



66kV 275kV 33kV 11kV 132kV 400kV

CASE STUDY
16183

Airbus Fairlawn

Refurbishment of the active Substation whilst maintaining full continuity of a 6 MW supply



11kV
Substation

PRIVATE
CONNECTION

TOTAL
CAPACITY

**6
MW**

BATTERY
STORAGE



AIRBUS

Introduction

The Airbus Filton site is a major UK aerospace facility where wings for the Airbus fleet are researched, designed, manufactured and tested. The site is extensive, containing numerous manufacturing halls, R&D centres, workshops, offices and essential plants - with a peak electrical demand of over 6 MW.

Fairlawn is one of three primary grid intake substations feeding Airbus' private 11 kV network. As this critical substation approached the end of its operational life, Airbus commissioned Powersystems to undertake a comprehensive refurbishment and full equipment replacement



Project Facts and Figures

- ▶ 14 weeks on site from mobilisation to handover
- ▶ 13 × 11 kV circuits
- ▶ 2 × 1000 kVA transformers
- ▶ 15 LV outgoing circuits, 125 - 400 A
- ▶ 13 HV terminations and 3 HV joints
- ▶ 11 LV terminations and 8 LV joints

Powersystems New switchgear (left) and the original switchgear (right) which was installed back in 1990.



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The project included:

- ▶ A new 13 panel 11 kV primary switchboard
- ▶ Two new 1000 kVA transformers
- ▶ A full LV switchboard replacement
- ▶ All primary and secondary cabling
- ▶ Battery backup systems
- ▶ Small power, HVAC, lighting and life safety systems inside the substation

As Principal Contractor, Powersystems provided full design, installation, testing and commissioning. Delivering such extensive works within a live manufacturing environment - and within the same building as the existing live equipment - demanded exceptional planning, collaboration and uncompromising safety management.

Project Challenges and Engineering Approach

Refurbishing an active strategic substation while maintaining full continuity of supply was one of the project's defining challenges.

All connected loads - manufacturing facilities, offices, research buildings, waste treatment systems and utilities - had to remain energised throughout. Airbus' operations run to tight schedules; unexpected downtime could result in major production and financial impacts.

Through close collaboration with Airbus Facilities and CBRE, Powersystems delivered a staged and innovative engineering solution:

- ▶ Reconfigured the 11 kV network to maintain redundancy
- ▶ Planned all unavoidable switching and short outages for weekends
- ▶ Introduced temporary alternative supply routes
- ▶ Sequenced the switchboard replacement in two halves
- ▶ Ensured no diesel generator backup was required

The result: a complete substation replacement with zero disruption to Airbus' operations.

Powersystems Partnerships

Airbus Operations Ltd

Owner of the private HV network and operator of one of the UK's most complex industrial electrical systems.

CBRE

Facilities contractor responsible for day to day network operations, who transferred HV network control to Powersystems for the duration of the works, enabling safe execution.

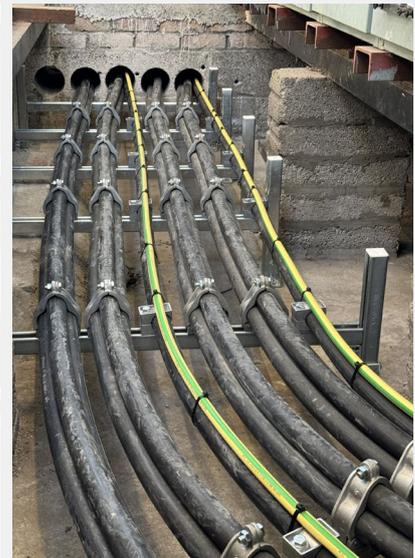
Leonard Engineering Design Associates (LEDA)

Client's engineer and project manager, responsible for feasibility, specification and oversight.

National Grid Electricity Distribution (NGED)

Local DNO feeding Airbus through two incoming 11 kV circuits connected into Fairlawn.

Powersystems also acknowledges the contributions of several specialist subcontractors whose collaboration supported successful delivery.



Project Development

Powersystems' relationship with Airbus dates back over three decades. Having installed the original Fairlawn HV equipment in 1988, we returned in 2024 to replace and modernise the infrastructure at end of life.

The project addressed a known operational risk for Airbus. Electrical supply resilience is critical for aerospace manufacturing, with any unexpected outage carrying significant safety, production and financial consequences. Airbus recognised that modernisation was essential for long term reliability and compliance.

Replacing the 11 kV switchboard required a two-stage approach, ensuring that at least one transformer remained energised at all times.

This project showcased the value of combining deep HV engineering knowledge with long-term asset understanding.



Key Risks and Mitigation Measures

1. Loss of Supply to Critical Operations

Reconfiguring the HV/LV networks temporarily reduced redundancy.

Mitigation:

- ▶ Detailed contingency planning
- ▶ On-call generators (not required)
- ▶ Rigorous monitoring of network loading and transformer conditions

2. High-Voltage Switching Operations

Switching at 11 kV carries inherent risk.

Mitigation:

- ▶ Senior Authorised Persons (SAP) from Powersystems and CBRE
- ▶ Jointly approved switching programmes
- ▶ Strict adherence to safety rules and documentation

3. Cable Identification and Removal

Hundreds of legacy cables were present - many redundant.

Mitigation:

- ▶ Two-week systematic identification and verification process
- ▶ Safe isolation and staged removal
- ▶ Clear routing for new cabling

4. Installation of Heavy Equipment

Transformers and switchboards in confined spaces required careful handling.

Mitigation:

- ▶ Controlled lifting plans
- ▶ Specialist lifting teams
- ▶ Clear exclusion zones

5. Maintaining Safe Access in an Operational Site

Airbus' site remained fully operational throughout.

Mitigation:

- ▶ Robust traffic, pedestrian and working-at-height controls
- ▶ Daily coordination meetings with CBRE and Airbus
- ▶ Strict control of permit-to-work systems

Scope of Works and Major Design Considerations

Powersystems designed, supplied, installed and commissioned:

- ▶ 13 panel 11 kV switchboard (2 incomers, 6 ring feeders, 2 transformer feeders, bus coupler, spare)
- ▶ 2 × 1000 kVA transformers
- ▶ LV primary switchboard
- ▶ Full HV and LV cabling, terminations and joints
- ▶ Refurbishment of the substation building, including:
 - Small power
 - Lighting
 - Fire alarm & intruder alarm
 - Heating and ventilation
 - Battery backup system

Key considerations included maintaining continuity of supply, working in tight spaces, and ensuring compatibility with Airbus' and NGED's operational requirements.

Project Timings

- ▶ July 2024: Works commenced after design and procurement phase
- ▶ September 2024: Major equipment replaced and energised
- ▶ October 2024: Reintegration into Airbus' wider network
- ▶ November 2024: Final commissioning and handover

The project was delivered on programme and without operational disruption.

What the Client Wanted

Airbus required:

- ▶ Improved reliability of their private HV network
- ▶ Replacement of end-of-life infrastructure
- ▶ Zero disruption to manufacturing
- ▶ A modern, resilient and compliant substation
- ▶ A trusted HV partner capable of delivering complex engineering within a live industrial site

Powersystems were selected based on experience, historical knowledge of the site, and proven capability.

How Powersystems Helped

Powersystems provided:

- ▶ Expert network reconfiguration allowing uninterrupted power
- ▶ A staged replacement ensuring continuous supply
- ▶ Engineering innovation that removed the need for temporary generation
- ▶ Full design, installation and commissioning capability
- ▶ Rigorous safety management in a sensitive operational environment
- ▶ Close liaison with Airbus, CBRE, LEDA and NGED

This value-added approach delivered the project safely, sustainably and with minimal.

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Environmental Impact

The refurbishment reused the existing substation building, avoiding new land take or structural construction.

Sustainability benefits included:

- ▶ Reduced material use due to reusing existing civils
- ▶ Smaller modern switchgear freeing internal space for spare storage
- ▶ No diesel generator use, improving carbon performance
- ▶ Efficient, modern equipment reducing long-term electrical losses

The Results

The Fairlawn substation was successfully handed over to Airbus in November 2024, just five months after mobilisation.

The upgraded facility now provides:

- ▶ Increased reliability
- ▶ Improved safety
- ▶ Greater resilience for mission-critical aerospace operations
- ▶ Modern protection, control and monitoring systems

Economic Benefits

- ▶ Improved uptime directly protects Airbus' production revenue
- ▶ Reliable energy supply ensures continuity of operations across manufacturing and R&D
- ▶ Accurate metering for tenant GKN supports internal energy billing
- ▶ Reduced risk of unplanned outages significantly cuts operational risk costs

Future Prospects

Airbus is progressing a programme of high-voltage infrastructure upgrades across Filton. Based on the successful delivery and positive feedback for Fairlawn, Powersystems is well-positioned as the preferred contractor for future substation refurbishments.



Challenges and Lessons Learned

- ▶ Large, historic private networks require extensive early-stage familiarisation
- ▶ Reinstating legacy protection schemes (such as NGED pilot wire) demands early engagement
- ▶ Coordinating multiple stakeholders is essential on an active industrial site
- ▶ Meticulous planning enables major HV refurbishment without operational interruption

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