Three ways to reduce operating costs of power generators with remote management

Whitepaper How remote management can be used to cut costs and improve maintenance.

© HMS Industrial Networks, 26 June 2017
www.hms-networks.com
Reducing operating costs of power generators with remote management

Table of contents

1. Introduction
2. Three ways to cut operating expenses of power generators with remote management
3. How remote management works
4. What information can you get from your power generators?
5. What about security?
6. Finding your solution for optimal ROI.
1. Introduction

Backup power generators may not run often, but when they’re needed, it is critical that they can perform. But how can you make sure that your power generators in the field are ready to start without physically visiting them all the time?

This has been an inherent problem for power generator-owners for some time — keeping the generators operational while reducing expensive service visits to a minimum.

With a cloud-based remote management solution, you can have immediate online access to generator parameters via a regular web browser. In this whitepaper, we propose ways in which remote management can be used to reduce operating costs and improve control.
2. Three ways to cut operating expenses for power generators

There are many things that can be done to improve the operation of existing gensets, but the key factor to successfully be able to reduce operational costs is information. By understanding when, how and if equipment is operating, we are able to make better decisions regarding site maintenance and take actions when necessary.

Below are some examples of how access to information helps us make better decisions and reduce operating costs.

1. Perform service only when needed

Power generators are often serviced according to a pre-determined service schedule. By understanding how the generator has been operated, it is possible to plan service more dynamically. As site visits are costly, you are able to optimize the service costs by only sending service teams to generators that actually need service.

The challenge is to know when service is needed at each individual site. With a remote management solution, you can check operating hours, oil pressure, battery status, coolant temperatures, generated power output, fuel level, GPS position etc. A notification may also be generated whenever a critical level has been reached, for example if the generator has been running more than expected. We may then send a notification when the running hours exceed the service interval.

By being able to analyze the operation of each generator remotely, you will be able to understand their health and more efficiently schedule service visits in the field.

Certain advanced remote management solutions also offer remote access functionality. This means that you can open up a secure tunnel to your power generator in the field and do configuration using your regular software tools. Just like if you connect to the control panel on site.

2. Test start generators remotely to reduce start-up problems

Just like a car that has been parked for an extended period, a generator engine that has not run in a long time is likely to have start-up problems. For back-up power generators that are not operated very often, it is important to regularly perform operational tests. Remote test starts can be made with a remote management solution that has control capabilities and is connected to the generator controller. With a simple action such as a remote operational test, you may increase the likelihood of the generator working the day there is a power outage and the generator needs to perform.

A well-maintained generator operates better and has lower operating costs since unplanned service visits often mean substantial expenses.
3. Minimize and reduce the effects of fuel theft
Fuel theft can be a significant problem. In certain regions, as much as 40% of genset fuel is reported to be stolen.

Avoiding fuel theft completely might be difficult since it is often stolen a bit at a time; during transportation, at fill-up, or at the power generator in the field. However, a remote monitoring system that connects to a fuel sensor can be used to ensure that the right amount of fuel is delivered at a refill. By using an intelligent level sensor, it is possible to track the fuel level of the tank. The fuel sensor can be calibrated to sense a full tank and by knowing this we can verify that the tank is properly refilled. A good fuel level sensor is able to detect variations down to 3-5 liters.

An abnormal decrease in content may be detected and indicate that the fuel is being stolen. With a remote monitoring system that supports alarms, a notification is sent immediately when the theft occurs. Even if it might be hard to catch the thieves, we are at least aware that the fuel has been stolen and we can schedule a refill to ensure the generators have the fuel needed to operate.

Tracking the level of fuel in a tank increases the awareness of what happens to the fuel on site and helps users understand when theft occurs. In some cases, where organized theft is common, this may help detect patterns and take action.

Remote monitoring puts you ahead of the game
Modern remote monitoring technology enables instant access to data from equipment in the field. While we are able to use this technology to reduce operating expenses as described above, it also brings us other benefits. By being able to have full control 24/7 and be instantly notified of any operational issues, the end-user also receives improved service quality.

To get this information, we need to gather it from the field equipment to a data center where it can be stored and accessed. The next chapter describes how this process works.
3. How remote management works

There are three main elements to a modern remote monitoring solution. The first is the physical layer that comprises of a communication gateway that links to your equipment, acquires the data, and communicates it to the remote server. The second is the remote server that collects and stores the data, and the third is software services that provide secure access to the data through a user interface.

Remote monitoring offer secure access to field data from remote sites. The above example comes from the Netbiter Remote Management solution from HMS Industrial Networks.

1. Communication gateways

Communication gateways are devices that handle the connection to the device or equipment being monitored. The connection is generally through serial or Ethernet based communication link using protocols such as Modbus RTU, Modbus TCP, SNMP, etc.

A common challenge to solve is access to the remote sites as many solutions require open ports in firewalls or VPN based connections to the field installations. It is normally better to avoid such solutions as open ports in a firewall reduces the protection of the site and VPN based access may give access to other components that what the connection may be intended for. A more secure method is to use a solution where the communication gateway initiates the communication to the remote server (only outgoing TCP/IP connections need to be open) and also uses communication protocols that only map selected data from selected devices to the remote server instead of open transparent access to the field site.

It may also be a good decision to use a solution which allows communication gateways to be pre-configured for the intended application. Such solutions make installation simple and require no programming or IT expertise at the time of installation and makes solutions are easier to deploy in the field.
2. Central server
Acquired data as well as information regarding events occurring in the field are sent to the management server by the communication gateway at selected logging intervals as demanded by the application. To communicate with the server, gateways generally use either quad-band GSM/GPRS, 3G or Ethernet based communication using TCP/IP based protocols.

Information held on this server can be displayed graphically in the form of customized dashboards (see below), or downloaded into the customer’s businesses management system for analysis and reporting.

3. Graphical dashboards
Information stored on the remote server can be presented using a standard web browser or integrated with other applications used for monitoring the field sites or applications handling logistics.

There are normally several different tools and functions available at the server to simplify configuration of a graphical display, customize reports or functions to provide access to the data stored on the server. A configuration can be packaged as a pre-configured profile that can be deployed to sites in the field and present a common user interface with information presented in the same way for each site.
4. What information can you get from your power generators?

Remote monitoring can be used to monitor and control all parameters of your power generators in the field. You can, for example:

- Check fuel levels — see when it’s time to refuel
- Check oil pressure
- Check battery status
- Check water temperature
- See the current and generated power output
- Direct alarms to go to the correct service staff
- Track generators via GPS
- Detect perimeter breach or fuel theft
- Test start your generator remotely

But modern remote management can also offer remote access to your equipment, meaning that you can do configuration remotely using the vendor’s own utility/configuration software. Just like being on site.

What to gain with remote monitoring

- Improve service to customers, enabling you to charge more.
- Reduce on-site scheduled and emergency service visits.
- Receive and direct alarms to service personnel whenever certain thresholds are reached.
- Generate reports on how different equipment is performing and analyze over time.
5. What about security?

Establishing a secure communication path with a remote monitoring solution requires solving a number of technical challenges (such as secure access through firewalls). Moving data off-site raises concerns over both its security and availability. By using solutions that are “firewall-friendly” and restricts communication to only the intended data, it is possible to limit the amount of information that can be access and reduces the possibilities of misusing the remote access. Most remote monitoring solutions also use encrypted communication to avoid eavesdropping on the data exchange.

Another method to ensure the security of wireless communications over GPRS or 3G, dedicated SIM cards with private APN. This means that it is not possible to ping or try to access the remote site except through any other link than the intended connection to the data center.

Data storage at the remote server also needs protection. It is common practice to regularly perform so called penetration tests of the remote server to ensure the security protection is up to date and detect any security holes.

Access to the remote monitoring system is normally centrally controlled and requires authentication. Multi-level password layers are used to provide permissions to access different functions, and the server authenticates users and ensures their correct access levels. The server may also record all user access as well as attempted access.

A secure and reliable remote management solution requires encryption both between the power generator in the field and the data center as well as between the data center and the web interface.
6. Finding your solution for optimal ROI

Custom-made remote monitoring systems will give you the exact functionality you need, but they are often costly to develop and time-consuming to deploy. A ready-made remote solution makes it possible to quickly deploy solutions at a lower cost.

Modern remote management solutions can be deployed within a couple of days. This helps make a quick return on investment (ROI). The cost of a communication gateway is normally less than the average cost of a service visit and by cutting down on travelling, it is also possible to reduce a company’s carbon footprint and only do service visits when really needed.

A very important factor to consider is that the solution should be a good fit with the genset control panels that you are using. Some remote management solutions, like the Netbiter remote management solution from HMS, have specialized solutions for power generators including pre-defined configurations for a range of control panels from different manufacturers as well as built in features for fuel level management etc.

What are the costs involved?

You pay for the communication gateway which connects to the power generator. Most modern remote management solutions offer different service levels for cloud access. Free versions with basic functionality are often available offering a very quick return-on-investment.

No matter which solution you choose, the ROI will most likely be quick. A service visit is usually the same cost as a single remote management gateway meaning that you may have a payback time of only a few months. and take action.