

RUNNING RINGS UNDER STOCKHOLM

Swedish CCTV company ISG approached U.K. firm AMG Systems to collaborate on a surveillance and safety system for Stockholm's Södra Länken project.

Like many 21st century cities, Stockholm has suffered, in recent years, from both increasing volumes of traffic and an increasing population that have put ever-greater strains on its infrastructure. In the 1990s, various municipal bodies that governed the city agreed on a semi-underground ring road for Stockholm--a massive engineering project that involved tunnelling under the suburbs of the city to provide roads that would otherwise have been routed through housing, offices and parks.

The Södra Länken tunnel is a key stretch of the Stockholm ring road and the largest-ever road tunnel construction in Sweden. Along its six kilometers, it interconnects with five other roads to create a 17-kilometer long mass of tunnels and ramps. The construction of Södra Länken commenced in the mid 1990s, and the complex opened in 2004 to carry around 60,000 vehicles per day.

Swedish CCTV firm ISG was responsible for installing the traffic surveillance system for the tunnel complex, which involved more than 400 cameras relaying video signals to Trafik Stockholm. This permanently manned traffic management center monitors traffic rhythms to ensure smooth flow of traffic and an overall safe journey for the public. However, in the event of breakdowns, gridlocks or accidents, Trafik Stockholm coordinates emergency support for drivers in the tunnel.

Video feeds are also used for traffic incident detection, and this posed a problem for ISG. "Incident and emergency management requires highly detailed, color images for the control room staff while the detection system is optimized to work with higher contrast monochrome images," said Matts Lilja, Managing Director of ISG.

"We were to install and maintain two cables from each of the cameras--a large capital investment and a continuing running expense."

Two other considerations also had to be mulled over in the selection of video transmission equipment. The first arose from the way that tunnel cleaning is carried out--via high-pressure washing. ISG had a tested and proven waterproof camera housing, and any ancillary equipment that could not be put

Case Profile

Case Nature:

AMG Systems' fiber optic installation that links a total of 400 cameras on Sweden's largest road tunnel, Södra Länken

Location:

Stockholm, Sweden

System Adopted:

Vision 2000 (with modifications)

Case Features:

- With a total length of 17 kilometers, the complex carries over 60,000 vehicles every day.
- Camera and transmission equipment had to fit inside waterproof housings that had been tested to withstand tunnel-cleaning equipment, with color and monochrome feeds required from each camera.
- Both signals are carried down single fibers to the Trafik Stockholm control room with huge reduction in infrastructure costs.
- Video signals are not compressed, ensuring that video quality is not compromised and latency is eliminated.

inside the camera housing would need its own waterproof housing.

Secondly, reliability was paramount. "Once operational, getting access to the equipment inside the tunnel to make adjustments or replace failing equipment is not a viable option," said Lilja. "Zero-fault operation is what we had to strive for."

Two in One

To achieve this goal, ISG approached U.K.-based AMG Systems to design, supply and install the fiber optic transmission equipment that would be crucial in the safe operation of the road. "At first sight, our Vision 2000 range appeared to be the ideal fit in the Södra Länken project," said Alan Hayes, Managing Director of AMG. "Its single channel transmission technology offers a highly cost-effective solution for local area systems where all the cameras are within a few kilometers of the control room. It is also exceptionally reliable. However, after investigating the camera and housing, we proposed a custom solution based on the standard Vision 2000 range that would overcome both the need for twin fibers to each camera and the need for additional waterproof housings."

AMG's final solution involved designing a camera-end printed circuit board to generate color and monochrome signals, both of which would be carried down a single fiber to the Trafik Stockholm facility where they were separated for incident monitoring and license plate recognition. This was integrated with the Vision 2000 equipment at the camera end to provide a low-cost video transmitter and data transceiver, all of which could be accommodated within the existing camera housing.

At a stroke, the fiber infrastructure was halved, and cleaning was not an issue. Combining the whole transmission and camera assembly within a single housing also meant that the entire unit could be lifted out and a replacement dropped in if any problems were detected.

Installing and Commissioning

"Coming up with the idea of combining video streams and customizing a long-standing standard range to easily accommodate the changes without affecting our ability to support the product over its lifetime was not the most challenging part of this project," said Hayes. "Installing the fiber was, as we worked




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alongside many other contractors while construction vehicles and tunnelling equipment were still in action."

The answer was to manufacture a set of de-mountable test equipment that could be used to test each fiber optic link as it was installed. Each fiber run was tested using the temporary rig and then sealed for the remainder of the construction process. "This worked very well," said Hayes. "We were able to progress the fiber installation while other heavy construction continued and minimize the danger of damage from passing trucks and heavy machinery. As you can imagine, that was an inconvenience and expense we were eager to avoid."

A final consideration for the AMG network was that the cabling should be resilient-- both fire and waterproof. Although, in the event of an accident, visibility from the camera would probably be impaired by smoke, it was crucial that the network last as long as possible to relay information back to aid coordinators on the ground.

A Long Partnership

"The Södra Länken tunnel was a major civil engineering project for Stockholm, and we were understandably keen to ensure that the traffic flow on this prestigious new route would be as smooth as possible," commented Lilja. "We were also acutely aware that we would have to keep abreast of technological developments during the five-year project and meet our installation and reliability targets throughout. Working with AMG Systems gave us this assurance and is allowing us to look at our future plans with the same degree of confidence." 

For more information, please visit the company's Web site at www.amgsystems.co.uk