



POWER & CONTROL TECHNOLOGY: INDEPENDENT POWER PRODUCERS

Independent Power Producers

100% Automatic Control from Diesel to Grid

An intelligent power management solution for IPP projects, DEIF's ground-breaking Plant Management System has been developed to secure stable and automatic plant management of sites of up to 256 gensets.

Superseding the traditional 32 genset limit, DEIF's technological expertise and focussed R&D has also enabled us to create a one-button intelligent solution that delivers maximum stability for your projects.

A fully automated solution, Plant Management continuously analyses gensets, transformers and fuel supply information to react on fuel density and overheating for instance, making output more reliable, guaranteeing uninterrupted performance and saving manpower costs.

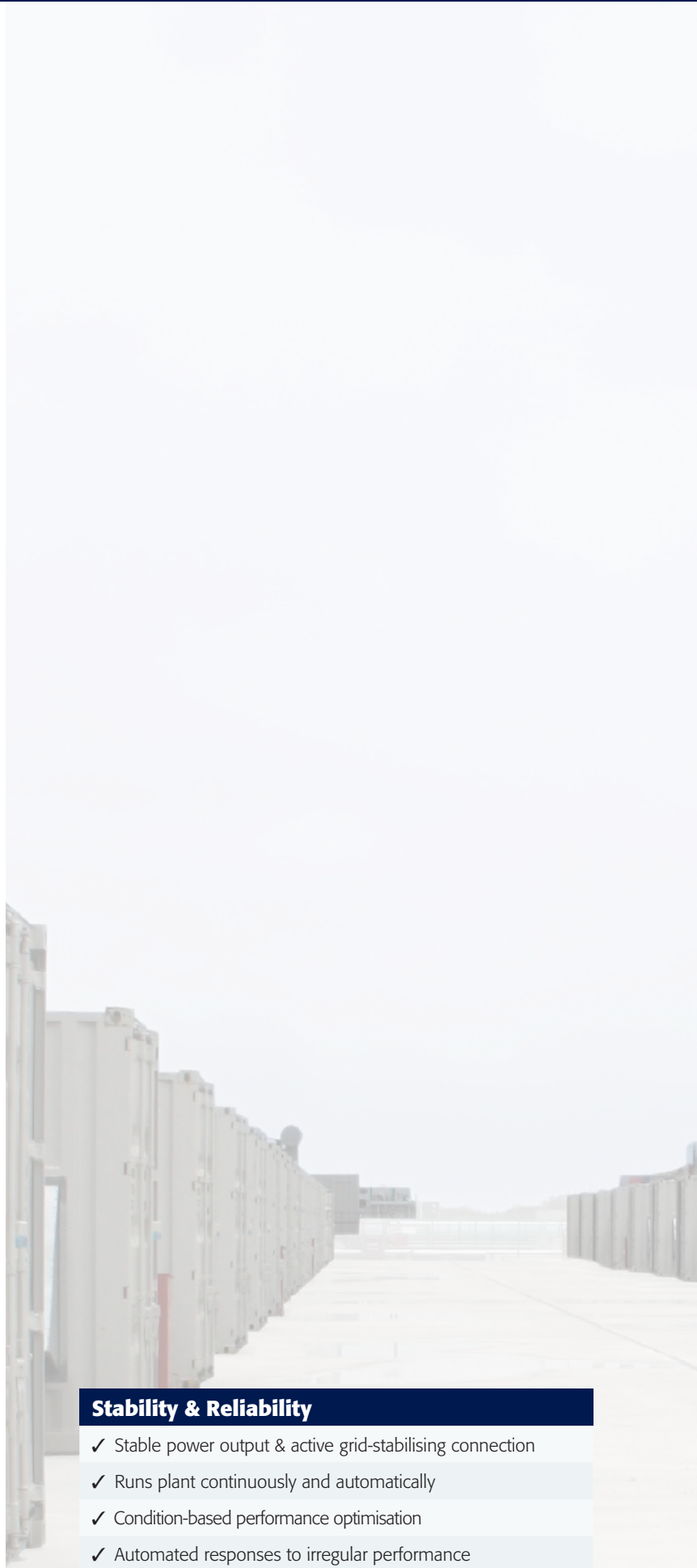
Securing stable power output and avoiding downtime, Plant Management helps you deliver the required power and minimises the risk of penalties.

This ground-breaking solution has revolutionised mega plant management with comprehensive automatic control.

Yielding higher performance, Plant Management also breaks with traditional manpower heavy operations.



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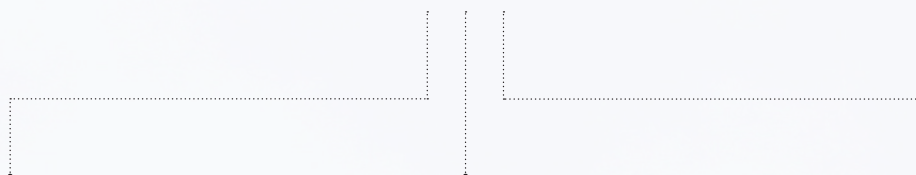
Stability & Reliability

- ✓ Stable power output & active grid-stabilising connection
- ✓ Runs plant continuously and automatically
- ✓ Condition-based performance optimisation
- ✓ Automated responses to irregular performance

256 Gensets, One Central Point Of Control

Information Exchange Between Generator, Transformer & Fuel Supply

Plant Management for IPP



Fuel Supply Module



Genset Module



Transformer Module



Best in Class

- ✓ Innovative solution
- ✓ Central control of up to 256 gensets
- ✓ More than 1 GW in operation in the field
- ✓ Proven technology tested at sites in Europe, South America and Asia

Cut Your Costs

- ✓ Fully automated system cuts manpower costs
- ✓ Intelligent fuel control and supply
- ✓ Stable operation cuts wear and maintenance costs
- ✓ Record time commissioning with DEIF Emulation



Power in Control

The following pages features a case study for an application that successfully runs DEIF units and solutions.

DEIF has become a preferred control solution supplier to some of the biggest operators in the market, not just because of our innovative, safe and reliable technology but because of our commitment in guiding you through all phases of your project, from specification to installation or configuration. DEIF's flexible product platform covers the full range of application possibilities.

Most customers are able to install and commission our standard products working from data sheets only. But in cases of doubt, DEIF's far-reaching network of sales and competence centres, distributors, customer care teams, and technical support teams is available to assist you and ensure you invest in and implement the best controller for your application.

DEIF realises how space is always in demand. Saving you time and cost, our standard controllers require limited room for mounting and installation in switchboard cabinets.

Basic installation information can be found in the product quick start guide, and application setup is made easy with DEIF's Utility Software.

For greater detail, we refer you to the product installation instructions, just as you are invited to attend training courses on how to install and operate DEIF's standard controllers.

Independent Power Producers Case Study

We just pressed the start button, and in less than a minute 40 gensets were online...

After DEIF had developed a comprehensive plant management system capable of handling up to 256 gensets, the company was invited to collaborate with APR Energy on commissioning a 40 1.7 MW MTU generator power plant in distant Trujillo, Peru. The plant supplies grid support to the mainly hydropower-based region during dry seasons.

DEIF used AGC Plant Management controllers, capitalising on the units' adaptability allowing operators to switch from base load to island mode and from power control to frequency control to name just a few functionalities that make AGC the comprehensive choice.

APR Energy's Director of Engineering, Edmund Campion, has worked with DEIF since 2002, but he was still impressed that not a single fault occurred during commissioning.

"We just pressed the start button and in less than a minute 40 gensets were online," he says. "What this means, is that APR Energy is now able to set up plants at a considerably faster rate than before."

Mr Campion believes that the plant in Peru represents his idea of how a plant should function and how to control it in real time.

Typical of the collaborative way DEIF works, the AGC Plant Management Control system is the result of DEIF and APR Energy's joint efforts to develop the optimum solution for this job.

Prior to commissioning the system, DEIF's engineers meticulously programmed and tested its control functionalities. Parts of these tests were carried out on-site. Having completed the tests, the engineers made absolutely sure that the plant would be able to start up and deliver the required 60 MW without any problems.

Edmund Campion praises the DEIF on-site support. "Right from the beginning, DEIF's engineers listened and worked with us to develop the flexible solutions we wanted. There is no doubt that DEIF has delivered on our expectations," Mr Campion says, giving DEIF 10 out of 10 for the process. "Cannot fault it."



Data

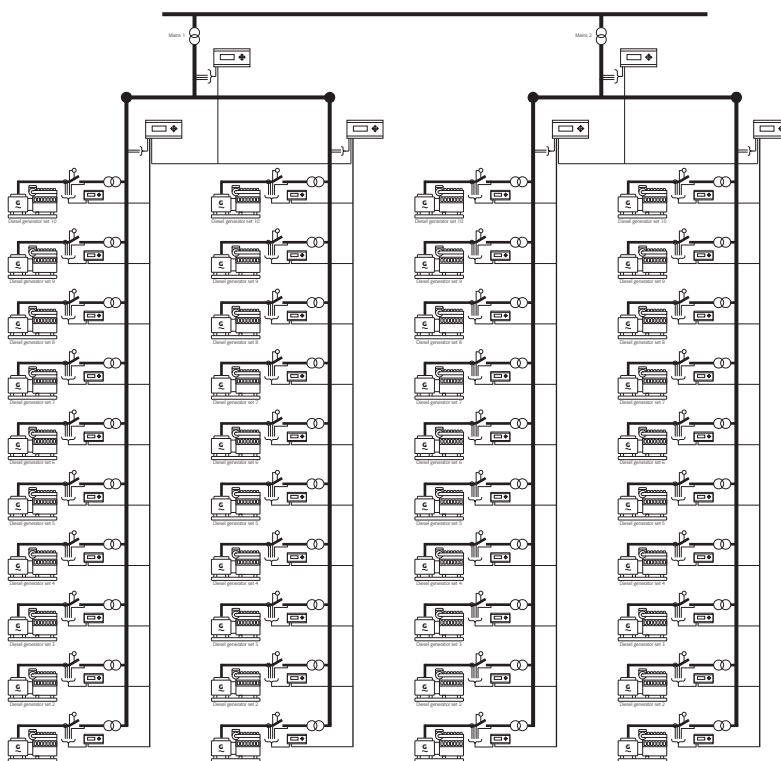
- ✓ 60 MW power plant from APR Energy
- ✓ 40 1.7 MW MTU generators
- ✓ Operators can switch from base load to island mode
- ✓ Operators can switch from power control to frequency control
- ✓ 40 gensets online in less than a minute
- ✓ DEIF's plant management system handles up to 256 genset

Product



Automatic Genset Controller,
AGC Plant Management

Diagram From Case





DEIF Diesel Control Technology's award-winning and innovative controllers are some of the most comprehensive on the market today, ranging from cost-effective single and advanced multi-function controller platforms to units suitable for innovative, engineered Power Management System solutions.

As a rule, DEIF's control concepts eliminate the need for external controllers and are user-friendly alternatives to standard controllers.

Working with DEIF, you benefit from the advantages of collaborating with one qualified supplier.

We also offer outstanding product quality, expert support engineers for standard support, consultant application engineers to check specifications, and project managers ready to assume responsibility for turnkey power management solutions.

Automatic Genset Controller, AGC Plant Management

Asymmetrical loadsharing improves plant fuel-efficiency without compromising the generators' spinning reserve...



Awarded Project/Initiative of the Year at the 2012 IPEE/Power Industry Awards in the United Kingdom, DEIF's ground-breaking AGC Plant Management solution controls systems of up to 16 grids and 256 generator breakers.

Tried and tested at locations in Africa, Asia, and South America over the past three years, AGC Plant Management solutions have been developed not just with an eye for safety but for fuel saving and optimised maintenance intervals. The system introduces fan control, black starts in both island and fixed power mode, and asymmetrical load sharing designs to cut running costs.

Lifting genset control from single units to plant level, easily enabling comprehensive control and protection for large setups from one central point of intelligence, AGC Plant Management incorporates plant power and power factor control at connection points, load profile priorities routines and much more.

Cost-optimised Design

The comprehensive AGC Plant Management solution uses the plant's generators to black-start large step-up transformers directly. With a proven ratio of up to 1:39 between the generator and the transformer, the solution cost-optimises black-start of plants in both island and fixed power mode, limiting the need for high voltage breakers. With a dedicated plant communication structure, SCADA systems are kept separate from the control system, limiting onsite installation to a minimum.

Reduced Fuel Consumption

Another key feature of the solution fixes the generators at their preferred fuel-optimised power setpoint. If an engine fails, the system will use the spinning reserve from operating generators until a new generator starts up.

Grid Support

Designed to monitor and detect grid abnormalities automatically, the AGC Plant Management system can reduce the amount of power produced to the grid in case the grid frequency rises. These functionalities are also useful for reducing the amount of kVAr passed on to the next upstream transformer: as the upstream transformer current declines, the transformer's load performance will improve.

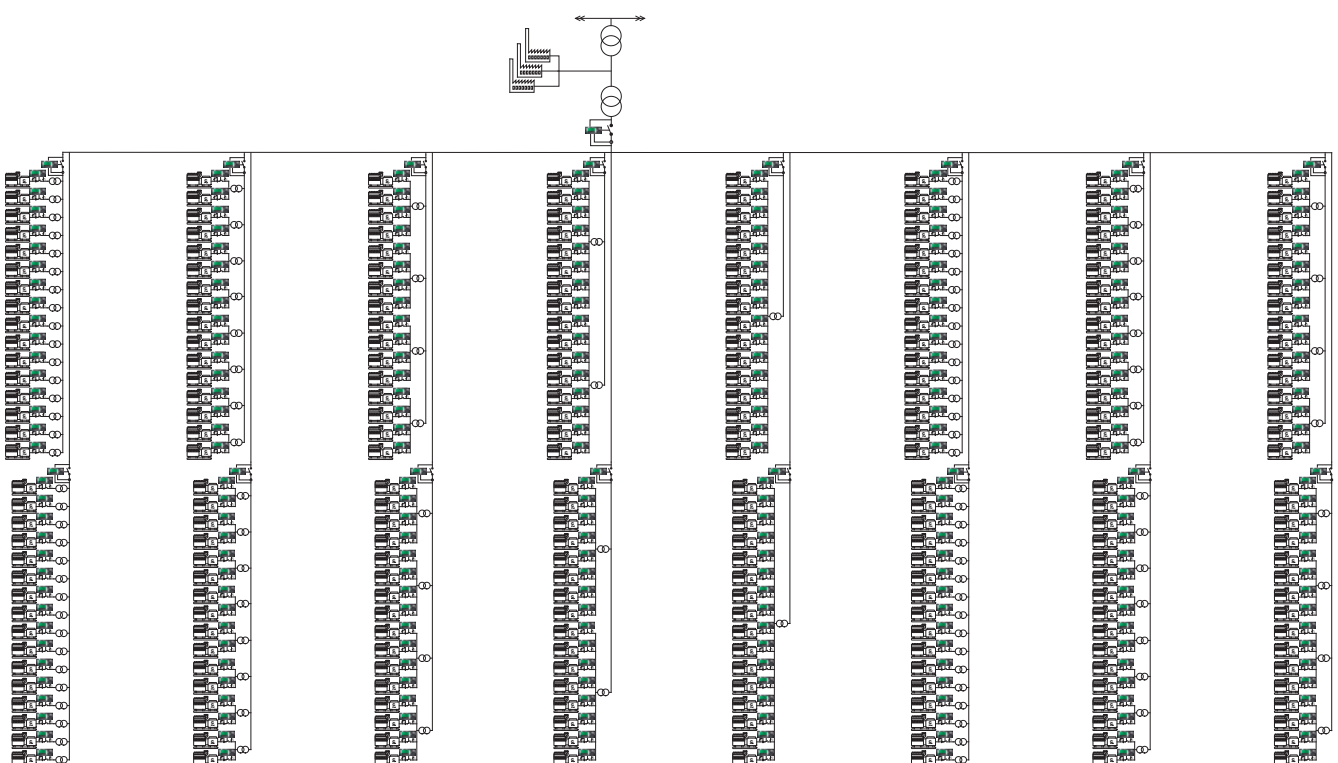
Automatic Genset Controller, AGC Plant Management

Fuel-optimised Plant Management for up to 256 Gensets

AGC Plant Management Features

- ✓ Fully scalable multi-master system of up to 256 gensets
- ✓ Simple graphical configuration
- ✓ Easy control from one central point of intelligence
- ✓ Cost-optimised design
- ✓ Reduced fuel consumption
- ✓ Grid support
- ✓ Monitoring and supervision
- ✓ Emulation Solution – uses and verifies the functions of the real system for test, production & design

AGC Plant Management Application Example



Automatic Fuel Controller, AFC Plant Management

The AFC concept makes moving and commissioning your fleet of gensets and fuel tanks flexible and dynamic.



Designed to control fuel logistics in liquid fuel-fired power plants, DEIF's Automatic Fuel Controller (AFC Plant Management) is an automated, safe and reliable control solution with new and innovative features.

Based on the idea of controlling larger numbers of smaller, decentralised fuel tanks rather than one large central fuel tank, the AFC Plant Management solution concept makes moving and commissioning your genset fleet as well as your fleet of fuel tanks more flexible and dynamic.

Safe Truck Unloading & Tank Levelling

In fuel transfer mode, the system can be pressurised to move fuel from the truck into the tanks. The system automatically monitors the tanks and stops pumps/valves when all tanks are filled to their maximum capacity.

During refuelling, fuel is levelled between the tanks to equally share fuel between all operating gensets, raising the tanks' operating capacity until the process has been completed.

Maximise Tank Capacity With Intelligent Management

Usually, tank inventory systems automatically stop filling at 80% to avoid problems with fluctuating fuel volume depending on changes in temperature. Maximising tank inventory intelligently, DEIF's Automatic Fuel Controller solution increases capacity by at least 10% for the same type of tanks without compromising safety.

Automated Day Tank Filling

The Tank Controller manages the integrated fuel pump and fuel transfers from tanks to the connected generators' day tank(s). When integrated with AGC Plant Management, the genset controller automatically stops fuel transfer to generator if day tank levels do not increase.

Complete Inventory Data

The system handles level inputs in the tanks, including simple resistive measurements and fuel levels determined by pressure. For reading and comparing the inventory, fuel temperature can also be measured for temperature-independent inventory value just as inventory and volume can be seen and displayed in actual values.

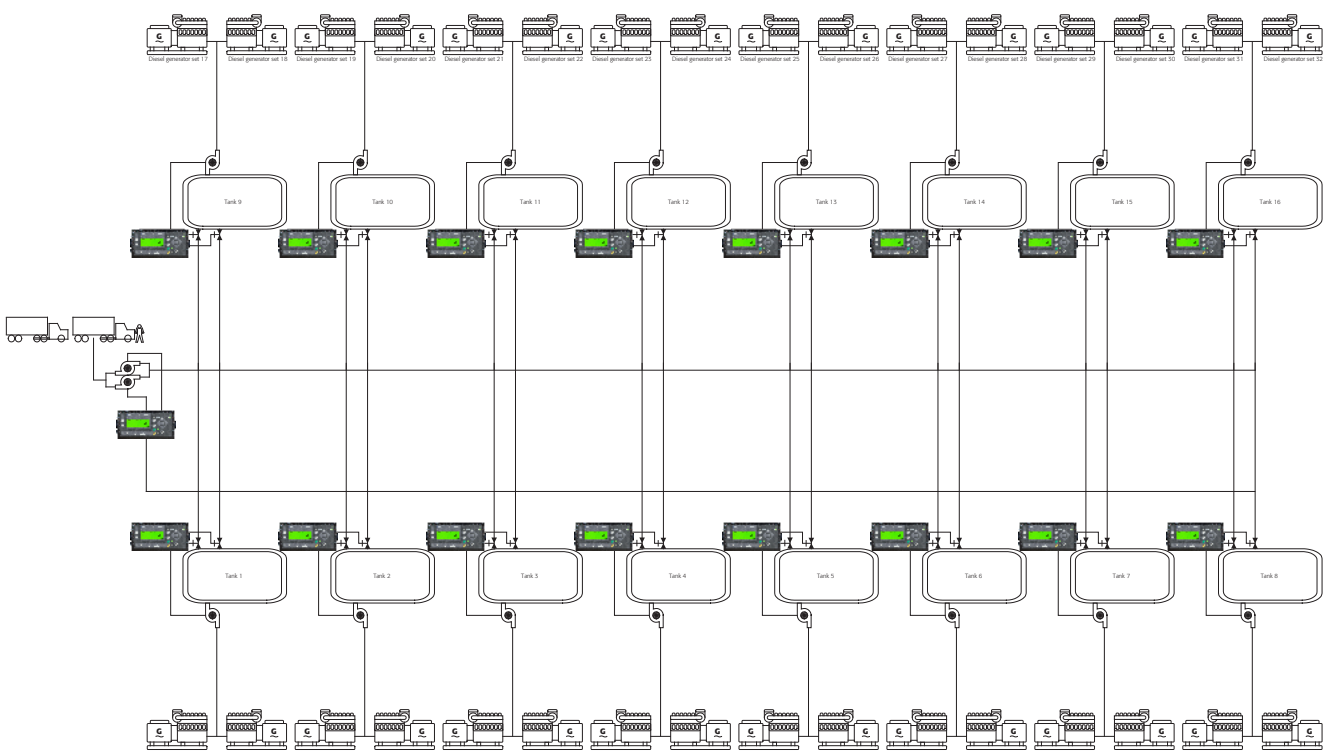
Automatic Fuel Controller, AFC Plant Management

Maximise and Monitor Your Tank Capacity Automatically

AFC Plant Management Features

- ✓ Fully scalable multi-master system of up to 256 fuel tanks
- ✓ Simple graphical configuration
- ✓ Safe truck unloading
- ✓ Tank levelling
- ✓ Maximise Tank Capacity
- ✓ Automated day tank filling
- ✓ Complete inventory data
- ✓ Monitoring and supervision
- ✓ Emulation Solution – uses and verifies the functions of the real system for test, production & design

AFC Plant Management Application Example



Automatic Transformer Controller, ATC Plant Management

The ATC automatically derates production to avoid transformer overheating.

DEIF's Automatic Transformer Controller (ATC Plant Management) is a combined protection, HV breaker and transformer logic controller.

The controller handles all electrical and temperature protections and features status and alarm handling. Because all relevant data and statuses are available with TCP/IP communication, the ATC Plant Management can easily be integrated as part of a SCADA system. The ATC Plant Management also features built-in energy-saving transformer cooling logic to reduce parasitic loads in the plant.



Programmable Tap Setting

The ATC Plant Management can handle up to 50 different tap settings. Each tap setting can be programmed individually with the electrical alarm values following the settings.

Energy-saving Transformer Cooling

Rather than overcooling the transformer with a fixed airflow, the ATC cooling system automatically adapts to actual cooling requirements, saving energy and money.

Plant Management System Solutions

For better performance, avoiding trips and increasing safety because the system blocks unauthorised operator interaction, the ATC can be successfully integrated with DEIF's AGC Plant Management solution. Extra automation features include automatic derate of production to avoid transformer overheating and automatically locking the generators when transformer protection is activated.

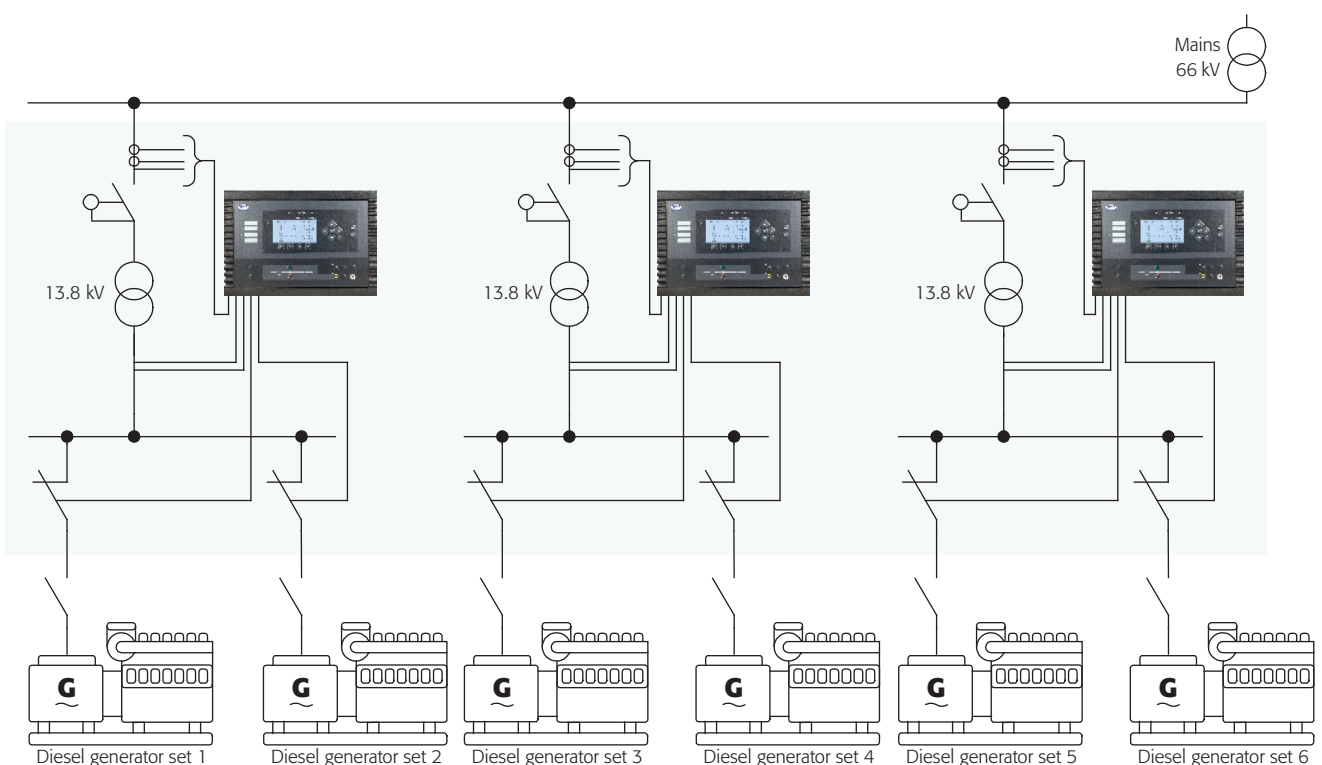
Automatic Transformer Controller, ATC Plant Management

Supervise Electrical and Temperature Statuses and Alarms

ATC Plant Management Features

- ✓ Simple graphical configuration
- ✓ Protections, Breaker Handling and Transformer Logic
- ✓ Programmable Tap Settings
- ✓ Energy-saving Transformer Cooling
- ✓ Plant Management system solutions
- ✓ Monitoring and supervision
- ✓ Emulation Solution – uses and verifies the functions of the real system for test, production & design

ATC Plant Management Application Example



DEIF is a market leader with a proven record of more than 80 years of technological achievement and innovation in engine & genset controls, marine bridge instrumentation, switchboard instrumentation and renewable energy controls.

Our goal is to always bring a competitive edge to our customers' businesses by providing green, safe and reliable product lines with flexible features and first class service and support.

The DEIF Group is committed to maintaining and expanding its position as a trusted global supplier of quality solutions.



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