

CASE STUDY: A NEW MEDICAL GAS PIPELINE SYSTEM

Hillingdon Hospital, North West London

Building a major development on a busy hospital site while maintaining the continuity of the hospital services and engineering infrastructure is a major challenge for any organisation and requires careful planning and coordination.

The Hillingdon Hospital's NHS Foundation Trust is facing these challenges as it expands its services to meet the requirements of the North West London Shaping a Healthier Future (SaHF) Programme, under which it has been designated as a major acute hospital.

The Trust has developed an operational plan to expand capacity in obstetrics, theatres, intensive care, emergency and acute services. The first operational phase of the plan will be when a new Acute Medical Unit (AMU) co-located with A&E, opens in January 2015.



Services provided by Hillingdon Hospital:

- Accident and Emergency
- Anaesthetics
- Breast unit
- Inpatient care
- Cancer and Palliative Care
- Day surgery
- Outpatient clinics
- Maternity services

The Project

The Trust Projects Department, in conjunction with SHJ Medical Gas Specialists, developed a medical gas pipeline strategy, which addresses the inadequacies of the current system, eliminating the single point of failure risks, improving system resilience, and providing the capacity and flexibility to service future developments.

The Challenges

The original medical gas pipeline systems at Hillingdon Hospital were over 40 years old.

Primary plant capacity is fragmented and of varying age and condition.

Site developments and the increased clinical use of medical gases has placed additional demands on this infrastructure, and there is no longer any spare capacity or resilience in the event of a pipeline or plant failure, let alone capacity to serve future site developments.

The provision of a new primary plant presented further problems for the Trust.

Services needed to be maintained whilst new plant was installed.

Existing plant rooms were not deemed suitable for upgrading the new plant.

Emerging site development plans were not sufficiently developed to allow the long-term positioning of permanent new plant rooms to be decided, and in any case time and funding available did not allow for the construction of permanent new plant rooms.



Key facts:

- A medical gas pipeline strategy was developed, which addressed the current system's inadequacies, eliminating the single point of failure risks, improving system resilience, and providing the capacity and flexibility to service future developments
- Hospital services needed to be maintained whilst the new plant was installed
- Self-contained plant rooms in standard ISO containers were created as the solution for the provision of a new primary plant for four bar medical air and vacuum systems
- The SHJ energy efficient medical air plant complied fully with NHS Health Service Technical Memorandum HTM02-01 and delivered medical quality air to European Pharmacopeia standards
- Plant status can be remotely monitored allowing early initiation of any remedial action needed
- Project covered by SHJ's own 5 year no quibble warranty

The Solution

The basis for the new medical gas pipeline system was to create ring mains for three primary services of oxygen, four bar medical air and vacuum along with reinforcement of the nitrous oxide and Entonox systems.

The ring mains would be of constant size and the primary plant could feed into the ring mains at designated ring main unit connection points.

The provision of a ring main provides the optimum in terms of resilience and flexibility for the site, allowing take offs from any point on the ring for services to new developments without interruption of supply.

The solution for the provision of a new primary plant for four bar medical air and vacuum systems was to create self-contained plant rooms in standard ISO containers.

This provided the low cost and rapid solution, which the hospital needed.

The containers are currently positioned adjacent to the Maternity building but could be moved at any time to an alternative location to suit future site development plans.

The containers have been thermally and acoustically treated and fitted with purpose designed ventilation. Fire detection is installed within each container and linked to the central hospital system. Self contained emergency lighting units are installed in each container.

The SHJ energy efficient medical air plant complies fully with NHS Health Service Technical Memorandum HTM02-01 and delivers medical quality air to European Pharmacopeia standards.

The system comprised of the following:

- 1 off HPC SM12 variable speed
- 3 off HPC SK22 fixed speed rotary screw compressors each capable of delivering 1,680 litres/minute at 10 bar. The compressors are supplied with HPC's Sigma control system
- 2 off 1,500 litre galvanised steel receiver vessels
- 1 off Silicair duplex dryer incorporating high efficiency water separators, oil filters, desiccant dryer and filters capable of producing medical quality air
- 1 number HPC Owamat oil water separator

The SHJ energy efficient medical vacuum plant complies fully with NHS Health Service Technical Memorandum HTM02-01.

The system is comprised of the following plant:

- 1 off Elmo Reitschle 'Twister' S Series variable speed screw type vacuum pump with cooler
- 3 off Becker fixed speed rotary vane vacuum pumps, each with a flow rate of 2,700 litres/minute
- 2 off 2,000 litre steel receiver vessels
- Duplex Bio filters incorporating high efficiency filter elements and drain flasks

The incorporation of variable speed machines as lead devices in both plant designs ensures minimum energy usage under low load conditions.

Both medical air and vacuum plants are monitored and controlled by Empower intelligent plant control systems.

These innovative controllers, developed by SHJ, interface with all aspects of the medical gas plant ensuring optimum operational performance and maintaining a log of plant operating data.

Plant status can be remotely monitored allowing early initiation of any remedial action needed.

A medical gas panel also for indication of plant status is installed in each plant room and these are linked to repeater medical gas panels in the hospital telephone switch board room.

The strategy also addresses compliance issues with the current systems.

The Benefits

The installation of the new plant rooms and modifications to medical gas pipeline systems including extensions to the Entonox and Nitrous Oxide systems were undertaken by SHJ between April and September 2014.

They form part of an ongoing site development programme but importantly have enabled the Trust to provide a reliable medical gas infrastructure to support the new Acute Medical Unit.

This project's plants are all covered by SHJ's own 5 year no quibble warranty, providing The Trust with the ultimate peace of mind that if anything were to fail it would be replaced new free of charge.

This warranty covers every item of the installation from compressors, to controllers, to batteries and includes labour and material costs for the entire 5-year period with 'no quibble'.

Customer Testimonial

Spokesman for the Trust and Project Manager Ian Svenson commented

“Without the innovative plant room solution designed and delivered by SHJ the Trust would not have a reliable and adequate medical gas infrastructure for the site as a whole and in particular for the new Acute Medical Unit development. The flexibility provided by the ring main system and the containerised plant rooms allows us more options when planning future site developments.”

This project is a fantastic example of how SHJ works openly and honestly with their customers, to plan, deliver and maintain tailor made solutions to match their needs. 3