



Case Study:

Service Plan Improves Safety and Sanitation on Site

Papua New Guinea Mine improves on-site safety and hygiene with a proactive service plan and equipment upgrade.

Ensuring a Site is Emergency Ready

Regular service and maintenance are critical to all machinery, including refuge chambers and underground toilets. Without servicing, equipment may not be ready to use when needed.

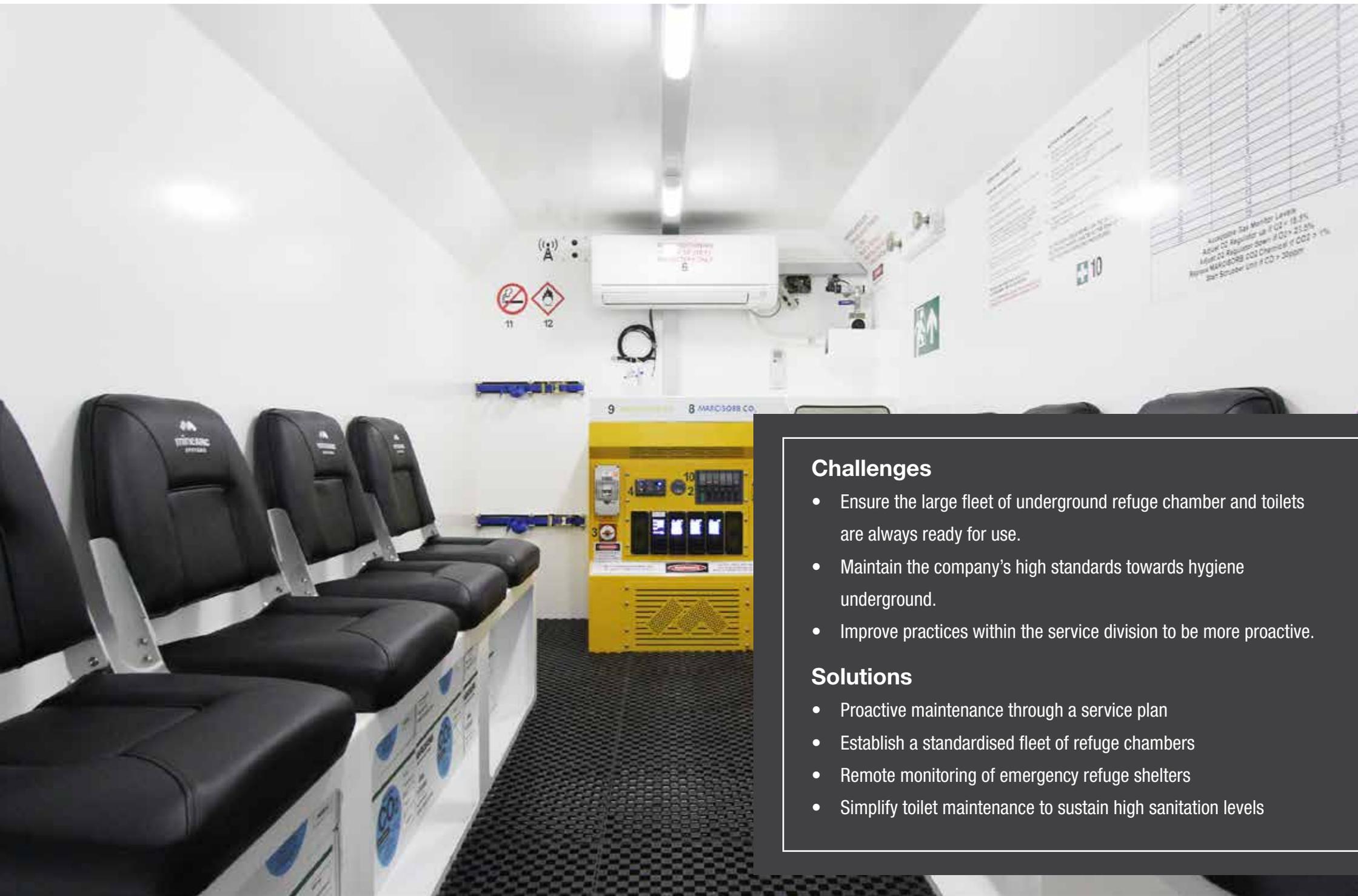
Machinery in the resource industry is exposed to harsh environmental conditions that affect their componentry. This environment presents a challenge to organisations who are trying to maintain a high operational standard of equipment.

A service plan is a versatile solution to ensure equipment is routinely checked. The plan outlines the timing and type of services required to ensure refuge chambers and other equipment are always prepared. In some cases, companies can seek the expertise of external contractors to provide specialised assistance.

One Oceanic site was looking to upgrade its safety operations by implementing a routine service schedule. The metalliferous mining operation in Papua New Guinea (PNG) has been in production since the early '90s. Utilising open-pit and underground mining, the site has established itself as one of the world's leading suppliers of gold and silver.



Pictured: Check valve replacement on a MineSAFE Refuge Chamber.



Challenges

- Ensure the large fleet of underground refuge chamber and toilets are always ready for use.
- Maintain the company's high standards towards hygiene underground.
- Improve practices within the service division to be more proactive.

Solutions

- Proactive maintenance through a service plan
- Establish a standardised fleet of refuge chambers
- Remote monitoring of emergency refuge shelters
- Simplify toilet maintenance to sustain high sanitation levels

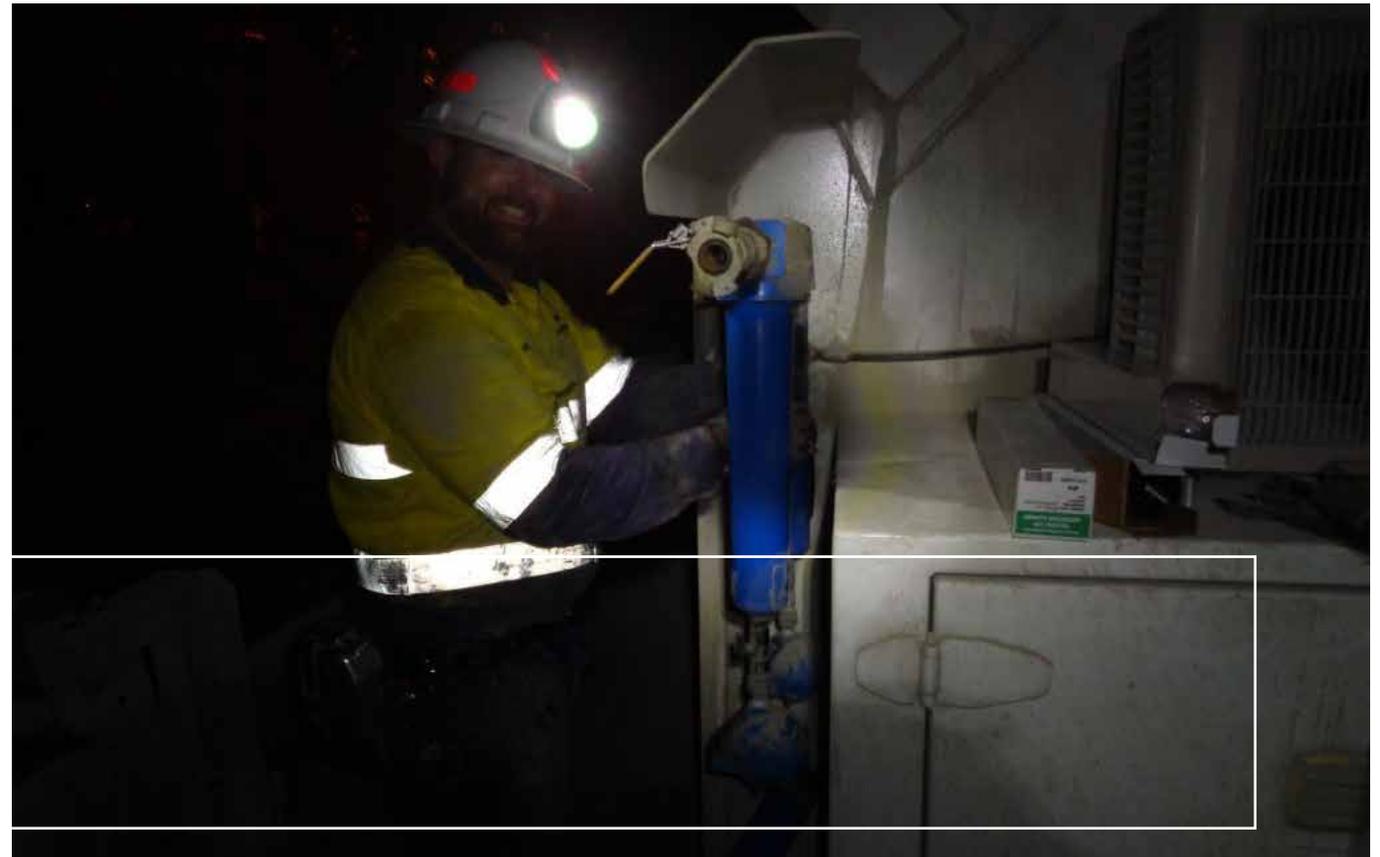
01.

Proactive Maintenance Through a Service Plan

Routine servicing involves keeping equipment and machinery in optimal working condition and emergency readiness. Refuge chambers contain life-saving equipment; these mechanisms require regular care to ensure they can perform in life-threatening situations.

The PNG site felt a tailored service plan was the ideal solution. After inspection, MineARC provided key recommendations to the site, which included consumables, parts and service periods. The two-year contract outlined fixed intervals where MineARC's Technicians would provide a service, travel and labour estimates and parts requirements.

Additionally, the mine has a set list of critical spare parts in stock on location, which has improved repairs and maintenance times. As areas within a mine can be closed if safety measures are impacted, improvements to maintenance times will benefit productivity.



Pictured: Servicing the
Compressed Air Management
System on-site

Establishing consistency across the emergency refuge chamber fleet was led by the Mine Managers and Underground Safety Department. Each department saw the value in standardising the active chambers on-site. The major benefits include:

- **Efficient Training and Operations:** Operator training is more convenient as each refuge chamber now contains consistent components and mechanisms. Underground personnel will possess the knowledge and capabilities to operate any chamber throughout the mine, regardless of location. Also, multilingual training materials, manuals and additional resources can be applied across the board.
- **Improve Service and Maintenance:** Working with similar machines aids troubleshooting and repair times. Technicians can familiarise themselves with the standard equipment, exponentially building their understanding and troubleshooting capabilities.
- **Cost-Effective:** Proactive maintenance and servicing allow more control over costs compared to reactive plans by reducing unnecessary expenses involved with stocking a vast range of OEM supplies and servicing equipment. There may be an initial outlay of costs; however, the long-term term benefits of keeping equipment operational far outweigh these.

The process involved in upgrading the fleet to meet their safety goals and grow productivity required the mine site to purchase new refuge chambers as well as refurbish the current stock with consistent equipment. Seven new MineSAFE Essential Design Refuge Chambers with airlocks, each with the capacity to safely hold 12 individuals during an emergency, were installed on site.

The chambers already on-site were refurbished in line with the components of the MineSAFE Essential Design; including two critical features:

- The installation of MineARC's **Compressed Air Management Systems (CAMS)** to control the mine air entering the refuge chamber. CAMS provides clean, breathable air through a four-phase filtration process, optimises mine air consumption, protects against over pressurisation of the refuge chamber, monitors for gas toxicity and water infiltration, as well as reducing service time during filter change-out.
- Conversion of the **chemical scrubber systems** from free pour to ELV MARCISORB Chemical Cartridges. These cartridges are a more effective method of cleaning carbon dioxide and carbon monoxide from the air within a refuge chamber. Importantly, chemical cartridges are easier to use during an emergency.

02.

Establish a Standardised Fleet of Refuge Chambers

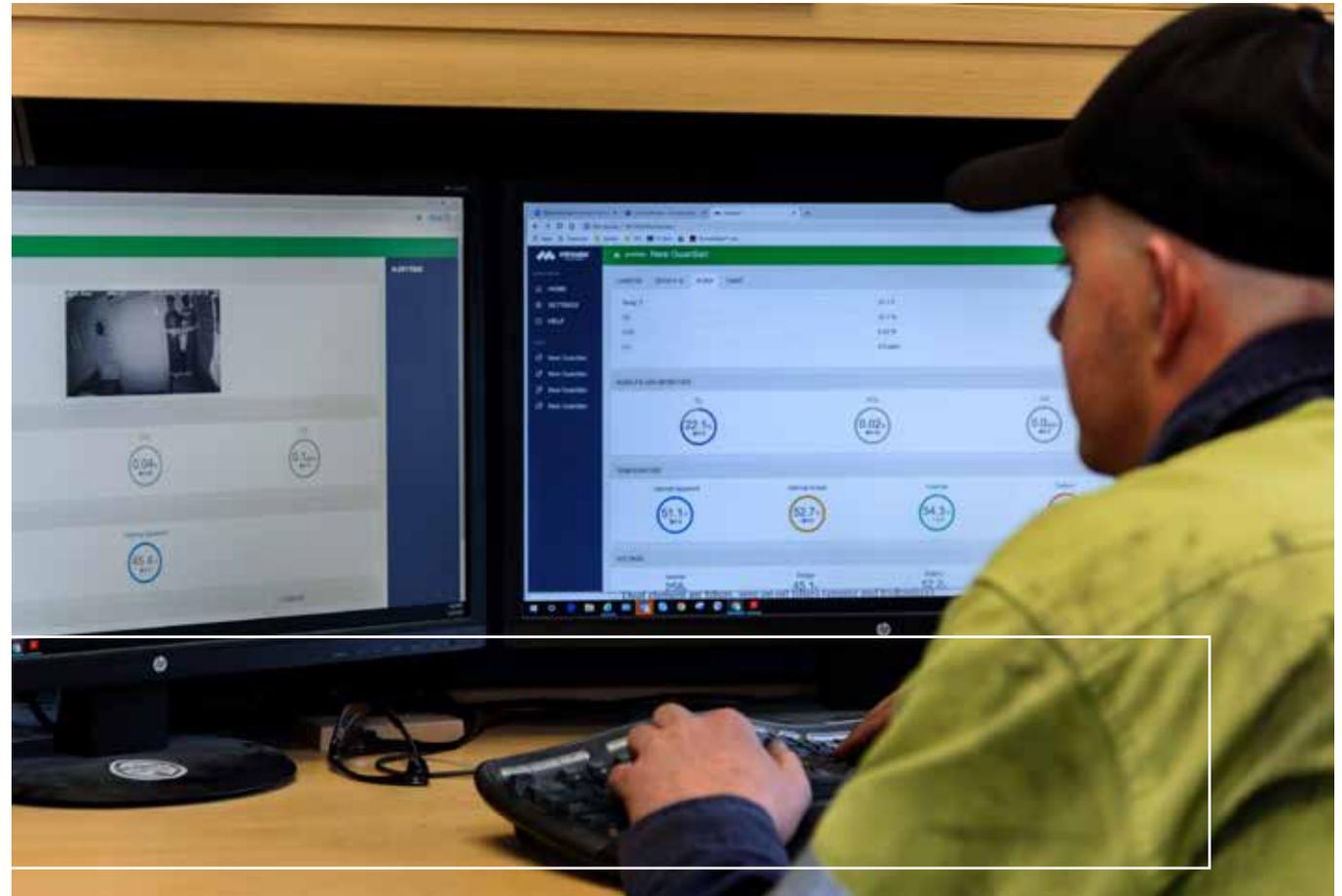
03.

Remote Monitoring of Emergency Refuge Shelters

Remote monitoring of refuge chambers assists with unscheduled maintenance and emergency operations. A service plan is an ideal solution for maintaining machinery and equipment, but the reality is that unscheduled repairs will still be necessary.

Adopting GuardIAN Refuge Chamber Monitoring into the site's maintenance and emergency planning has improved asset communications and efficiencies. During stand-by and emergencies, the mine manager can view the status of each refuge chamber through a locally hosted webpage. Patterns are observed, and push notifications provide alerts to initiate action.

Accessing real-time, accurate data from refuge chambers can negate the impact of ad hoc repairs. The mine can track irregular activity, using GuardIAN Refuge Chamber Monitoring, such as changes in power or gas levels, and address these immediately, reducing the long term effects of mechanical failure.



Pictured: Using GuardIAN Refuge Chamber Monitoring from the control room.



Pictured: Standard Design EnviroLAV Toilet situated in an underground mine.

04.

Simplify Toilet Maintenance to Sustain High Sanitation Levels

Maintaining high sanitation levels in a tropical climate is crucial to the health of personnel on-site. Mine toilets, whether above or below ground need to be routinely serviced to ensure they are performing at their optimal level and process waste efficiently. The PNG site uses MineARC's EnviroLAV Toilets as their primary hygiene solution through the underground drifts. These mine toilets have been installed in workshops and high traffic areas in the drives.

In conjunction with the refuge chambers, a regular servicing schedule was developed to ensure the reliability of these self-processing systems. A full service on the fleet entails the replacement of critical parts, service components and consumables.

If assets such as refuge chambers fail, it can put people at risk, slow production or ultimately shutdown a site. One solution is a service plan; a predetermined schedule of service checks which ensures chambers are reviewed regularly and meet required safety standards.

Servicing and maintenance are essential; generating value through cost control, asset utilisation and resource allocation. More importantly, servicing ensures refuge chambers are in optimal status to provide life-saving support to all staff in the event of an emergency. Together MineARC Systems and the mine site created a tailored plan to develop service and maintenance on-site.



Pictured: Checking the refuge chamber batteries during service.

Tailored Industry Solutions

Refuge Chambers & Toilets

- MineSAFE Essential Design
- Non-MineARC Refuge Chamber Refurbishment
- EnviroLAV Standard Design

Life-Supporting Technology

- Airlocks
- GuardIAN Refuge Chamber Monitoring
- Service Kits
- Aura-FX Digital Gas Monitoring
- Compressed Air Management System
- ELV Scrubber
- MARCISORB Chemical Cartridges

Training & Education

- Dual language training and operation materials
- On-site operational training
- On-site certified refuge chamber servicing
- Operational guides
- e-learning access

For More Information

To learn more about how MineARC Systems can support your site, visit minearc.com

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