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Cramming more hours into a day

Got a minute? No, few people in your industry do, which is why optical character recognition systems have become so important for ports worldwide. Tim Newbound speaks to three main competitors...

Just take a second, as you find time in your busy schedule to read this article, to consider what your office life would be like without internet capabilities. Perhaps you are reading this edition of *World Port Development* while commuting, and have just finished checking emails on a portable laptop connection. Perhaps you have just sent out communications to customers and colleagues across the world at the click of a button from your desk... Whatever the case, consider the revolution the internet has brought to the business world, and think of how it has helped speed-up and simplify operations. Now consider the impact information technology has had on the operations of ports and terminals in recent years... Finished? It's pretty impressive isn't it? At present, this impact is best exemplified in the ever-advancing implementation and development of optical character recognition (OCR) technology. Where ISPS Code enforcement last year may have thrust the market's development forward somewhat, in 2005 OCR manufacturers are entering another new phase for the technology. The buzzwords in *World Port Development's* April 2004 article on OCR were very much 'comprehensive solutions' (especially in terms of the number of cameras),

and 'security' (largely due to the obvious ISPS concerns). While these remain very current factors, after speaking to three leading suppliers, the words we're humming this year are 'centralising' and 'efficiency'. With continued expansion of containerisation globally, it is inconceivable to consider ports building at the same rate into hinterland, or outwards through landfills. As such, mega terminals need to mega-utilise the space at their disposal! And this is where the principle of centralisation comes in – the centralisation of IT, that is. In this sense, smaller detectors across a terminal can work in tandem with one central CPU. Hi-Tech Solutions, Israel, is very conscious of this, and is striving to apply this ideal to its truck plate OCR plaza lane systems, which match the identified truck plate a 'pedestral lane' level to a corresponding portal read. This is designed to provide automatic processing of trucks as they pass through the different processing points of the terminal. Working within a terminal, 'pedstral level' readers are used as a supplement to Hi-Tech's gate OCR systems – of which the company has installed over 100 in 11 marine terminals. Gate systems collect the original

feed of information on incoming traffics – taking down either colour or black and white images, recognising truck number plates, the chassis number and container numbers. Additional features such as colour damage inspection and identification of IMO labels can be added. With these checks subsequently spread out across the port, an operator can clearly satisfy that aforementioned need for 'comprehensive operations'. But the market is far from solely focused on safety and 'covering all the angles'. One of the governing factors for OCR technology always has to be efficiency – and this is something recognised by all the manufacturers *WPD* spoke to, particularly on this matter of highlighting the centralision of OCR system administration. Belgian solutions provider, Camco Technologies, placed particular stress on the importance of computer systems operating as autonomously as possible in its response. Anton Bernaerd, Business Development Manager at the company, told *WPD* how this principle is applied in the company's staple gate recognition system, the SuperGate AGS. "Deployment of the SuperGate OCR portal at terminal gates enables data elements to be pre-filed in the Terminal Operating System, thus minimising the amount of data entry required and reducing transaction times," he said. "The captured images are used to process the OCR read of container, chassis, and license plate numbers, which are then automatically pre-filed in the TOS." Bernaerd states that one of the key features of SuperGate is the ability to scrap load lists or other aids. But aside from this and

the concentration on assessing, storing and finalising as much as possible at the portal gate stage, is Camco's focus on having the actual cameras processing the optimal amount of information independently. "Every camera unit comprises not only the digital camera sensor but also an embedded computer that executes all the CPU intensive tasks (i.e., capturing the image, compressing it into JPEG format, and OCR processing) making the need to install Windows-based PCs near the cameras obsolete, as well as increasing the overall reliability," he said. Banaerd said that this allows OCR engines installed on these embedded computers to process the identification numbers of containers and trucks separately, communicating the temporary results between them. This allows a truck throughput rate of around 35 mph, processing information on the container, chassis, and license plates, and even allowing a continuous traffic flow of trucks during peak times – "bumper to bumper", as Banaerd put it. The company boasts that, by utilising the SuperGate system, terminals can achieve processing rates of up to 500 trucks per hour, per OCR portal, with accuracy rates in excess of 98 per cent. Indeed, we were told that in a recent (Feb 3)

audit conducted on three lanes at Pacific Coast Terminals, Vancouver, Canada, 1,200 trucks were read at 99.81, 99.38, and 98.59 per cent accuracy. Reducing the number of terminals, human attendants, and the general running costs, these measures can greatly stem the need to change or enlarge existing infrastructure – an ideal fully subscribed to by Hong Kong firm, Asia Vision Technology (AVT). The company highlights the success of its 2004 installation at Container Terminal West 8, operated by Container Terminals Ltd, as an example of working around the physical limitations faced by some of the operationally massive terminals that are crammed into limited space. In its response to *WPD*, the company stated of the Terminal West 8 set-up: "Addressing the limitations in its physical environment while controlling project budgeting, power-saving LED light is utilised, the pole height for video camera installation is adjusted, and only a single CPU is needed to process image capturing, number recognition and verification in five seconds on average." With space now at such a premium, measures like these are becoming vital, and it is no wonder that all the manufacturers *WPD* spoke to are reporting healthy order rates. One of Camco's latest line developments, in fact, is the introduction of the TrainGate system at HHLA Burchardkai, Hamburg, Germany. Indeed, systems monitoring rail processing remain vital as containers stream into ports via mainland connections, and this is an area that has also proved highly successful for Hi-Tech in recent years. A recent example is of Hi-Tech's success in this sector is the portal SeeTrain installation at the Port of Los Angeles. The characteristics of Hi-Tech's rail system are that it can read the container numbers on rail cars traveling at speeds as high as 50 mph, and can be bi-directional, detecting and recognising images on one or two stacks of containers. A number of SeeTrain installations are being made across US West Coast ports, Hi-Tech states. As a train enters or exits a terminal, the system scans the passing containers and automatically detects them, recognises their ISO codes, and reports the results and images to the terminals information network,

with the additional option of recording railcar numbers. Aside from its rail-monitoring technologies, Hi-Tech has achieved success with its portal gate OCR systems at the Port of Los Angeles, and boasts that its installation of 56 full gate OCR systems at the Pier 400 Terminal equates to "the world's largest single container OCR system". AVT has also enjoyed success at the Port of Los Angeles, through the supply of its Vecon-MIV (mobile inventory vehicle) solution for the APM Terminal (run by the Maersk Group), also based at the greatly-publicised and much-lauded Pier 400 Container Terminal. Again, the principle is one of using smaller cameras within a terminal to communicate with a more central Terminal Operating System. "This automated system helps to maintain container terminal inventories," the firm told *WPD*. "Whenever a truck passes along these rows, information of the container number, ISO number and lot location will be transferred back wirelessly and updated in the TOS or their host system. Vecon-MIV is capable of identifying the location of depots, which indicates if the stall is open or occupied, and recognising container numbers."

Speculate to accumulate

For the world's larger ports, which continue to expand, it seems that investing in these OCR technologies is a necessity rather than a lavish outlay. This expansion can surely only be facilitated by the continual advancement of efficiency – and, importantly, safety – enhancing measures. Accuracy rates are paramount, as is smooth, quick processing. Examples of this can be found in many manufacturer-provided statistics. AVT boasts, for example, that its Vecon-Con system – which operates at CSX World Terminals – can massively speed up the processing of containers through the out gate. Automated database verification and approval triggers the lifting of barricades, which can shorten processing time by 58 per cent, delivering more than 98 per cent accuracy when compared with manual documentation, AVT states. Elsewhere, Hi-Tech reports that its customers are reporting a 50 per cent increase in terminal productivity due to its OCR systems world

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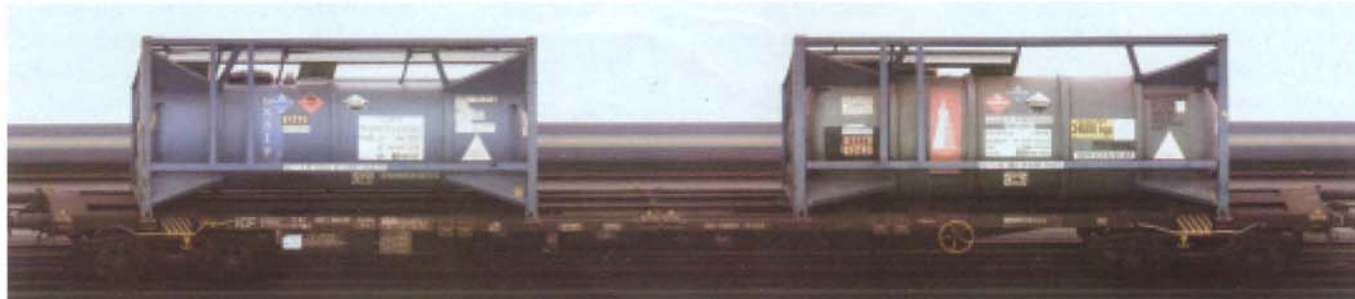
wide, while Camco's audit results are detailed above. With many exemplary performances, then, what are the key factors to look for when seeking a good return on investment (ROI), according to the manufacturers themselves? Camco's Bernaerd simply makes a case for 'you get out what you put in'. "At one side you have systems that work with standard CCTV cameras that just take an image of the container number. The advantage is that the price is low but the OCR read rate will be in optimal cases in the low nineties, while the processing speed will be very slow," he says. On the other side, he says, operators have the option of systems that use Line Scan technology, making high resolution images of all sides of high speed moving trucks. The initial outlay may be higher, but the results are close to perfect, and make money through improved safety and throughput. Similarly, AVT stressed the fact that the outlay is only initial, and that the benefits are long term – adding that manufacturers, as previously stated, are now more equipped than ever to build around the infrastructure needs of the customer. "From an ROI perspective, adoption of an OCR system may incur initial capital to implement. The expense is ONLY one-off infrastructure overheads," the company stated. "Enhancing productivity with security-enhancing measures is, indeed, a long term and crucial benefit. It is particularly optimistic when container terminals do not need to alter current infrastructure nor computer systems to cope with any security automation specifications requirements." The company stressed that building around existing infrastructure with minimal disruption is key to its policy. As AVT suggested to *World Port Development*, proper governmental implementation of the ISPS Code from nation to nation might not be as practical as it could be, but the company accepts that the Code has helped push forward OCR systems' development. But this is a process that comes down to so much more than meeting stipulations laid down by the IMO. OCR has developed, and is developing, because in times of ever-heightening containerisation, the world needs to find ways to make the most of the infrastructural space it has in its ports, and to maximise the efficiency of processing. OCR is no longer just needed for security – there has and always will be a need for this. In modern terminals, the technology must be safe, efficient, and – importantly – adaptable around infrastructure. In a world where both time and space are dwindling resources, where we are all rushing around like crazy looking for more hours to cram into a day, the advancement of solutions like OCR is vital. ▥

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news

Friday 19 August 2005

AVT notches up three container terminal projects

Asia Vision Technology (AVT), a developer and provider of Optical Character Recognition (OCR) systems, has won three major container terminal projects in Korea, Hong Kong and China.

The company's VECON Vehicle License Plate Number Recognition (LPNR) and Container Number Recognition (CNR) systems will be installed on the six berths at the Busan New Port North Container Terminal, in Korea. The system was ordered by Pusan Newport Company, a joint-venture company established by Samsung Corporation and Dubai Ports International, which operates the terminal.

Meanwhile in Hong Kong, AVT has supplied a Gate-out Processing automation solution on 5 out-lanes of Gate 1 of the River Trade Terminal, located at Tuen Mun, which caters for the growth of trade movement at the Pearl River Region.

The Automated Gate-Out Management system helps to detect containers, recognises and records container numbers, ISO codes and container types at gate-out for record and security assurance, enhancing efficiency and lowering operating cost.

In China, AVT has installed what it claims is a world first – "Zero manpower at in/out gate" – at Dalian Dayaowan, a significant port in China for transshipment in the Northeast Asia region with expected handling capacity of 700,000 TEUs per annum. The CNR system captures and recognises container numbers, country codes, and ISO codes automatically in less than 0.012 seconds from trigger to image capture. Captured images are transmitted to the TOS for central processing to enable security with minimal manpower.

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The 12 months prior to July 01, 2004 were fascinating. In fact, the six months that led into the ISPS Code implementation deadline were simultaneously exciting, intriguing, controversial and utterly confusing. As global maritime operators grappled with the realities of the world's greatest sea-borne trade security shake-up for 30 years – if not ever – all types of opinions, concerns and questions were voiced. Some grumbled over the practicalities and realities of ISPS stipulations; some questioned the potentially detrimental effects they would have on trade and ports in developing countries; some questioned whether the new measures were really necessary. Moreover, some factions were left questioning what was expected of them altogether! Now, 12-plus months on, the industry can finally reflect on global maritime security with a little more certainty, a lot more cohesiveness, and lashings more positivity. As Ian Lush, marketing director at transport insurer the TT Club said: "While accepting that there are bound to be some dissenting voices, the tone of comment back to the Club is overwhelmingly positive. And indeed, from the perspective of the insurer, we believe the ISPS Code introduced a much-needed 'reality check' that has contributed significantly to improvements in the safe and secure operation of ports." Moreover, the port and ship operators and security firms that responded to *World Port Development's* maritime security survey had a lot to say – which is of little wonder, really, when one considers just how much planning and effort goes into such changes. Not only this, but the effects ISPS have been so widespread, they can only ever be properly analysed at great volume. One of the most obvious changes over the past few years in maritime security – arguably spurred on by throughput benefits and a general concern

Secure the area!
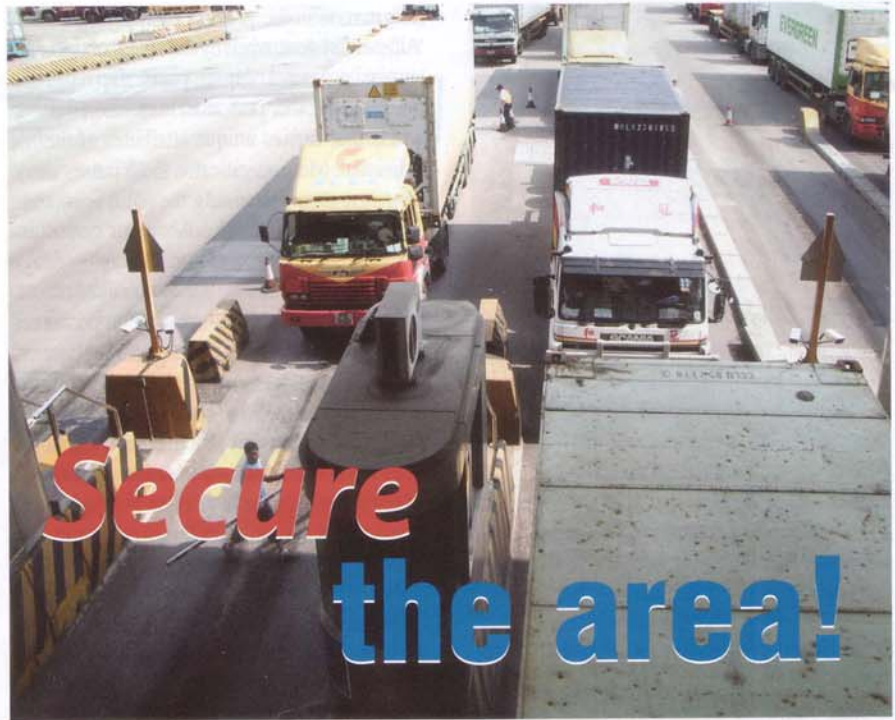
over immigration and world terrorism as much as by the ISPS Code – has been the trade success and technological advancement of companies providing hi-tech security systems, such as optical character recognition and vessel traffic management systems. *WPD* has, in the past year, run articles observing these developments at length. Companies such as Hong Kong's Asia Vision Technology (AVT), Belgium's Camco Technologies, and Israel's Hi-Tech Solutions have all made huge strides in technological development and marketing of optical character recognition systems. Simultaneously, American firms such as L-3 Security and Detection Systems, Rapiscan, BIR Inc, and Smiths Detection have all made advancements in cargo x-ray systems. Both applications share the 'in-gate-out-gate' approach to secure cargo throughput – something that is increasingly relevant in these times of ultra containerisation. Indeed, recent contracts secured by AVT include gate systems at the

Port of Busan in South Korea and the River Trade Terminal at Tuen Mun, Hong Kong. Meanwhile, Smiths Detection has been further developing technology to stop the trafficking of radioactive materials that could be potentially be used for terrorist activity, stating that: "Experience in many parts of the world still proves that movements of radioactive materials outside the regulatory and legal frameworks continue to occur." To deter such movements as much as possible, the company has developed the Radetect system, which utilises a special HCV x-ray system to immediately identify radioactive risks within a cargo load for an operator. Although x-ray systems (which observe the loads being transported) and OCR technology (which records and ratifies that the correct vehicles / containers are coming and going) are different in their fundamental nature, both play key roles in an area that was cited as important by all the port operators to which *WPD* spoke: the matter of strictly monitoring 'everything and everyone' that comes in and out of the port.

Fingerprints

Every port to which *WPD* spoke ensured that enhanced monitoring of who and what comes in and out of the port was mentioned. In fact, the global effects of this improved vigilance were praised threefold by the TT Club. In the first instance, the Club noted a positive change in the numbers of stowaways – a problem that unfortunately has many connotations in terms of terrorism, crime, highly dangerous and inhumane people trafficking, and government

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expenses. "The code is achieving success in reducing the number of stowaway attempts," Mr Lush told *WPD*. "Here, not only do would-be migrants now have to overcome much tighter port security, but also access to ships themselves has been restricted by the code." The latter half of this statement relates to another matter TT Club highlighted in its three-pronged appraisal of benefits for ports that have fully instigated the Code: that of 'secure zones' and varying security card / biometric systems to control which personnel have access to which port areas.

More importantly, when measures are properly applied with secure perimeter fencing, there are substantial safety, security, and hence financial benefits to be reaped from ensuring that 'only personnel' attend hazardous or risk-sensitive terminal zones. "Even though many ports have, over the years, realised the necessity to segregate people from equipment, they remain dangerous places even for those accustomed to their hazards. A by-product of the Code has been a dramatic reduction in the number of people – primarily 'visitors' – allowed access to port facilities, and this will surely improve ports' liability risks," began Lush, highlighting that expenditure on meeting Code requirements will not have been without a potential return on investment. But it is not just the threat of human injury that has been reduced, as he continued: "Though not cured, cargo theft from ports is falling. While no official statistics are available, TT Club's experience since July 2004 is that fewer claims are being received. As an example, we know of at least one UK port that has suffered no incidents of cargo theft since the introduction of the code." The method for controlling the movement of personnel across authorised zones varies from case to case. Controlled zones, such as in the Port of Hakata, Japan, are now an expected industry standard. The Port of Antwerp,

Belgium, is in the process of applying its 'Alfapass' system, whereby the access of dockers, terminal personnel, ship suppliers, ship repairers, truckers and other personnel is monitored using a pass that carries unique attributes of the individual. More specifically, these passes carry biometric data concerning the palm print and fingerprints of the holder. A similar system is being instigated by Kenya Ports Authority (KPA) at the Port of Mombasa. With a centralised access database carrying all information on personnel (and into which zones these personnel are allowed), employees are to be given magnetic and proxy tags linked to said database. Readers at all access gates will process this data, along with biometric fingerprint readers, blocking access routes to any unauthorised 'visitors'. Such a centralised system offers blanket security for an entire port area, and the Port of Riga, Latvia, is also administering such a scheme. Cyprus Ports Authority (CPA), which is responsible for Limassol, Larnaca, Vissiliko, Dhekelia and Moni, is instigating a 'colour-coded' pass system. When properly combined with improved fencing, direct phone lines to police / emergency departments, and aforementioned measures such as proper lighting, CCTV and OCR / VTS technologies, it is possible to keep a tight rein on all the comings and goings of a port. Unfortunately, faced by massive business networks and infrastructure nightmares, the process of applying theory is far from easy for ports both large and small.

Planning isn't doing

Large-scale change for networks of businesses, terminal operators, ship operators, and general personnel as intricate and all-encompassing as that of CPA is always daunting. And, unsurprisingly, authorities such as this left *WPD* in no doubt about the effort invested in the transition from forming a security plan, getting it approved, and applying it. Balance this task with that of not suffering too great financial losses due to service downtime, and it is plain to see what a challenge the maritime industry has faced over the past few years. As the authorities at the German megaport of Hamburg (which has 65 port facilities that fall within the jurisdiction
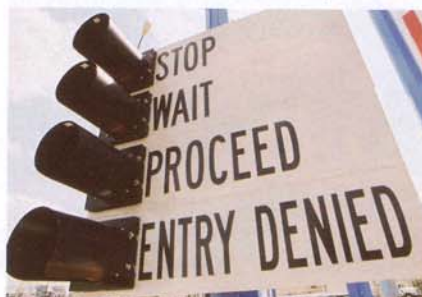
of the ISPS Code) put it: "The challenge consists of improving the necessary danger defence against terrorist attacks in maritime traffic and ports, without restricting Hamburg's competitive conditions in international shipping." Quite a feat when one considers just how much containerised cargo is processed at Hamburg each and every year. Embarcadero Systems Corp. (ESC), which has been commissioned to supply full security plans and implement systems for the TTI and STS mega terminals at the Los Angeles / Long Beach harbour complex, faces similar tasks. Indeed, the company further underlined the weight of expectation by highlighting that busy ports have still been expected to expand over the past few years – all within already constrained physical capacity. Kevin Doyle, general manager at Georgia Ports Authority (GPA), which presides over the four US ports of Savannah, Brunswick, Bainbridge and Columbus, added: "Both the individual port facilities tasked with implementation as well as the regulatory agencies tasked with enforcement are finding that this can be a difficult process at times." But he is far from downbeat: "However, ideally we both want the same end result – safer ports and a safer nation. This is a work in progress and should always continue to be so, but one whose dividends will prove to be well worth the effort." And the latter half of this statement, it seems, gets to the crux of the matter. While there have been and are teething problems in implementing new security measures worldwide, it is essential to make the effort. Trade relations demand it, statutory government laws often demand it, and simple progress demands it. To use slang vernacular, you might say it's a case of 'grin and bear it'.

Paying its dues?

But how much of a burden is there to bear? In these very editorial pages over the past two years, *WPD* has highlighted that many security measures (especially IT solutions – OCR, VTS etc) actually show a quick return on investment. Be it reducing theft and insurance claims (as in the aforementioned TT Club statement) or simply oiling efficient throughput with a reliable chain of checks and balances, it's not all a case of spend spend spend. Indeed, when one considers just how multi-layered the task of implementing security plans is, it becomes clear just how much costs must mount up. Looking again to the massive security operation at Hamburg and considering the matter of 'PFSO's (port facility security officers), we can note that the megaport has four RSOs (recognised security organisations) and five recognised training institutions for security matters. You hardly need a brain for

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figures to work out this means a lot of man hours and a lot of expense – as is also the case when observing the extensive early planning stages and time taken to install fencing / IT measures etc. And then we have to consider the actual investments in the equipment itself. But, with VTS, OCR, x-ray systems and the like now more essential requirements for both security and efficiency, surely extra costs are worth it to get on the IMO's 'white list'? Here's one account from large Belgian (and prominent European) port Antwerp: "The Port Authority for its part made the necessary investments in security during 2004. To help ensure safe operation of the locks, the Zandvliet, Berendrecht, Boudewijn and Kallo lock areas were fully fenced off and closed to bystanders and entirely surrounded by a fence two metres high with 50cm of barbed wire on top. The central throughways are monitored by video cameras, and the gates and personnel entrances are guarded. In order to gain access it is necessary to first report to the lockkeeper. The entire project cost the Port Authority Euro 530,052." While these costs may seem fairly modest for such extensive work, money – as they say – doesn't 'grow on trees'. Accordingly, security tariffs may become a post-ISPS factor. Here's what Cyprus Ports Authority told us: "The costs of introducing the ISPS Code at Cyprus ports are mainly concentrated on the expenses that were made in order to introduce the extra security measures. Most of the costs, such as those related to the infrastructure of the ports or the recruitment of new staff, were covered by the CPA. In order to cover these costs as well as the costs for maintaining the port at the security level required by the ISPS Code, CPA is considering introducing a security tariff to its customers. However the

introduction of this tariff will be done on the basis of the results and recommendations that will derive from the questionnaire that was initiated by the European Sea Ports Organisation within its members on how to deal with these costs." But CPA is also very much 'on message' with the TT Club: "The benefits from the implementation of the ISPS Code are related to the enhancement of the protection of vehicles, containers and other cargo that are stored at the open storage areas of the ports from being damaged or stolen. Another benefit is the minimisation of the cases of stowaways. Also through the introduction of the identity card system, the uncontrolled presence of individuals and vehicles at specific port areas – especially at the high-risk zones – of the ports is avoided."

Messy mesh?

Ultimately, though – and as the Port of Vancouver, Canada stated to *WPD* – port security is reliant on a number of symbiotic factors and is a highly complex matter. Within the port, contracted operators have to cooperate with the chief authority; technical and physical security operations have to be carried out with the same diligence throughout the chain if it is not to break down. Outside the port, political matters, world events, discrepancies between standards – and of course, even the weather – can cause problems. Moreover, if a terrorist organisation is determined to cause damage/harm, then sometimes it will succeed. Indeed, as the TT Club's Ian Lush put it: "Although it is doubtful that any potential target can ever totally protect itself against the threat of a truly determined terrorist assault – one has only to observe that it was possible to infiltrate and explode a bomb in a port in such a security-conscious country as Israel – that does not mean

that we may as well make it easy for terrorists by tolerating lax security." Some things simply can't be controlled, and though the efforts of authorities at the Port of Karachi, Pakistan, to ban mobile phones with visual capabilities are admirable, those who responded to our survey saw such measures as a little over-ambitious and unrealistic. The drastic changes in port security over the past few years – ISPS-inspired or otherwise – have surely helped alter things for the better. Many may well feel that the Code is still not perfect, and there may still be discrepancies over who, where and what is on or off the 'white list' of approved ports (for more information, visit www.imo.org/Newsroom/mainframe.asp?topic_id=897). But overall, there now seem to be few dissenting voices – in fact, no respondent came back to *World Port Development* expressing negative opinions about the Code. This may well be because dissent after implementation is inadvisable for any number of reasons. However, this appraisal of the Code's impact from the TT Club's Lush seems fitting: "The introduction of the ISPS Code has, in the Club's opinion, been the catalyst that has focused minds on security in a sector that had not had to think too carefully about it in the past. Now, everyone knows the rules and port and terminal security officers are getting the facilities and management support they need to implement effective measures." Still essential, still confusing, still compelling - maritime security – still evolving. 🔲

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ANNUALREVIEW

by Madeleine Lau , Asia Vision Technology, Hong Kong

New view

VEHICLES CONTAINING DISPOSABLE CONSTRUCTION WASTE WILL BE WEIGHED BEFORE THEY UNLOAD. THE OWNER OF THE VEHICLE WILL BE CHARGED ACCORDING TO THE DISPOSAL WEIGHT

Innovative use of ALPR means the technology has a bright future – and not just for road tolling

As traffic increases, solutions need to be found in four main areas: traffic flow analysis, congestion, checkpoint surveillance and vehicle security management. License plate recognition technology is ideal for these tasks.

TAKE A TRIP
The Trip Ticket system (TTS) project is an innovative example of fleet management and charging enabled by Asia Vision Technology's (AVT) Automatic License Plate Recognition system (ALPR) to facilitate the waste management implemented by the Civil Engineering and Development Department (CEDD) in Hong Kong.

Before the application it cost the land developers and contractors nothing to dispose of construction waste. In support of the

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Waste Management Campaign initiated by CEDD, AVT provides OCR expertise for the TTS by deploying ALPR at six landfill locations where the license plates of authorized trucks are recognized and information transmitted to TTS for further processing.

The vehicles containing the construction waste are weighed before and after they dispose of their load and the weight difference is cross referenced with the license plate number and recorded in the database. The truck owners receive a payment statement issued directly from CEDD within a month.

In view of the average daily traffic flow of 1,800 vehicles, the deployment of TTS is ultimately to prevent human error and corruption, as well as to help traffic flow and reduce waiting time. In addition, the daily transaction review report provides a significant source of information for traffic flow analysis to form a basis for future planning of traffic flow management. AVT is playing a leading role as the main contractor in the TTS project, including the following areas: system design and consultation, project management, TTS application development, ALPR, network design and operator training.

ON THE BRIDGE
The innovative use of visual technology for Vehicle Identification and Classification (VIC) has been proposed for the Stonecutter Bridge application. This idea is composed of four sub-systems designed for speed detection, vehicle length measurement, vehicle tracking and gap measurement. Only one high-resolution digital camera is required to carry out these functions for a six-lane application at the bridge. No external triggering device is necessary to capture the traffic data and the customized Visual Analysis Software will function as the core of the system to cater for the needs of different road environments and ITS applications.

SAFETY ENHANCEMENT
In addition to enhancing the safety of road users, AVT has developed another device named VECON Speed, an efficient and accurate system applying license plate recognition technology to measure vehicle speed on a point-to-point basis. The device can transmit the captured license plate numbers, triggered time and images to the control room, thereby providing quick access to road-traffic data. To tie in with Checkpoint, a comprehensive automated ALPR system for highway and surveillance, the road safety and surveillance capability will be heightened immensely.
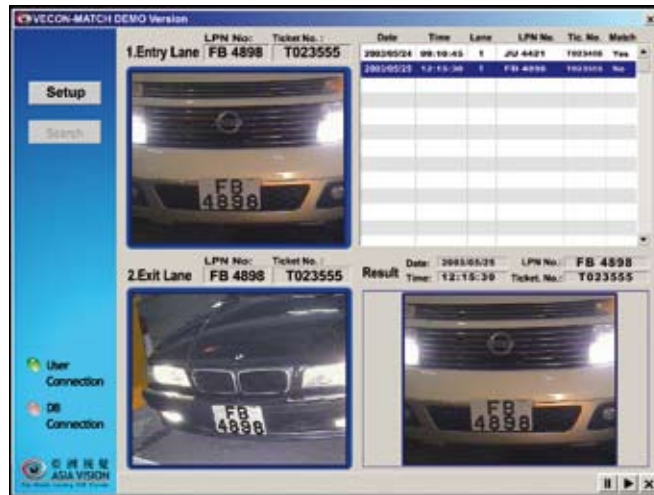
A VEHICLE PROFILE AND LICENSE PLATE NUMBER MATCHING SYSTEM PROVIDES VIDEO SURVEILLANCE FOR SECURITY CONTROL AT TOLLS, BORDERS AND RESTRICTED AREAS

VECON-TYPE IS A VEHICLE IMAGE PROCESSING AND PATTERN RECOGNITION SYSTEM

THE CAPTURED IMAGES FOR TRIP TICKET SYSTEM DEPLOYED BY CEDD

To enhance checkpoint surveillance and vehicle security management, AVT has a portable radar-enabled license plate number recognition system that is tailor-made for speeding vehicle surveillance. It offers dual video channels to recognize vehicle license plate numbers for full view image capture. This portable device is named Mobile Police and it curbs the infringement of traffic offences such as red light running, illegal stopping and illegal U-turns.

ITS SOLUTIONS IN THE LONG RUN
In the long run ALPR will continue to be a cost-effective application to provide intelligent solutions to traffic congestion around the clock and under all weather conditions. To meet the demands of car park operators, Asia Vision Technology has developed various devices including VECON-VIS, JANITOR, MATCH and VLS. By using ALPR technology, the journey time of each vehicle between recognition points in a given area can be measured. Like the existing practice of

toll collection operated in car parks, however, it will be a brand new concept to collect tolls for road use during peak hours. For instance, vehicle drivers will have to pay extra charges for road use in restricted zones, highways or borders in order to solve the existing challenges of flow during peak periods and traffic law enforcement.

Apart from the above, AVT's VECON-Match and VECON-Type are enhanced applications developed based on the pattern recognition technology. VECON-Match is a vehicle profile and license plate number matching system that enables alert signals to be sent when the vehicle images do not match with the license plate number. This application can enhance vehicle surveillance together with VECON-Type, another advanced vehicle image processing and pattern recognition system that has been designed to empower surveillance capabilities. Pattern recognition technology is sure to play a more significant role in the future development of intelligent traffic systems. ∎

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