

# A Breath of Fresh Air?

## The Challenges:

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.

The original medical gas pipeline systems at Hillingdon hospital are 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 new primary plant presented further problems for the Trust. Services needed to be maintained while new plant was installed. Existing plant rooms were not deemed suitable for upgrading for 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.

## The Solution:

The Trust Projects Department, in conjunction with their specialist provider, SHJ Hospital Pipelines Ltd, has 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 strategy also addresses compliance issues with the current systems.

The basis for the new medical gas pipeline system was to create ring mains for the three primary services of oxygen, 4 bar medical air and vacuum along with reinforcement of the nitrous oxide and Entonox systems. The ring mains would be of constant size and 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 new primary plant for 4 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 is comprised of the following:

1 off HPC SM12 variable speed, and  
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, and

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 Hospital Pipeline Systems, interface with all aspects of the medical gas plants 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 Outcome:

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 Hospital Pipelines Ltd 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.

Spokesman for the Trust and Project Manager Ian Svenson commented “without the innovative plant room solution designed and delivered by SHJ Hospital Pipelines 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.”