and the rules are sometimes vague and unclear. Consultants are often engaged to make the standards more clear and create strategic plans for upgrades and compliance.

Governing Entities

NERC North American Electric Reliability Council
- Originally Formed in 1968 and reformed in 2006 under the same name as a nonprofit corporation.
- Mission: "ensure the reliability of the North American bulk power system".
- Certified by FERC as the US's Energy Reliability Organization.

FERC Federal Energy Regulatory Commission
- Independent agency that regulates the interstate transmission of electricity, natural gas, and oil.

NERC Compliance and Options to Consider

Whether driven by obsolescence or other factors, upgrading is an opportunity to achieve NERC compliance. Considerations:

- Retain existing controls:
  - Spare parts become harder to find and costs increase with demand.
  - Connected interfaces such as Human Machine Interfaces need to maintain compliance. (GAP options)
  - Potential significant security weaknesses.
- HMI strategic upgrades:
  - Server/client configured HMI systems compatible with MK IV, MKV, and MKVI controllers.
  - Plug and play replacement systems are available such as Turbine Monitoring Systems (TMOS). Designed to replace existing OEM and aftermarket turbine and BOP control system interfaces on most turbine applications.
  - Provides a direct replacement for OEM supplied HMI and offers all OEM functionality and in some instances more.
  - Easily configured to meet NERC requirements as well as satisfy customer's unique cybersecurity needs.
  - Hardware Replacement
- Complete controls upgrade:
  - While expensive initially, the benefits of a complete system upgrade will pay off over time.
  - As a whole, the benefits are regulatory compliance, reliability and availability.
  - Extensive non-OEM options are available.
  - OEM options typically mean high price tag and limited customization.

Turbine Technology Services | TurbineTech.com | TurbineTechParts.com | +1 (407) 677-0813

Brownfield Commissioning
Case Study

Dynamics on the pipeline infrastructure necessitated... *Flexibility.*

SITUATION

Like virtually everyone in the distribution and transmission sector, this North American leader in the gathering, transportation, processing and storage of natural gas, was very busy in 2016-17 with significant system modifications and project development to effectively monetize the rapidly changing production basins (Marcellus and Utica) as well as the somewhat lagging emerging markets or demand centers (industrial buildout & LNG exports). The dynamics on the pipeline infrastructure necessitated that the existing network become more accommodating with gas flows and/or customer needs throughout various times of the year.

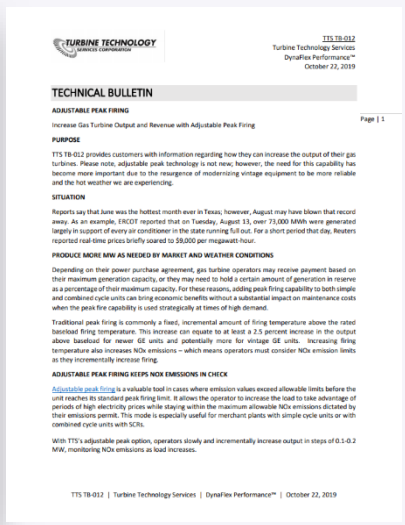
As a result, many pipeline companies in the long-haul natural gas business, undertook several projects focusing on developing a backhaul capability. This pipeline company will be able to move 2 bcf/d to the Gulf Coast and Midwest markets via bidirectional flows in 2017, while retaining full capacity to deliver to Northeast markets when needed.

Achieving these bi-directional flows requires that the existing compressor stations along the pipeline to be modified with valves and piping that will enable the option of compressing gas north or south of the existing compressor units. Once pipelines become fully bidirectional, market arbitrage forces will command the guidance of flows at these flexible locations.

The natural gas compressor station featured in this case study is in South Central Kentucky and one of the many compression stations that underwent the flow direction upgrade. After the valves, pumps and piping has been modified, an engineering firm needs to be engaged to commission the drive units and coordinate bringing the facility back online.

Turbine Technology Services (TTS) has a great deal of experience and expertise in this area and received the contract to manage and execute the commissioning. The following case study details TTS' responsibilities and scope of work.

TTSMidstream.com



TTS TB-012
Turbine Technology Services
DynaFlex Performance™
October 22, 2019

TECHNICAL BULLETIN

Page | 1

ADJUSTABLE PEAK FIRING

Increase Gas Turbine Output and Revenue with Adjustable Peak Firing

PURPOSE

TTS TB-012 provides customers with information regarding how they can increase the output of their gas turbines. Please note, adjustable peak technology is not new; however, the need for this capability has become more important due to the resurgence of modernizing vintage equipment to be more reliable and the hot weather we are experiencing.

SITUATION

Reports say that June was the hottest month ever in Texas; however, August may have blown that record away. As an example, ERCOT reported that on Tuesday, August 13, over 73,000 MWh were generated largely in support of every air conditioner in the state running full out. For a short period that day, Reuters reported real-time prices briefly soared to $9,000 per megawatt-hour.

PRODUCE MORE MW AS NEEDED BY MARKET AND WEATHER CONDITIONS

Depending on their power purchase agreement, gas turbine operators may receive payment based on their maximum generation capacity, or they may need to hold a certain amount of generation in reserve as a percentage of their maximum capacity. For these reasons, adding peak firing capability to both simple and combined cycle units can bring economic benefits without a substantial impact on maintenance costs when the peak fire capability is used strategically at times of high demand.

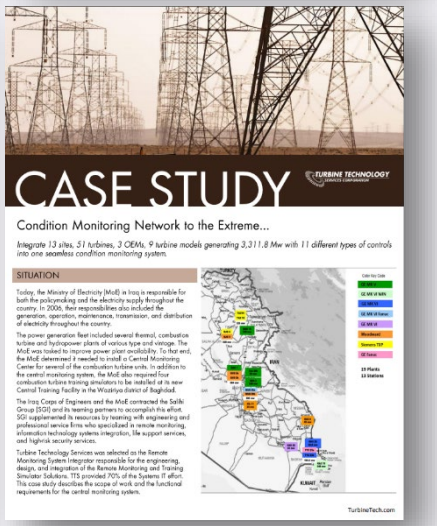
Traditional peak firing is commonly a fixed, incremental amount of firing temperature above the rated baseload firing temperature. This increase can equate to at least a 2.5 percent increase in the output above baseload for newer GE units and potentially more for vintage GE units. Increasing firing temperature also increases NOx emissions – which means operators must consider NOx emission limits as they incrementally increase firing.

ADJUSTABLE PEAK FIRING KEEPS NOX EMISSIONS IN CHECK

Adjustable peak firing is a valuable tool in cases where emission values exceed allowable limits before the unit reaches its standard peak firing limit. It allows the operator to increase the load to take advantage of periods of high electricity prices while staying within the maximum allowable NOx emissions dictated by their emissions permit. This mode is especially useful for merchant plants with simple cycle units or with combined cycle units with SCRs.

With TTS's adjustable peak option, operators slowly and incrementally increase output in steps of 0.1-0.2 MW, monitoring NOx emissions as load increases.

TTS TB-012 | Turbine Technology Services | DynaFlex Performance™ | October 22, 2019



CASE STUDY

Condition Monitoring Network to the Extreme...

Integrate 13 sites, 51 turbines, 3 OEMs, 9 turbine models generating 3,311.8 Mw with 11 different types of controls into one seamless condition monitoring system.

SITUATION

Today, the Ministry of Electricity (MoE) in Iraq is responsible for both the policymaking and the electricity supply throughout the country. In 2006, their responsibilities also included the generation, operation, maintenance, transmission, and distribution of electricity throughout the country.

The power generation fleet included several thermal, combustion turbine and hydropower plants of various type and vintage. The MoE was tasked to improve power plant availability. To that end, the MoE determined it needed to install a Central Monitoring Center for several of the combustion turbine units. In addition to the central monitoring system, the MoE also required four combustion turbine training simulators to be installed at its new Central Training Facility in the Wasitiya district of Baghdad.

The Iraq Corps of Engineers and the MoE contracted the Sallik Group (SGI) and its teaming partners to accomplish this effort. SGI supplemented its resources by teaming with engineering and professional service firms who specialized in remote monitoring, information technology systems integration, life support services, and highrisk security services.

Turbine Technology Services was selected as the Remote Monitoring System Integrator responsible for the engineering, design, and integration of the Remote Monitoring and Training Simulator Solutions. TTS provided 70% of the Systems IT effort. This case study describes the scope of work and the functional requirements for the central monitoring system.

TurbineTech.com

Line Cards
Case Studies
Brochures
Training Manuals
Technical Bulletins

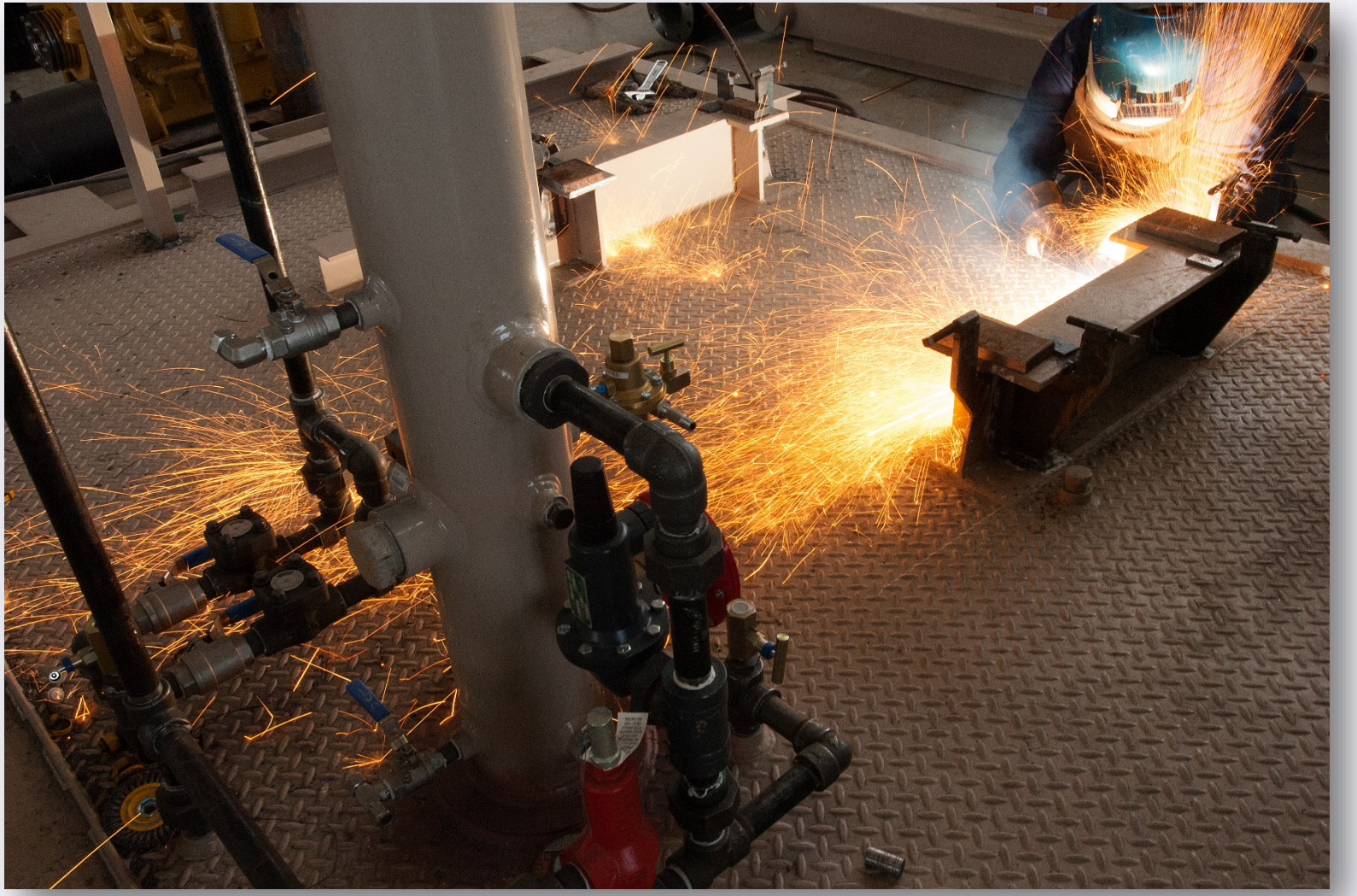
TRADE SHOW

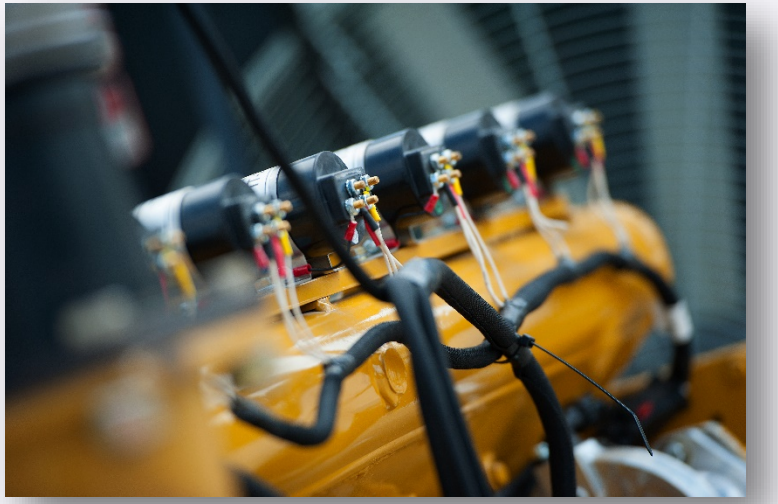
8’X10’

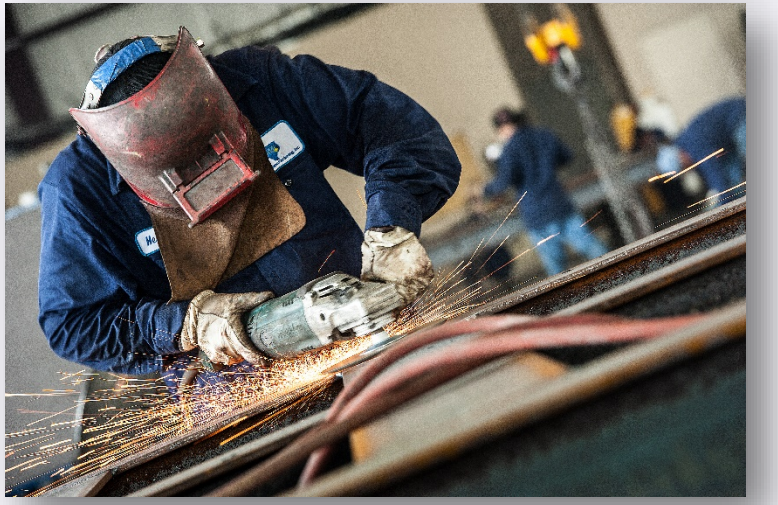
PRESENTATIONS

Internal
Corporate
M&A
Product/Service

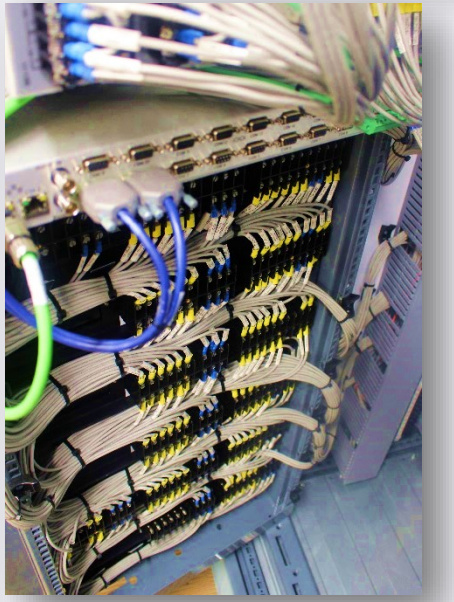
PHOTOGRAPHY



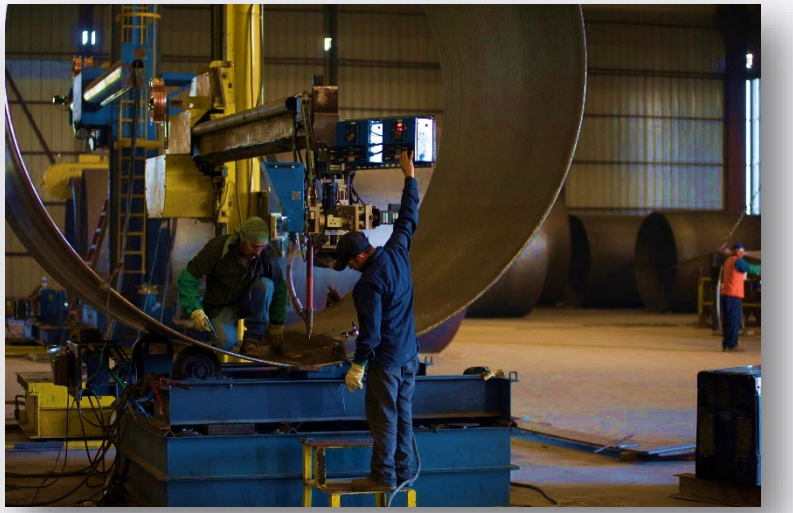




PHOTOGRAPHY



PHOTOGRAPHY



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PORTFOLIO
2020