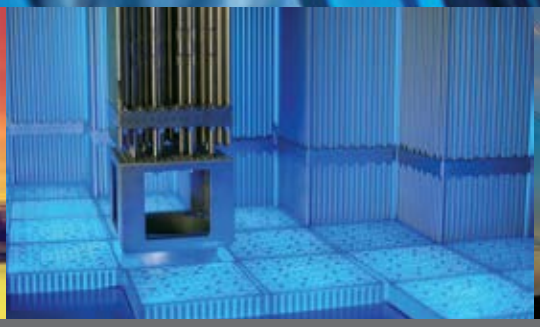
invensys™

Industrial automation and software solutions for the power industry



Partner with Invensys to reduce risk and accelerate time to profitability

Executive Message

from Mike Caliel

As you guide your operation through these challenging times for the power industry, I hope you'll look to us as your partner.

For decades, Invensys has been a preferred automation supplier to the power generation industry. We work as flexible partners with utilities, independent producers and industrial processors as well as major EPCs across the globe. Our client list includes leaders such as Valero Energy, Georgia Power, Salt River Project, Duke Power, Vectren, Castle Peak, Datang Power, SSE, and China Huaneng Group.

Today, I'm proud that 18 of the world's 22 largest power producers are Invensys customers. And note that we're an independent company, specializing in process automation. So we deliver innovative solutions for any class of power plant, including turbines from all leading manufacturers.

You'll find that our world-leading brands such as Foxboro, Triconex, Wonderware, SimSci, and Avantis deliver continuously current, scalable solutions that can equip you to meet the ever-growing demands of the power-hungry global economy.

As your automation partner, I look forward to helping increase your compliance, competitiveness — and profitability.

Sincerely,

Mike

Mike Caliel
President and CEO
Invensys Software and
Industrial Automation

The global power business faces formidable challenges from multiple directions. Forward-thinking executives and managers know that making the right automation choices will be key to agile, efficient, safe and profitable operations.

Generating opportunity

Risks and responses

One thing on which fossil-fueled power generation utilities can count is rising demand. Projections show global electricity use will increase 65% by 2030.

Fulfilling that demand, however, presents challenges:

- Aging assets increase risk and require immediate upgrades
- Lost workforce knowledge hinders effective operation
- Environmental and safety concerns grow, while regulations tighten
- Fuel prices fluctuate, racheting up competitive pressures
- Demand in developing markets requires accelerated new construction

In response, companies worldwide are positioning themselves to grasp emerging opportunities. They're modernizing power automation systems, improving productivity and agility and controlling operations to meet ever-stricter environmental and safety standards.

Increasing business value

Improving the industrial automation and software infrastructure of your business can be the most empowering response to all of these challenges. The right industrial automation and software partner can bring seasoned expertise and fresh thinking to all your issues, finding optimum ways to reduce risk and accelerate time to profitability.

Invensys is a global leader in power automation and operations management systems. We offer wide experience and success in automating coal-fired, gas-fired, gas turbine and combined-cycle units — for public utilities, independent producers and industrial applications worldwide.

Our full range of enterprise control technologies, applications and services helps you meet developing demands. Our engineering expertise ensures safety and regulatory compliance while increasing competitiveness and profitability.

Our proven project execution makes certain you stay on time and on budget. And our holistic modernization program provides the roadmap that keeps you well ahead of the automation curve.

In today's fast-paced power markets, a holistic modernization strategy can be your most critical success factor. Some control or safety vendors may supply only part of the solution; others may provide more than you need. Because we start with the business strategy, our experts can help you develop a plan to extract maximum value from your current assets and modernize only where it will do the most good.

Why partner with Invensys?



As your automation and industrial software partner, Invensys can help you reduce power project risks, increase management and engineering efficiencies, accelerate schedules — and cut total project cost by up to 30%.

Invensys enables 20% of the world's power

Industry expertise

Our control experts work with yours to address the most demanding challenges in turbine, boiler, burner, fuel and water system control; combustion optimization; environmental system management and much else.

Low cost; low risk

Invensys systems and services are priced competitively. Our plug-in DCS migration solution offers the safest and easiest migration path in the industry. And the built-in efficiencies and comprehensive support packages of our technology prove a commitment to your long-term satisfaction.

Proven reliability and availability

Our control and safety systems plus high-availability modernization projects keep your power running day-in and year-out. Invensys control and safety systems, for example, deliver some critical components with "seven nines" reliability — availability scores of 99.9999958%, to be exact.

Knowledge and power

Innovations such as our 2D and 3D operator training simulators can cut your training schedules in half. Our mobile devices and applications empower all your people to share a wealth of ready knowledge about processes and procedures.

Safe and cyber secure

Our world-class experts can help you put in place an affordable yet all-inclusive threat management program. Invensys process safety management specialists provide assured assessment and mitigation.

Built-in future-proofing

Our open architecture and innovative upgrade programs make obsolescence a thing of the past.

Industry-leading technology

- InFusion enterprise control:
  Ensure high ROI and flexible expansion for your entire operation with integrated control, safety, instrumentation, software and business solutions, blending legacy, Invensys and third party applications with ease
- Process automation:
  Get premier Foxboro DCS, SCADA and PAC process control with unparalleled reliability, painless migration and lowest total cost of ownership
- Safety systems:
  Obtain the world's leading solutions with Triconex TMR ultra-reliable fire and gas safety, emergency shutdown and turbomachinery control, including technology for boiler protection and burner management
- Advanced software:
  Access state-of-the-art SimSci software for APC, RTO, simulation, combustion control and much more
- Operations management:
  Synchronize your workforce, equipment, materials and workflows through the world's most popular HMI via Wonderware industrial software

Invensys automation and industrial software solutions for:

FOSSIL GENERATION CONTROL

Water Treatment Control

- pH
- Hydrazine feed
- Condensate polisher
- Brine treatment
- Demineralizer

Emissions Monitoring

- Monitoring and reporting

Turbine Safety and Control

- Speed governor
- Frequency governor
- Overspeed protection
- Online valve test
- Auto-synchronization
- Automatic startup
- Valve actuators
- Hydraulics
- Steam coil air heater

Boiler Control

- Drum once-through
- AGC control
- Coordinated control
- Combustion
- Drum level
- Furnace pressure
- Steam temp
- Load runback
- Load block

Environmental Control

- Mechanical precipitator
- Electrostatic precipitator
- Wet/dry scrubber
- Selective catalytic reduction

Fuel/Coal Control

- Uploader
- Crushing
- Drying
- Stacker reclaimer

Burner Management

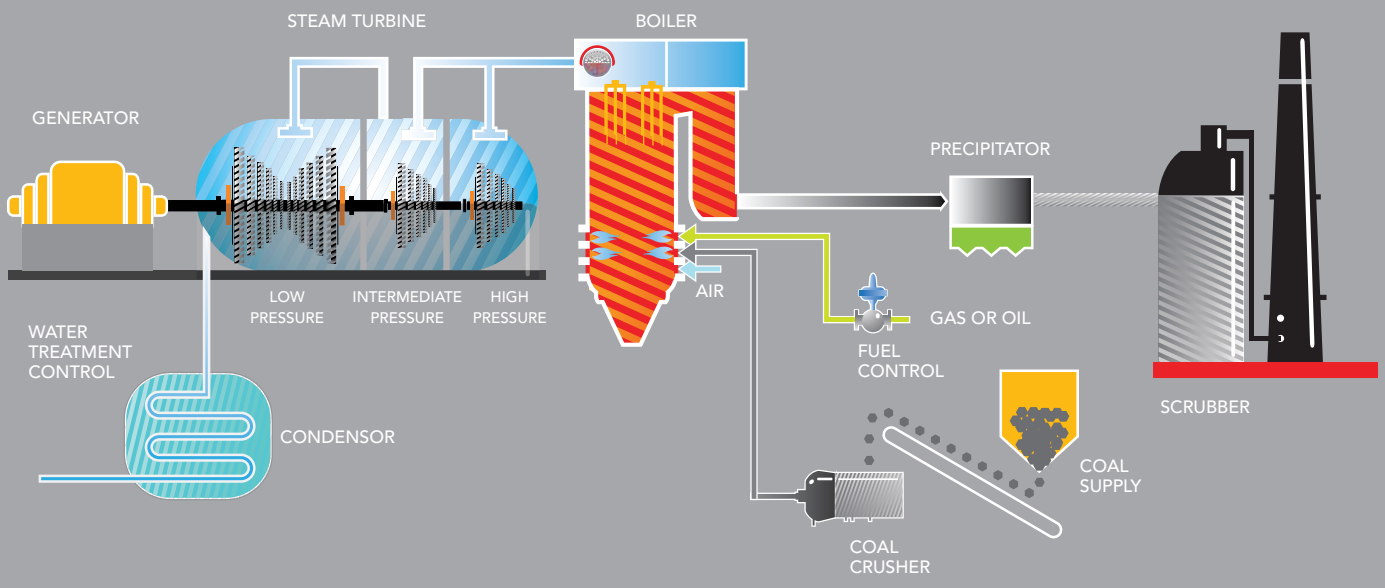
- Auto-purge and pre-light
- Emergency shutdown protection
- Burner pulverizer automation
- Boiler control interface
- Burner-front equipment

Combustion Optimization

- Advanced control
- Adaptive tuning
- Constraint control
- Emissions control

Balance of Plant Control

- Condensate control
- Condensor hot well
- Feedwater heaters
- Make-up water
- Turbine lube oil temp
- Generator H_2 temp
- Motor logic
- Steam coil air heater
- Switchyard



INDUSTRIAL SOFTWARE

Design and Simulation

- Dynamic control system studies
- Design changes and improvements

Key benefit:

Continuous improvement

Procedural Workflow

- Workflow procedures
- Online process or offline business workflow

Key benefits:

Compliance with operational and safety procedures

Reduce errors

Mobile Operators

- Mobile workforce and decision support
- SOPs
- Asset performance
- Hand-held operator interface

Key benefits:

Improve plant availability

Reduce errors

Operator Training

- High-fidelity training simulation system
- Dynamic simulation
- 3D plant model

Key benefits:

Improve time to operator efficiency

Retain knowledge

Improve operational safety

Power Fleet Generation Management

- Manage and track performance of generation assets
- Improve asset utilization
- Monitor unit and fleet KPI
- Optimize mix of generation plants to match grid/ market conditions

Key benefits:

Manage fleet performance in real time on unified platform

COMBUSTION TURBINE CONTROL

Coordinate Control

- AGC control
- CT, HRSG, ST coordinated control

Fuel Control

- Oil
- Gas
- Improve safety
- Improve efficiency

Steam Turbine Control

- Speed governor
- Frequency governor
- Overspeed protection
- Online valve test
- Auto-synchronization
- Automatic startup
- Valve actuators
- Hydraulics
- Steam coil air heater

Emissions Monitoring

- Monitoring and reporting
- Regulatory compliance
- NO_x reduction

Balance of Plant Control

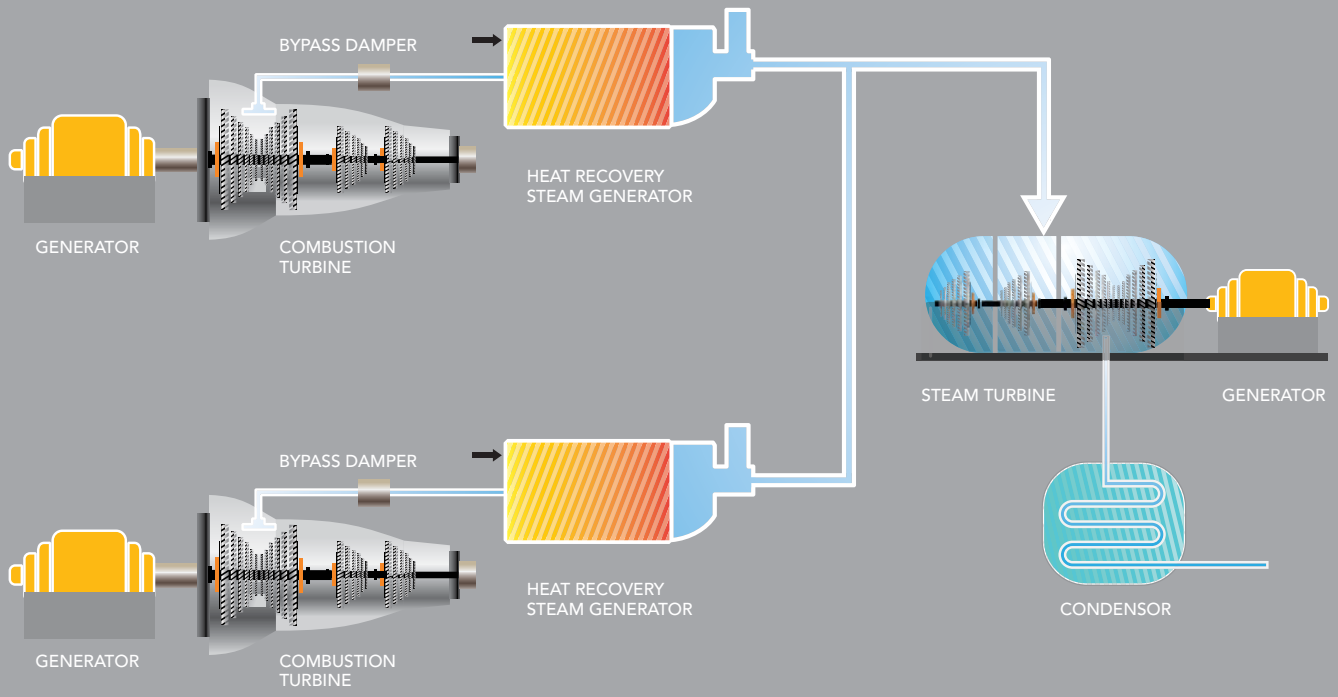
- Sequencing and protective logic
- Motor logic
- Water treatment
- Switchyard

Combustion Optimization

- Advanced control
- Adaptive tuning
- Constraint control
- Improve heat rate
- Decrease NO_x

HRSG Control

- Drum level control
- Steam temp control
- Combustion control
- Blowdown sootblowing



Information Management

- Data acquisition
- Information retrieval, storage and reporting
- Performance calculations
- Controllable losses
- Periodic and demand reports and logs
- Post-trip review reports
- Sequence of events reports
- Generator monitoring
- QF calculations option

Key benefit:

Real-time information visibility

Enterprise Control

- Operations management system
- KPI and reporting
- Real-time finance
- Third-party integration

Key benefit:

Align process and business

Cyber Security

- Establish proper procedures and protocols
- Monitor systems 24/7
- Properly isolate control network
- Meet regional regulations and standards

Key benefit:

Secure operations

Asset Management

- Enterprise asset and maintenance management
- Predictive diagnostics
- Instrument asset management

Key benefits:

Maximize asset utilization

Reduce unscheduled downtime

In today's power automation world, many major projects involve renovation of aging infrastructure. Invensys' holistic modernization reduces time/budget project risk. We help you steer clear of obsolescence, sharpen competitiveness and comply with regulations — all while reducing costs and avoiding new capital investments.

Experienced modernization

Continuously current; ever ready

Invensys modernization experts guide you through the complexities of replacing aging control and safety systems, retrofitting turbomachinery controls, protecting your operation from cyber threats and implementing advanced software applications. Our continuously current product development and lifecycle philosophy keeps you ahead of the technology curve for the life of your plant.

The power industry has zero tolerance for downtime. Invensys specializes in perhaps the highest-availability control and safety systems offered today. Many of our projects — ranging from economical HMI phase-ins to complete system replacements — feature hot-swappable modules and unique migration strategies that deliver the least possible downtime, even during complex modernization efforts.

Are your legacy process automation and safety systems of varying vintages and vendors? Are they supported by an incomplete knowledge base that's unevenly dispersed throughout the organization? After more than 500 successful DCS migration projects, Invensys can help align your people and processes with your business and performance needs.

The holistic approach

Some "upgrades" just refresh some existing technology. Our holistic modernization methodology instead identifies new sources of sustainable business value and helps you strategically implement them via automation advancements.

This approach ramps up revenue through improved execution of business strategy. Compared to haphazard, piecemeal efforts, it can reduce overall modernization costs by up to 10%!

Consulting and assessment

Invensys experts work with your engineering procurement construction contractors (EPCs) and consult with your key stakeholders to understand objectives and priorities. We assist in creating a vision of your operation's future. Then we help you get there, via long-term planning to avoid both technological and business obsolescence.

Look to Invensys to help select and implement world-class solutions in these critical power plant modernization technologies:

CONTROL SYSTEM MODERNIZATION

SAFETY LIFECYCLE SOLUTIONS

TURBOMACHINERY CONTROL SYSTEM RETROFITS

CYBER SECURITY PROTECTION

ENTERPRISE AND PRODUCTIVITY SOFTWARE APPLICATIONS

Proven project execution

Minimizing risk and meeting targets

Invensys project execution strategy sets clear, simple goals. We meet your overall objectives while reducing execution risks.

Our trained project managers marshal wide experience in balancing environmental health and safety, quality, business risks, schedules and costs to deliver your project on time and on budget. We effectively apply people, processes, technology and support infrastructure to achieve your control, safety and information management priorities. From small system upgrades to mega-projects with multiple EPC contractors where we take full responsibility as your main automation contractor (MAC), rely on Invensys for successful project execution.

Invensys advantages

Core execution team. Our experts integrate our vast experience as a single-source supplier of field instruments, control and safety systems and advanced applications worldwide. Our leaders focus the team on a single goal: your success.

Intelligent engineering tools. We apply our integrated, reusable engineering toolset — proven in a wide variety of previous power projects — to produce the best results for you.

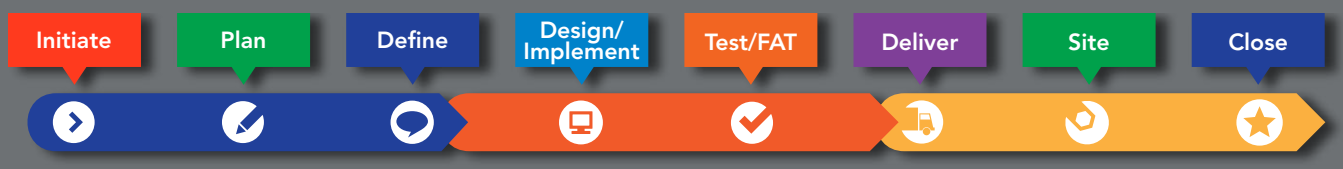
Ensured quality process. Design guidance and quality assurance remain consistent across all phases of the project, and ensure it complies with all industry standards. Our teams execute uniform procedures via proven, world-class stage gate methodology to enforce quality at each site and every step.

Seamless knowledge transfer. Central engineering experts and local support teams utilize common communications protocols and tools. So knowledge critical for effective support is shared throughout the organization.

Minimized testing time. Our integrated operator training system (OTS) helps reduce testing and commissioning cycles to necessary minimums.

Maximized transparency. Invensys keeps you constantly informed of your project's progress. You receive detailed status and audit trail information every step of the way.

Rely on Invensys' proven stage gate methodology to ensure quality at every step of your project.



For more than 100 years, Invensys has been the automation supplier of choice to some of the world's leading power producers. Once clients install an Invensys system, our open architecture and continuously current philosophy make it easy to scale the automation around business and performance needs. You may never need to buy another control platform again. Here are comments from just a few Invensys clients:

What our clients say

On meeting long-term goals

"The Foxboro I/A Series control technology, particularly its object-based control software, gives us the flexibility we need to complete dual fuel conversion at all our targeted units, and we can do it sooner and with fewer costs. Because of the open nature of the technology, Foxboro solutions will help us provide reliable, cleaner energy in a safe, responsible and sustainable manner, as well as meet our long-term strategic objectives and comply with future regulations."

Jose Mulero, chief engineer,
Puerto Rico Electric Power Authority

On migrating to a modern control system

"We now have a supportable system with the capacity we need to proceed with a number of control improvements, which were being held up by the limits of our previous system. Not only was the migration completed with minimal impact on routine plant operation, it has also been possible to retain much of the look and feel of the original system."

Hugh Ferguson, C&I engineer & DCS upgrade
project manager, Keadby Power Station

On freeing operators from maintenance tasks

"The percentage of time the operators had to devote to regulating and manually intervening with the old control system had been relatively large, leaving them less time to focus on enhancing unit performance. Now, with the new Foxboro I/A Series Distributed Control System, the operators can spend more time focusing on other issues for enhancing the performance of the unit."

Joe Chow, plant manager, Castle Peak Power

On validating DCS with simulation software

"The simulator paid for itself as a result of the DCS-Checkout alone."

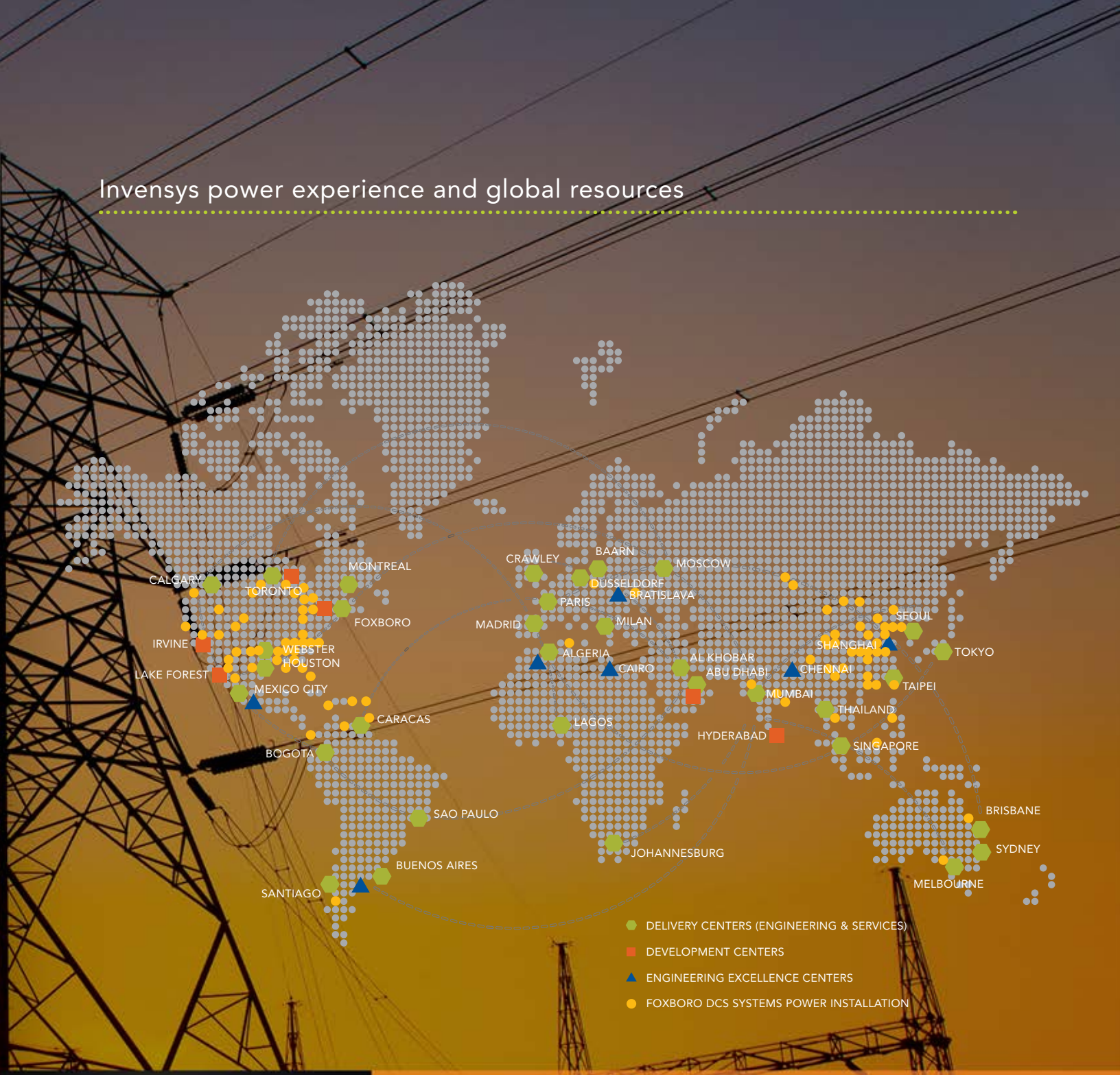
Bill Morgan, project manager on DCS project,
Intermountain Power

On turbomachinery control upgrades

"We have more control to modify the logic design of the system to match the needs of our plant. With the digital control system, we can easily make enhancements."

Marlon Dempsey, instruments and
controls engineer, Duke Power

Invensys power experience and global resources



Today, 18 of 22 top power producers utilize our advanced products and services.

Supporting their success: our global centers for manufacturing, expertise and support.

About Invensys

Invensys is a global technology company that works in partnership with a broad range of industrial and commercial customers to design and supply advanced technologies that optimize their operational performance and profitability. From oil refineries and power stations to mining companies, food and beverage companies and appliance manufacturers, Invensys' market-leading software, systems and controls enable its customers to monitor, control and automate their products and processes, thereby maximizing safety, efficiency, reliability and ease of use. Invensys offerings are delivered under several prominent industry brands, including Avantis, Foxboro, InFusion, Triconex, Simsci and Wonderware.
To learn more about Invensys, visit **www.invensys.com**.

Invensys
10900 Equity Drive
Houston, Texas 77041 USA

www.invensys.com

I-PW-0117 Rel. 09/13 1303016