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Case Study: Sydney Harbour Tunnel

Company overcomes tunnel vision to streamline maintenance management

Users of computerised maintenance management systems (CMMS) should take into account the broader issues of work practices and procedures if they are to realise the potential benefits of such systems according to the company that operates Australia's first major, privately funded road infrastructure project.



*Above:
Sydney Harbour
Tunnel Company
General Manager,
Bob Allen, in the
control room*

The Sydney Harbour Tunnel Company (SHTC) had to address poor work practices and overcome the reluctance of some workers to embrace IT before it could achieve the benefits of using Mainpac.

General manager, Bob Allen, says: "Now we are able to put our fingers quickly on a vast amount of information in respect of equipment incidents and defects which is stored in Mainpac. That benefit is priceless," he said.

Just one example of such a benefit is an incident report requested by the NSW Roads and Traffic Authority (RTA). The report, aimed at operational improvements in the Tunnel, documents the number of times the Over Height Barriers above the Tunnel approaches have been hit by vehicles. It also allows Mr Allen to detail precisely to the RTA the cost and resources used to repair the barriers.

But benefits eluded the company initially because "although a lot of time and effort had gone into selecting the right computerised maintenance management system, the reasons for its purchase and subsequently, its correct operation was not adequately promoted by management," Mr Allen said.

An audit conducted one year after Mainpac's implementation alerted SHTC management to three major shortcomings in its work practices that were stifling the benefits of the CMMS.

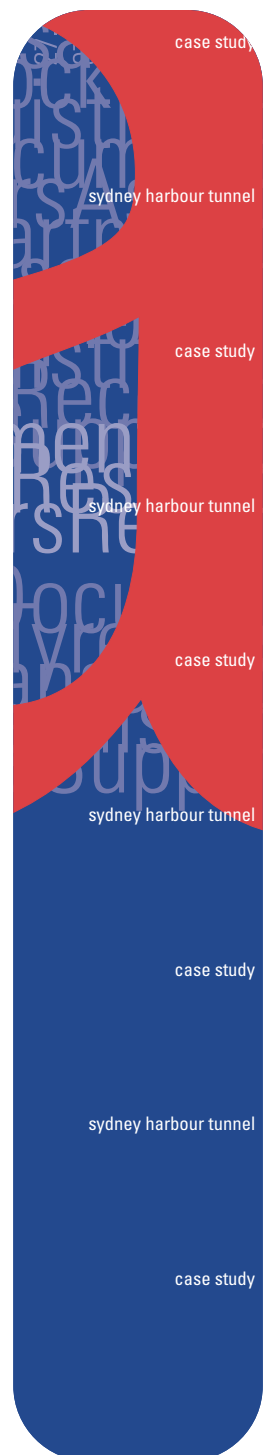
"We had to overhaul those work practices," Mr Allen said.

The overhaul was designed first to match invoices for spare parts with orders. Too often, paperwork was not completed for orders after they had been placed by phone. In other instances, spare parts were removed from the store without the use of the barcode scanner or without the entry of a job number to the Mainpac system.

And while by all accounts, maintenance was being carried out, a total of 700 outstanding issued job sheets were located in and around the maintenance office, reflecting a similar procedural shortcoming. Third, though the majority of equipment in the first 12 months of the Tunnel's life was repaired under warranty, it was found that the amount and quality of defect recording was inadequate.

"We recognised that we had not adequately promoted the correct operation of the system, so we devoted the next 12 months to rectifying those problems with some major changes," Mr Allen said.

The first of these was to conduct an education program, involving all maintenance and operations personnel, so everyone had enough knowledge of the Mainpac system to enter and view defects and view the stores inventory.



Similarly, all maintenance personnel have been trained so they have a working knowledge of the inventory and stores system. Stocktakes now result in a minimum number of discrepancies.

In a further change to procedures, SHTC initiated a policy that all stock items and consumables should be purchased by the administration coordinator, other than when urgently required. Now, all items are bar-coded and have a unique stock number.

The issuing and accounting of planned maintenance sheets has become the responsibility of the leading hand technician. All sheets are issued on a Monday to cover the following seven days. All sheets must be accounted for and either closed off or re-scheduled before the new 'work to' list is formed. The maintenance superintendent checks all sheets to ensure quality of the system.

Defects are entered into the system by the operations personnel who monitor the operation of all equipment or are usually the first point of contact for other personnel. The technician who rectifies a defect is responsible for issuing and completing the defect job sheet. Checks are made to ensure the same information on the job sheet is entered into the computer

Finally, regular reviews of the planned maintenance task are conducted to ensure their relevance.

The SHTC conducted an extensive evaluation of four suppliers of computerised maintenance management systems. Key selection criteria were that the software system must be user friendly, well supported in Australia and capable of generating reports on groups or individual pieces of equipment, including histories of resources and parts used in maintaining them. It must obviously be capable of scheduling the regular maintenance to be conducted by staff or contractors.

With its selection of Mainpac, the SHTC was to conclude, "the Sydney Harbour Tunnel would be receiving market leading software that was guaranteed continuing support and upgrades as well as expandability to meet future needs."

The evaluation satisfied SHTC that Mainpac would provide all maintenance quality records by keeping track of all preventive and breakdown maintenance and any equipment modifications. It would also enable accurate accounting of the stores inventory and would interface with the SHTC accounting system running on a Sun Microsystems hardware platform.

"Even if an organisation purchases the perfect package for its needs, it will not work unless everyone involved in the operation of the system is committed to its success. After a learning curve we attained that commitment and the benefits have followed," Mr Allen said.

100 year life calls for sound maintenance practices

The Sydney Harbour Tunnel is one of a number of major road tunnels in Australia, with more in the planning stages, particularly in Sydney.

Opened in 1992, the Tunnel is now in the tenth year of its thirty-year concession term under private company management, before being transferred to the State Government. At that time SHTC is obliged to hand over a tunnel in good condition and capable of at least another seventy years of service.

"This requirement certainly underscores the importance of sound maintenance practices," Mr Allen said.

The maintenance philosophy supporting the operation of the Tunnel combines the so-called 'run to fail', preventive and predictive maintenance principles. The core of maintenance activity is the preventive maintenance program, or routine, repetitive planned maintenance. Predictive maintenance is also important, with regular performance or condition monitoring of selected items of plant and structures, using techniques such as vibration analysis and thermography. Additionally some equipment and components are allowed to run to fail.

The Tunnel is 2.3 kilometres long and comprises two separate land tunnels on the north side of the Harbour, each just under a kilometre long and a further two separate land tunnels south of the Harbour, each just under half a kilometre long. These are joined by eight concrete immersed tube units that rest in a trench on the bottom of the Harbour, providing just less than 1 km of tunnel under water. The various sections combine to provide two separate carriageways, each carrying two lanes of traffic.

The tunnel shares approach roads with the 70 year old Sydney Harbour Bridge and since its opening has dramatically eased the cross-Harbour traffic bottleneck which existed in Sydney.

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