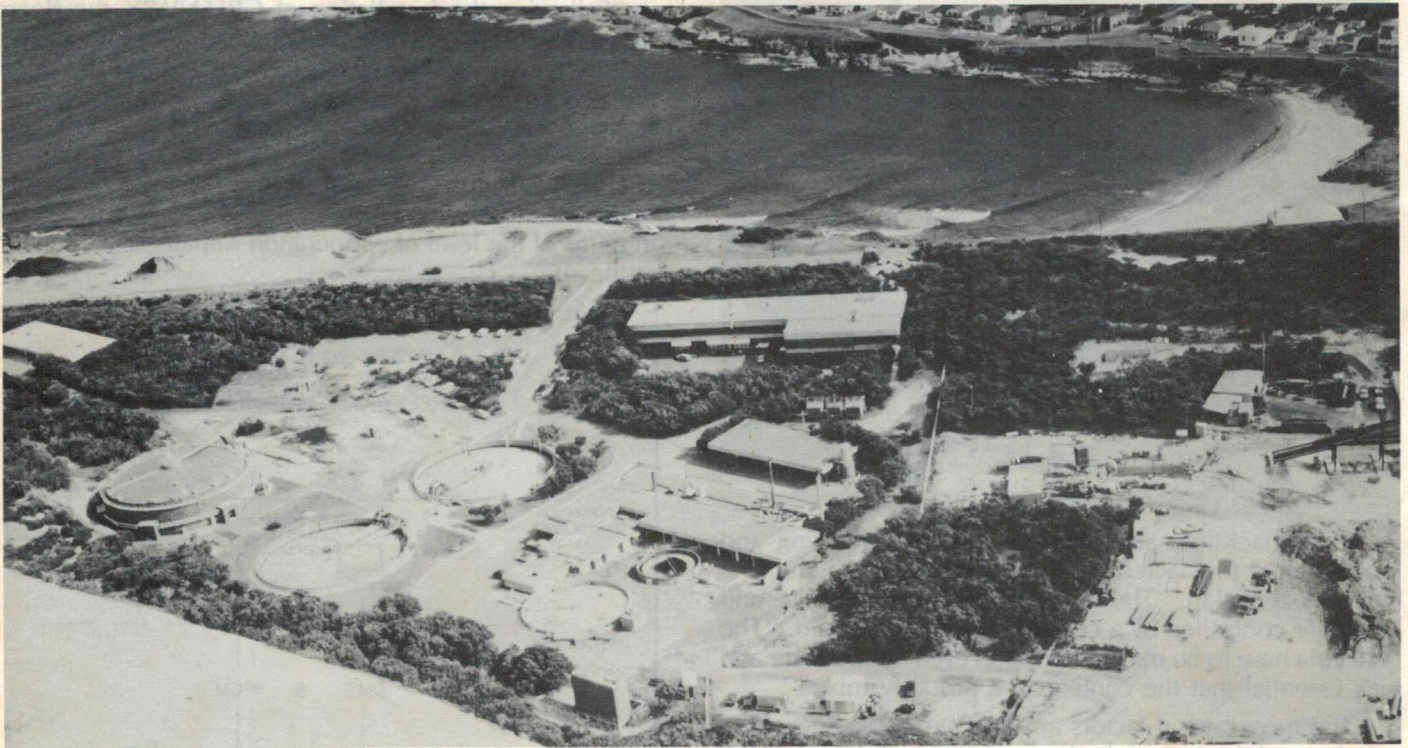


Greenway applications



Greenway cleans up at Malabar Sewage Plant



Aerial view of the Malabar Plant

After having installed a computerised system that integrates several treatment processes at the Sydney Water Board's sewage works at Malabar, Kilpatrick Green Systems Engineering has carried out a major upgrade.

A system which removes scum from sedimentation tanks is now supervised by an operator seated in front of a terminal in the central control room. Using the terminal's colour screen, the operator is able to monitor the amount of scum in the tanks, the positions of valves, the status of the skimmer and other devices, and whether any alarms have been triggered. Previously operators monitored the tanks' performance by interpreting information provided by meters and dials.

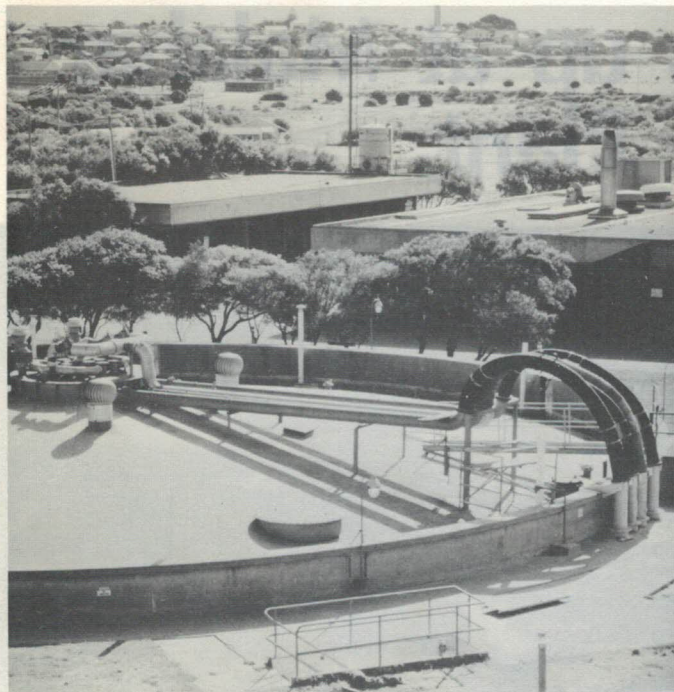
The scum handling process has been integrated into Kilpatrick Green's large-scale GREENWAY system which also controls and integrates the operations of a large digestion tank, and two incinerators and material handling equipment at the Board's Malabar Water Pollution Control Plant. The result of installing the system is higher quality effluent, greater productivity among the plant's employees and improved maintenance techniques. It is among the most advanced sewage control systems in the world.

GREENWAY gives the operator control by gathering and distributing data from a variety of incompatible programmable logic controllers (PLCs) which drive the equipment. The steps in the treatment of sewage are straightforward. The plant takes in raw sewage, filters out and burns any solids, and remixes treated sludge with effluent before pumping it into the ocean. Controlling these steps is where the difficulty arises.

"Control of this plant is very complex", said John MacKillop, Malabar's Sewage Treatment Manager. "A simple mistake could cost tens of thousands of dollars and result in adverse environmental problems".

"To improve the performance of the plant, we could either install a better control system or ensure that our operators displayed a degree of split second timing that was totally unreasonable." The Water Board opted for an improved control system.

At the heart of the process at Malabar is the number 5 digestion tank which contains hundreds of thousands of litres of sewage. Bacteria in the tank convert the sewage into a harmless grey soil, producing methane and carbon dioxide in the process. However there are two important factors. The temperature in the tank must be maintained at between 32 and 35 degrees Celsius, and the contents need to be kept moving for the process to work at optimum efficiency.



Digestion Tank

John MacKillop said that the task of cultivating and maintaining the bacteria in the digestion tanks requires a great deal of skill. "The dry tanks are pretty sensitive and they are controlled by a complex process", he said. "The bacteria have to be maintained at an even temperature and it's essential that the contents are properly mixed".

The most critical factors are the rate of feeding of the sludge and the rate of the by-products' withdrawal. If the sludge is loaded too fast or too slow, the contents can go sour. If the process were not rigorously controlled, the bacteria colony would eventually die, a different, less effective species would develop, or there would be a release of foul smelling gases. We would have to restart the whole colony of bacteria and that would give us a huge quantity of sludge to get rid of.

Two PLCs control the gas blowers, which mix and recirculate the gases. Another manipulates the equipment that loads and unloads the sludge being processed, while a fourth in another part of the plant controls the system that removes the scum. Four PLCs of a different type are installed at the incinerator and materials handling area. All communications between the plant's central computer and the PLCs, and between the PLCs themselves travel along fibre optic cables via the GREENWAY protocol translator.

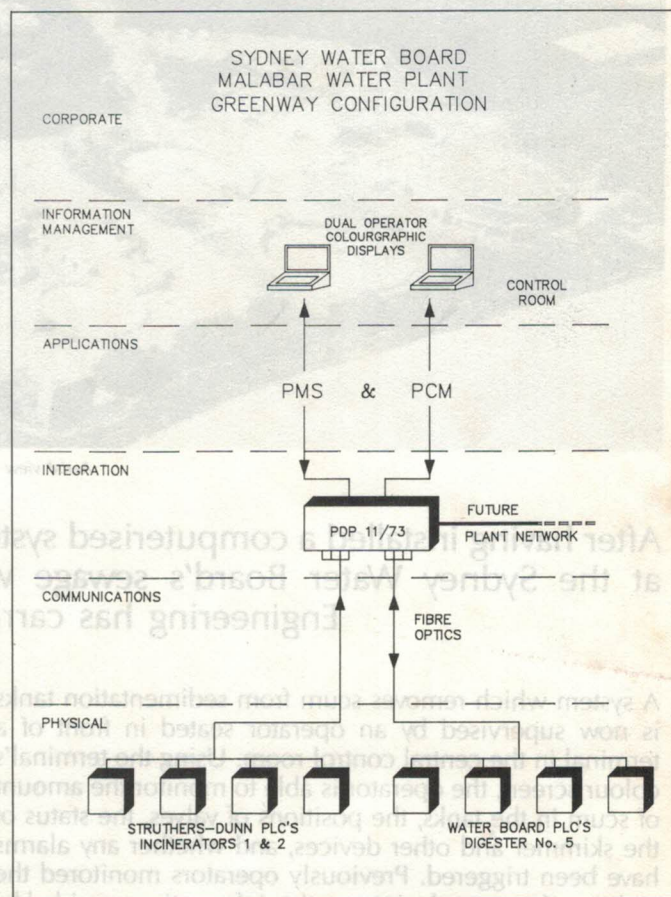
Using GREENWAY, operators enjoy online monitoring and control of the plant. Gone are the days when they need to make a 300 metre tour of the works checking the status of the PLCs. Another function of the GREENWAY system is to automatically check the status of each device every

five seconds. If one of the 150 valves at the plant jams or malfunctions, the operators are informed immediately. The system also shows whether the valve was opening or closing at the time. Previously the Board's team had to physically check every valve and then work out what it was doing.

At that time, the Operations Manager Sewage Treatment was Mr. Graham Dooley, who managed the Board's 31 sewage treatment plants.

He said "The GREENWAY system has led to significantly increased performance at a time when stringent environmental controls are being imposed. Number 5 is a very good tank but the Board needed the most sophisticated control devices available to extract maximum performance. If the Board had not controlled it effectively, it would have needed to have spent \$30 million or \$40 million building another tank".

"Following the installation of GREENWAY, the Board began re-thinking its whole control philosophy and I believe that this type of technology may very well fit into the overall picture. Not only is the equipment much more reliable than similar competitive technologies operating in other plants, but the GREENWAY system is also effectively fine tuning the PLCs, allowing the Board to get optimum performance out of existing equipment. The project was very well done in terms of the level of cooperation Kilpatrick Green won at the site".



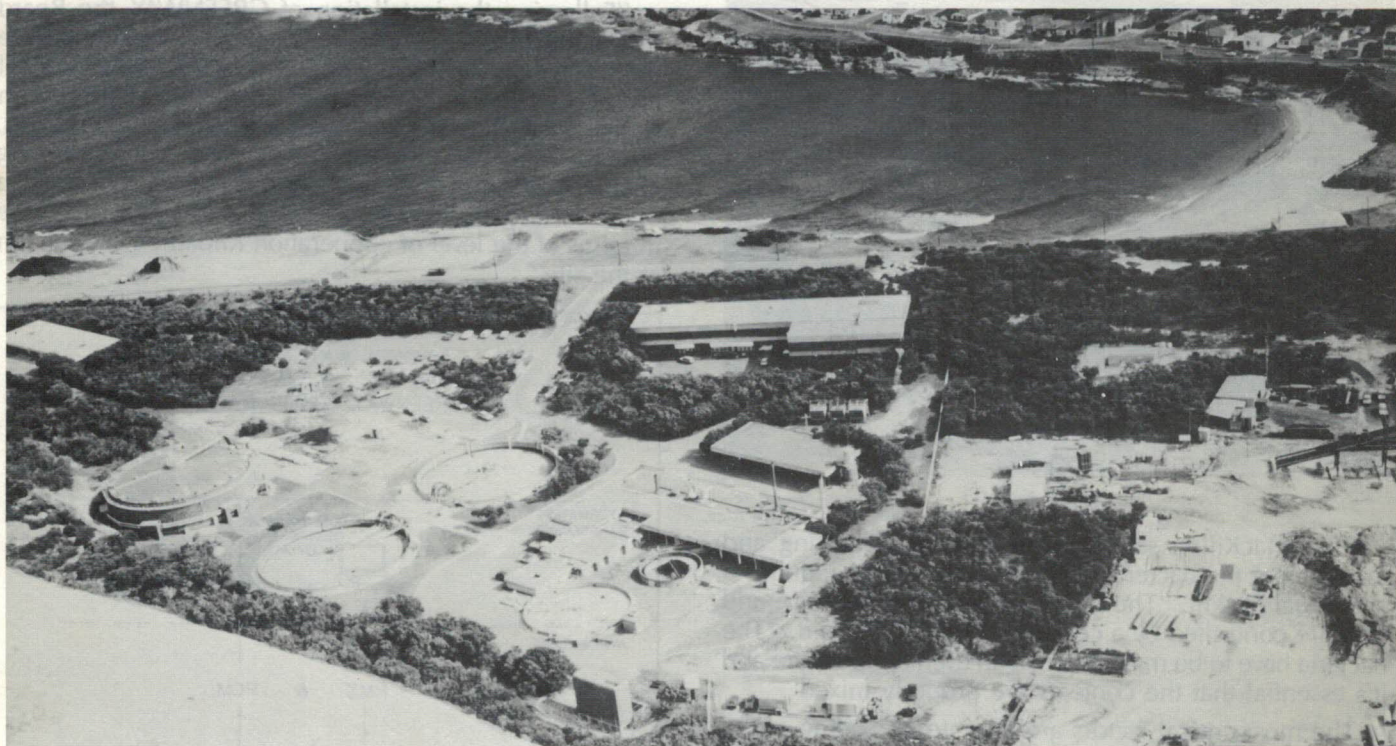
Configuration of Greenway System at Malabar

"The Board's operations staff did a lot of the system design and also specified screen layouts. As well, they were deeply involved in the installation of the new system which meant that they were more than willing to embrace the new procedures", said Mr. Dooley.

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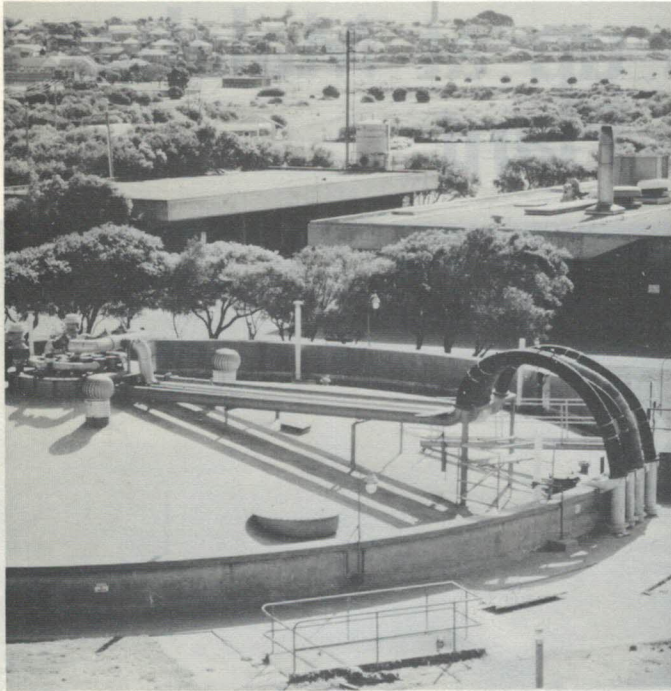
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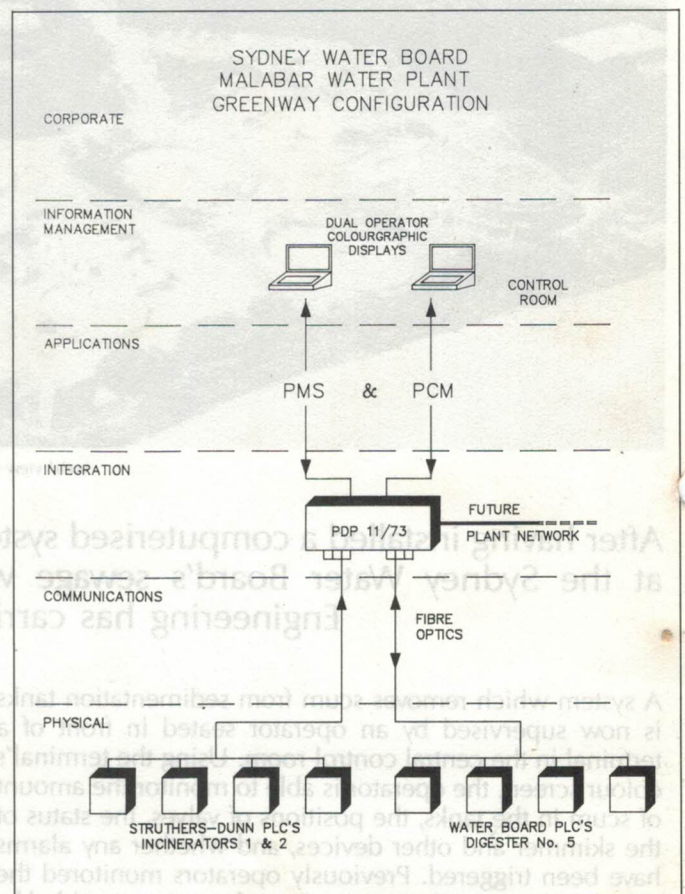
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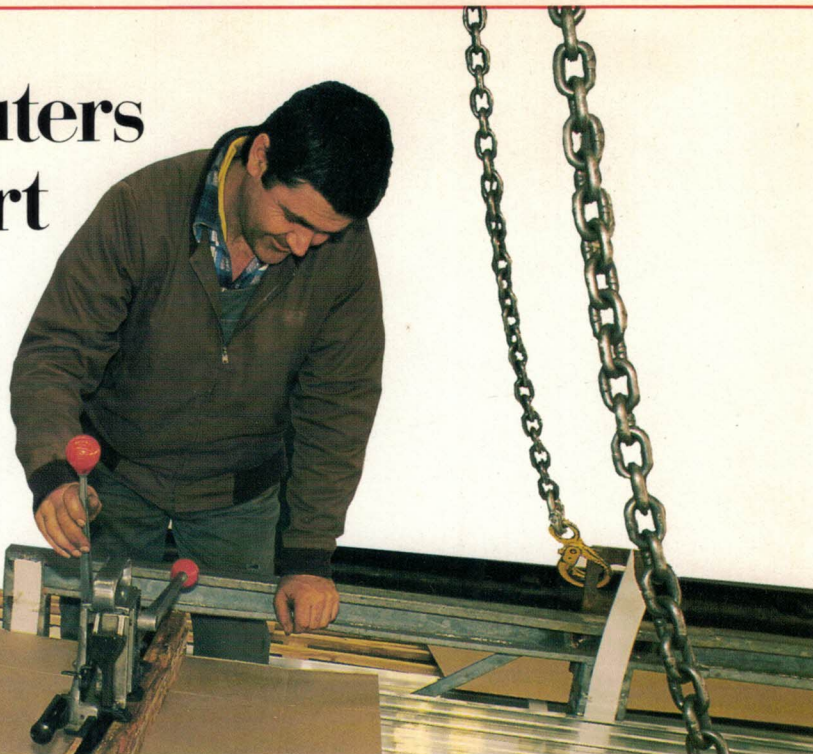
IBM RT Computers play a major part in Comalco's Advanced Aluminium Production System

When Comalco Aluminium Limited installed fully automatic aluminium extrusion equipment in its plants in New South Wales and Queensland, the company had one goal in mind. It wanted to create a paperless plant. To achieve this objective Comalco needed to integrate shop floor systems with commercial computer applications, something no other aluminium plant anywhere in the world had managed to do. Comalco has become the first. At the centre of the new systems are IBM RT computers which provide essential communications links between programmable logic controllers (PLCs), which drive the aluminium presses, and a central IBM 4381 mainframe computer.



"The major benefit of the integration will be a 20 per cent increase in the throughput rate of the plant with the same number of employees," explained Derek Greliche, Technical Development Manager, Extruded Products Group, Comalco's Mill Products Division. This greater productivity will allow the system to pay for itself in two years. Another benefit will be an improvement in the quality of the doors, windows, ventilation louvres and other components manufactured at the plants for the construction and electronics industries.

* IBM Marketing Contractor, Kilpatrick Green Systems Engineering, supplied the IBM RTs, and designed and wrote the applications software. IBM's Marketing Contractor program is a national program in which selected software and systems houses and systems integrators are contracted to market and install



specified IBM products. Every day the 4381 creates production information for the following day, each production lot containing a wealth of information about the goods to be produced. The data is sent by landline from the 4381 to the RTs which process the information before loading it into the PLCs. The RTs also provide operators with details about the production process. The RTs' work does not finish there.

"We record all operating conditions for each lot on the local RT," said Mr Greliche. "If an operator has to change the parameters in a PLC, the changes are recorded in the RT and sent back to the mainframe. Supervisors use screens to generate standard and special reports on lots produced by the plant. Downloading the lot information from the 4381 saves a great deal of time and eliminates the need for an operator to key into the PLCs information from lot tickets. The automatic system is also more accurate."

Immediately each lot is produced, production data is sent by the RT to the IBM 4381 computer which uses it to process invoicing, accounting, costing, inventory and other commercial applications. "In one step we have gone from process equipment that was rather old to using plant and information systems that are more advanced than those used by any other aluminium producer in the world," said Mr Greliche.



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