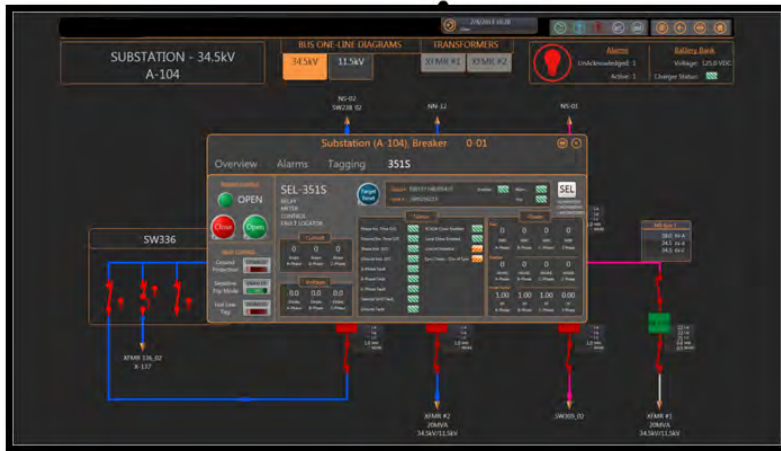


ITAC has tremendous experience executing complex projects for the most demanding customers. In fact, the existence of ITAC was conceived by our founder more than 26 years ago as a vertically integrated design/build provider. We are not just an engineering firm with a few electricians or an electrical construction firm with a few engineers. ITAC has a multi-discipline engineering, design, and project management workforce of more than 200 people and a mechanical and electrical construction workforce of more than 150 people. We also have an in-house machine shop, UL Label-capable control panel and switchgear shop, 30,000 square foot fabrication facility, PLC and software simulation laboratory, and other internal capabilities that further differentiate us from our competition. In order to illustrate our past project performance, we have included brief summaries of power system projects recently executed.

**EXAMPLE PROJECT #1 – NASA Langley Research Center Complete Facility SEL Relay and Redundant Real-time SCADA System Installation Design/Build Project.**

This \$4MM design, furnish, and install project was awarded to ITAC in the Summer of 2011 to engineer, fabricate, install, commission, and support a completely new protective relaying system, load tap changer control system, and dual redundant real-time SCADA system for all three of the facility's 115KV substations. In all, about 40 new Schweitzer Engineering Labs (SEL) relays were installed, programmed, and commissioned by ITAC. Real Time Automation Controllers (RTAC) from SEL were also used to aggregate data from relays in real time and provide operators monitoring, control, trending, and event reporting capabilities via a redundant 10,000+ tag SCADA system based on software from ICONICS. All protective relaying panels were fabricated and tested in ITAC's 20,000 square foot panel shop located in Chester, VA. All SCADA system software simulations and testing were conducted at ITAC's Software Simulation Lab to confirm SCADA system and relay operations prior to shipment to the site. ITAC then completed site installation and final commissioning services. This project was successfully completed in 2013.





### EXAMPLE PROJECT #2 - US Government DOD Facility SCADA System Upgrade and SEL Relay Retrofits

This \$1.5MM fixed-price project was awarded to ITAC in the summer of 2013 to design, fabricate, program, and commission a new Supervisory Control and Data Acquisition (SCADA) System for the worlds' largest Navy Base and several outlying Navy facilities in the Hampton Roads, Virginia area. ITAC designed a dual-redundant SCADA system using the latest in graphical human machine interfaces, SQL database logging, and Ethernet based

communication networks. ITAC also performed the engineering, panel fabrication, programming, and commissioning necessary to replace approximately seventy five 34.5 KV and 11.5 KV feeder and transformer protective relay systems at Norfolk Naval Station. The outdated electromechanical relays were replaced with state of the art microprocessor relays from Schweitzer Engineering Labs (SEL), Real Time Automation Controllers (RTACs), and new touch screen HMI's in each substation. The new "smart" relays were integrated with the new SCADA system for real-time monitoring, alarming, and control capability from the centralized operations center. Engineers now have remote access to protective relay configurations and event history making fault restoration easier and improving power system reliability. This project is currently schedule to be complete in the Fall of 2014.

### EXAMPLE PROJECT #3 – NASA Langley Research Center Transonic Dynamics Tunnel Main Drive Relaying and Switchgear Replacement

This \$2.3MM fixed-price project was awarded to ITAC in the summer of 2012 to engineer, fabricate, install, and commission a new motor control and protection system for the facility's 32,000 horsepower main tunnel fan drive motor. This extremely complex project involves the integration of relaying, automation, safety interlocking, metering, and control of an extremely large medium voltage wound rotor induction motor with an outboard pole changer, liquid cooled rheostat, and synchronous condenser. This project integrates protective relay and automation products from Schweitzer Engineering Labs (SEL) to enable complete overload and differential protection for the very large motor control system. Integrated industrial touch screen HMIs will allow operators to see real-time system status and monitor for abnormal conditions. ITAC completed all relay wiring, integration, and switchgear testing in our panel shop in Chester, VA. NASA officials will witness switchgear testing prior to shipment to site and installation by ITAC's electrical construction workforce. This design/build project was completed on time in the summer of 2013.





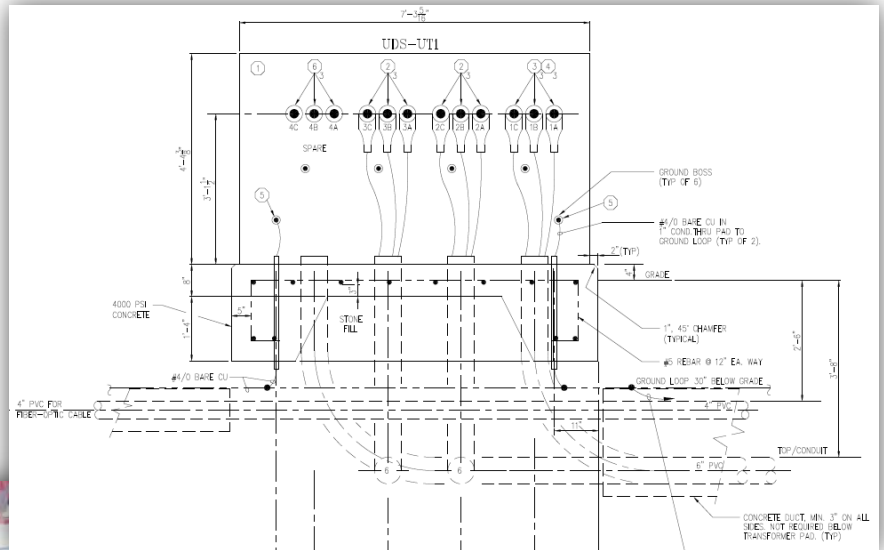
### EXAMPLE PROJECT #4 – Power Generating Station in Virginia 4160V Emergency Generator Installation

ITAC was selected from a group of national design/build providers to engineer, procure, and construct a backup power system large enough to supply emergency power to an entire commercial generation plant. This project was awarded to ITAC in late 2012 and involved the supply of a 3 megawatt Caterpillar diesel generator and custom 4160 volt generator paralleling switchgear, each in drop-in prefabricated equipment buildings. ITAC designed, fabricated, and tested the custom switchgear system in our switchgear fabrication shop in Chester, VA. The switchgear control system had to allow for Isochronous and Droop control of the massive 4000 horsepower V-16 quad-turbo diesel engine and switch dynamically between the two modes, while running, in order to allow for a stable supply of power into the plant's auxiliary buses. ITAC utilized the latest in microprocessor generator control and synchronizer products from Woodward and protective relaying from Schweitzer Engineering Labs in order to implement this complex control system. ITAC's self-perform electrical construction team installed the 5 KV and control wiring duct banks, conduits, and other infrastructure necessary to complete the project. This system was successfully commissioned during a plant outage in the Spring of 2013. The project was completed on schedule which all project goals met.



### EXAMPLE PROJECT #5 – Industrial Facility 13.8KV Medium Voltage Underground System Installation

This \$1.5 MM fixed-price project was sole-sourced to ITAC’s Power System Services group based on our very strong competency with medium voltage power systems. The scope of this project involved the specification, design, integration, installation, and commissioning of two lineups of outdoor 15KV gas insulated switchgear systems to replace one obsolete air insulated switchgear system. At the same time, the customer’s distribution system was converted from overhead to underground construction, from radial feeds to looped feeds, and configured for automatic switchover upon loss of either utility power source. More than two miles of underground 15KV wire was supplied, installed, terminated, and tested during this project. ITAC’s engineers performed all design work necessary to integrate control and protection devices from Schweitzer Engineering Labs and other suppliers to create a completely automated system. User control and monitoring is provided by a color touch screen HMI which removes the operator from the arc flash hazard zone. The gas insulated switchgear system was supplied by G&W Electric per ITAC’s specifications. All switchgear motor operators, position feedback switches, and gas sensors were monitored and controlled by ITAC’s control system. ITAC performed all



startup and commissioning services on the gas insulated switchgear and now provides warranty support for this system. All cutover work was performed with only a 48 hour outage due to ITAC’s detailed pre-outage planning and a project team focused on the customer’s business priorities. This project was completed in February of 2012.



### **EXAMPLE PROJECT #6 – Virginia Hospital Twin Engine Generator Paralleling Switchgear System**

ITAC, in partnership with Schneider Electric (Square D), was selected to design, fabricate, and commission this customer's latest mission critical emergency power switchgear system. The system is based on Square D's standard QED-6 draw-out low voltage switchboard product but incorporates a control, automation, and protection system completely designed and built by ITAC. This system was designed to automatically parallel the output of twin Caterpillar 1000 KW emergency diesel generators to supply power to the Mary Immaculate Hospital's critical loads. The customized switchboard system simultaneously monitors engine, generator, and breaker telemetry data, up to 15 automatic transfer switches, and annunciates alarms and warning messages on a 15" color touch screen HMI. An integrated secure web-server allows for remote troubleshooting and alarm emails and text messaging to the customer's facilities management staff. All design, software programming, simulation, and testing of the switchboard's control system was performed at ITAC's office in Chester, VA. The customer witnessed factory acceptance of the custom switchgear system at ITAC's location in May of 2012. ITAC will provide extended warranty support for all ITAC and Squared D materials provided.



### **EXAMPLE PROJECT #7 - Steel Manufacturer 132,000 KVA 230/69 KV Transformer Installation**

ITAC was selected to perform this design/build project to install the customer's spare 230KV to 69KV transformer as a hot system spare. This project also involved the installation of a new 230 KV Motor Operated Air Break (MOAB) switch, 230KV breaker, 69KV manual gang-operated switches, and an all new transformer relaying and annunciator panel. ITAC performed all civil, structural, power, and controls engineering tasks required. In partnership with a specialty subcontractor, ITAC also completed the fabrication of approximately 300 feet of new 230KV and 69KV overhead

buswork. The new relay panel, based on relay and control products from Schweitzer Engineering Labs, was constructed, programmed, and tested in ITAC's own panel shop. This project was successfully commissioned during a 12 hour plant-wide outage in May of 2012.

### **EXAMPLE PROJECT #8 – Power Station in West Virginia.**

This \$1.5MM fixed-price project was completed in September of 2010 and involved the supply of a totally integrated power equipment building containing 5kV switchgear, 480V distribution equipment, a Delta V DCS control system, a DC battery bank and a redundant HVAC systems. ITAC provided all engineering deliverables on the project including duct bank, protective relaying and control systems, building layout, and foundation design. ITAC built, wired, tested, and installed the switchgear's relaying systems in our 10,000 square foot panel shop. All other systems were installed in the modular building at ITAC's fabrication shop. Our customer's representatives visited ITAC's shop facility to conduct acceptance testing on the entire building before we shipped it to site and installed it. The building's medium and low voltage systems were online less than one week after the building arrived onsite.





### **EXAMPLE PROJECT #9 – Industrial Manufacturer Data Center Generator, Paralleling Switchgear and UPS Systems**

This \$1.4MM fixed-price project was completed in January of 2011 and involved the supply of a 500KW caterpillar diesel generator, custom generator paralleling switchgear based on Square D's QED-6 low voltage draw-out switchboard, redundant parallel Liebert UPS systems and other power system hardware to supply power to the customer's critical data center loads. ITAC was responsible for all power system engineering and supplying all hardware necessary for this project. ITAC designed the generator paralleling control system using the latest generation of engine/generator control system components from Woodward, the leader in this industry. The entire control system was built and tested in our in-house panel shop.

### **EXAMPLE PROJECT #10 – Oil Refinery and Terminal 13.8 KV Underground Power Distribution Upgrades.**

ITAC has assisted this customer over a multi-year period with the replacement of essentially all of the facilities underground 13.8KV power distribution system. Several new unit substation, pad-mount transformers, 15KV switchgear, and miles of new duct banks have been constructed through the course of this multi-million dollar project. All cable pulling, splicing terminating and testing was performed by ITAC's own MV certified cable terminators

### **EXAMPLE PROJECT #11 –Ethanol Bio-Energy Primary Power System Design/Build**

This \$2MM project was completed in January of 2010 and involved the design, specification, installation, and commissioning of an overhead and underground 34.5 KV power system to feed the newly constructed Bio-Energy Ethanol Plant in Hopewell, Virginia. ITAC's Power System Services division performed all SKM system

modeling, calculations, coordination, and design work necessary to distribute 34.5 KV to each of the plants eight substation transformers. The switchgear used was SF6 gas insulated. ITAC also specified and supplied the high resistance grounding systems used in the plant. After ITAC's engineering and procurement phases were complete, our Electrical Construction division installed and tested the new systems. Final relay settings, startup and commissioning were performed by ITAC's Power System Services division. ITAC provided a blanket warranty for the entire power system.



### **EXAMPLE PROJECT #12 – Research & Development Center Switchgear Design/Build**

When our client decided to replace a 40 year old piece of double ended 3000 amp 480V switchgear feeding their Research and Development Complex, they sole-sourced ITAC to be the “turn-key” provider on this \$700K fixed-price project. This decision was made because of the critical nature of the equipment, the complexity of the project, and ITAC’s reputation for delivering results. The loads fed from this power system could not be turned off for more than four days without having a major impact on the owner’s business processes. Also, the customer wanted to add SCADA, metering, and arc flash protection features to the power system during the same outage. The customer knew this project would be complicated and would require a professional project management, engineering, and construction team. ITAC’s Power System Services division designed the custom switchgear and coordinated with the switchgear manufacturer during the planning stage. After more than six months of planning, the switchgear was replaced over the Labor Day 2010 weekend by ITAC’s electrical construction personnel within the timeframe allowed by working around the clock in shifts. ITAC’s Power System Services personnel performed checkout, testing, and startup services in the pre-dawn hours of the fourth day of the outage. All project requirements were met and all critical loads were back online within the time allowed.

### **EXAMPLE PROJECT #13 – Kings Dominion Intimidator 305 Rollercoaster Power System Design/Build**

This \$1.2MM project was completed in February of 2010 and involved the design, specification, installation, and commissioning of a underground 15kV power distribution system to feed this amusement park’s largest attraction ever. ITAC’s Power System Services division modeled the existing power system and the proposed new power system in SKM’s power system simulation software package. After completing all engineering and procurement of the 15kV equipment, ITAC installed, tested, and commissioned the new 15kV gas insulated switchgear, power transformers, and low voltage distribution and control systems.



### **EXAMPLE PROJECT #14 – Investor Owned Utility Protective Relay Replacement Design**

This \$250,000 time and materials project was completed in the Spring of 2009 and involved the engineering services required to replace electromechanical protective relays on more than 200 distribution circuits throughout their service territory. ITAC modified almost one thousand existing substation drawings and created hundreds of new drawings showing the removal of the old relays and installation of new Schweitzer Engineering Labs microprocessor relaying. Substation Automation and SCADA system modifications had to be made to accommodate the new relays. ITAC worked closely with our customer’s Substation Engineering during this fast-paced project which was completed on schedule.



### **EXAMPLE PROJECT #15 – Investor Owned Utility Arc Flash Relays Design/Build**

This \$5MM time and materials project was completed in early 2009 and involved engineering, equipment, installation, and checkout of new protective relays on every medium voltage bus in every power generation plant our customer owns. The new relays were installed to replace out of date electromechanical relays but also to allow for an “Arc Flash Mode” feature to further protect operators from the hazards of an arc flash event. ITAC generated the drawings for each station, procured the needed material, and then installed, programmed, and tested the new relays. Station automation system (DCS) and SCADA systems were also modified to communicate with the new relays.

### **EXAMPLE PROJECT #16 – Logistics Fulfillment Center Critical Power System**

This \$800k fixed-price project was completed in April of 2011 and involved the engineering, equipment, installation, programming and commissioning of a PLC-based generator control system and new 4000 amp 480V switchgear to serve a critical facility. The generator control system was designed to convert an existing 2000 kW diesel generator from standby to parallel operation. At the same time, a larger utility transformer was installed. The switchgear system is based on Square D’s standard QED-6 low voltage draw-out switchboard product which was then highly modified by ITAC to enable automatic generator synchronizing, load control, and protection. ITAC was responsible for all phases of the project and coordinated all work efforts including those of the electric utility company and their crews. The project culminated in a scheduled two day weekend outage to cut-over to the new power system. ITAC worked around the clock in shifts during the outage and all loads were re-powered 12 hours ahead of schedule. ITAC now provides service and support for this system.



### **EXAMPLE PROJECT #17 – University of Virginia Cavalier Substation**

ITAC completed this \$1.8MM fixed-price project in 2007 which involved power system modifications and new 15kV switchgear and multiple transformer installations at UVA’s Cavalier Substation. ITAC was responsible for all equipment, installation, startup and commissioning services necessary to complete the project’s goals. Implementation required careful planning of staggered outages to distribution system circuits in order to minimize the impact to the University’s power system customers.

### **EXAMPLE PROJECT #18 – Dixie Pellets Green Field Plant Design and Construction Management**

ITAC was selected to perform a multi-discipline engineering and construction management roll for the construction of the world’s largest wood pellet manufacturing plant in Selma, Alabama. This \$8.6MM contract began in 2007 and involved nearly every ITAC business division. Among many other tasks, ITAC performed all power system engineering required to design a completely new 20 MVA, 4160 Volt power system, medium voltage motor control systems, and low voltage motor control systems necessary to power the entire plant. All medium voltage motor control systems were based on the SEL motor overload relays. Also included was all outdoor and indoor site lighting, security systems, telephone systems, PLC hardware design and programming, construction management, commissioning, and training of plant operators. ITAC’s PLC programmers stayed on site well into the operational phase of the plant to continue tuning the process control systems and training operators on how to achieve peak process efficiency.

### **EXAMPLE PROJECT #19 – North Carolina Steel Mill 230 kV Coupling Capacitor Installation**

ITAC was selected to perform all engineering tasks required on this customer's project involving the specification and installation of a 230 kV coupling capacitor and carrier blocking protective relaying panel for use in their manufacturing facility. ITAC provided the structural, controls, and power system engineering required to modify their existing 230kV bus, install new structural supports, and integrate a new relay panel into their existing protection system. The new relay panel utilized protective relay products from Schweitzer Engineering Labs. This project was commissioned in 2011.



### **EXAMPLE PROJECT #20 – NASA Langley Research Center Design, Furnish, and Install Mach 6 Tunnel Heater System**

ITAC was awarded this \$4+ MM fixed price project for the design, delivery, installation, and commissioning of a PLC controlled tunnel heater system for the Mach 6 tetrafluoromethane (CF<sub>4</sub>) Tunnel in Building 1275. This hypersonic test facility was critical to the research center's testing initiatives as it was the only real-gas test facility of its kind in the country. ITAC provided complete EPC services on this critical project and achieved all project goals on schedule.

For more information regarding ITAC's Power System capabilities, please contact:

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