TRACKING & TRACING SYSTEM

Organisation	Scootabout International Ltd
Trigger	• Recognition of the potential for an intelligent system to address issues of crime and logistics efficiency within the garment industry.
Objectives	• To revolutionise conveyors. • To capture data on the movement of products. • To adapt to the specific needs of industries interested in addressing issues of crime.
Tools/techniques	• Application and development of existing technology. • Dissemination of information about the technology used as a means of attracting funding.
Enablers	• Technological development allowing 'DNA' for distribution systems to be considered.
Tensions	• Challenge of finding funding to develop applications and test prototypes.
Impact	• As yet unknown, as the system has to be fully tested.
Lessons	• Such systems potentially create integrated, transparent systems where data is available to operators and managers.

Synopsis

This case concerns an 'intelligent' distribution system that enables any product from factory to store to be tracked and traced. When fully developed, this integrated and transparent system, where both operators and managers can access data, will offer complete tracking, traceability and directional control of each and every product or batch attached to a 'bead'. The 'bead drive' was designed to provide 'DNA' for machines, where intelligence was built in. The system would potentially benefit the fashion industry, as the system not only improves the efficiency of the distribution process, but also enables the detection and tracing of products that have been stolen or mislaid. The company has produced a computer simulation of the system, which has to be adapted to specific needs, and the Managing Director is currently raising finance to get this put into production and bring certain applications to market.

Background to the Tracking and Tracing System

The primary aims of the Managing Director, Scootabout International, who invented the Intelligent Bead System was to revolutionise conveyors, particularly the overhead variety and to enable tracking and tracing of products on and off line. A further aim was to enable data to be captured and simultaneously transferred, using systems developed by Rockwell or Siemens, from a variety of factories to control or distribution centres. Efficient process management and evaluation would, believed the Managing Director, drive down waste, reduce costs and help improve poor practices. Although not specifically designed to address problems of theft, crime certainly featured as a major driver, particularly in the garment industry, as the Managing Director points out:

"Misappropriation and theft costs industry £2.6 billion in the UK alone. Theft can occur at any time during the manufacturing process, through distribution, to point of sale and thereafter when products are displayed in-store. Our system can capture and transmit intelligent data from point of origin and point of sale and dramatically reduce the opportunity for theft / misappropriation" (Managing Director).

This case study was based on a report written by David Jephcott, Managing Director Scootabout International Ltd, for the Design Against Crime team.

Design Process

Concept

'Bead Drive', the basis of the intelligent system, was designed to provide 'DNA' for machines, where intelligence is 'built in' rather than supplied from an outside source. The intelligent bead drive system comprises a composite tube in which a series of beads are propelled along the system by strategically placed motors. The chain of beads, which can operate within an overhead or flat bed conveyor, moves the product along in a way different than that of conventional conveyor belts. In addition, each bead can contain a RF tag giving intelligence to the system. The beads, which are propelled along by worm or friction drive principles using low-cost local motors strategically placed throughout the system, are controlled by radio frequency.

Where intelligence is installed, each bead can be given a code. The intelligence incorporated within this system allows the user, through a computer-controlled system, to track and trace every movement made by a product and the actions undertaken on it. In addition, each bead can respond to commands that are communicated via radio frequency transmissions controlled centrally. Since the beads react independently to each other, they can be directed anywhere within the system.

Management

The 'Bead Drive' enables people to work together by (i) intelligently marshalling product information during production and (ii) picking up data from others in the system with an overview of what is going on within a section of the plant at any one time. The operatives are able to see via a screen the work in progress and its effect on others in the same environment. Further upstream, floor managers are able to review whether things are operating efficiently or

otherwise and office management can, in turn, interpret product progress in relation to delivery expectations and the purchase of raw materials.

As products leave the distribution centre, the data is automatically transmitted to intelligent vehicles using the same technology. In this way, the distribution arm of any operation can have direct dialogue with the dispatch area and maintain this en-route whilst products are being delivered. The ability to verify the location of the product at point - from the product's departure, through to loading, transportation and unloading - eliminates much of the potential for theft, as products are not left to languish unattended.

Technology

The manufacture of a new system has been made possible by developments in technology, which allow independent movement of the beads, as well as simultaneous product and data capture and transmission. The drive system is self-lubricating, thus avoiding the use of potentially damaging lubricants used in existing systems. The materials used and the design create a low cost system, which is lightweight, safe and utilises available space efficiently. The lack of maintenance and use of modern composite materials enables the bead drive system to be adopted in harsh production environments, e.g high humidity or wet conditions.

Development & Prototyping

The bead drive concept has a wide and varied range of potential applications, as it can be used for conveyor systems or with any materials handling functions where belts, chains and pulleys have traditionally been used. During the development of the overhead conveyor at the Pera Research Institute, Scootabout International was able to deliver a software programme, developed for them at a Research Institute in Spain, designed to cope with both Internet and Intranet activities.

Modifications and Applications

The system will be further modified to address crime in the design process itself, as the Managing Director goes on to explain:

"I believe this [addressing crime prevention] will be an on-going process… The radio frequency implant into the system forms the bedrock of data capture and carriage and will be fundamental in crime prevention and detection" (Managing Director).

The company's future development will centre on other applications of use for the intelligent drive transmission, such as materials handling, both in buildings and on the road. Interestingly, the company is also working towards a very large project involving the University of Newcastle upon Tyne for intelligent sea-going vessels. This is likely to manifest itself as an intelligent river barge able to transfer products from the continent to small ports on the east coast of England.

Tensions

The Managing Director has also detected good opportunities for micro technology applications, but, due to the lack of human and financial resources, this has not been progressed. Being a small company, the Managing Director has always had to work to a programme of dissemination for the new technology via a worldwide licensing programme. The company's interim funding prior to flotation will provide the funds to be able to travel to meetings.

Impact

The Managing Director believes that such technology has the potential to address issues of product theft and cross the boundaries traditionally separating manufacture from distribution – and potentially retail, as he explains:

"We wanted to introduce a technology which could migrate from one quadrant of manufacture and distribution through to any other – an A to Z as it were" (Managing Director).

Scootabout International has generated some strong interest from major players in the manufacturing and distribution world for this technology and is currently working with several well-known players. The company has historically been developing the concepts and implementing a patent programme, its next steps are to develop proven prototypes:

"Our time scales from today are to deliver working, proven prototypes of all conveyors, lorries, and ancillary equipment by the end of 2003. The overhead conveyors and the principle lorry will be before that, somewhere in the spring of 2002" (Managing Director).

The Managing Director recognises that it is difficult to judge the potential impact of the system on crime and efficiency, when there is still a long way to go in its development:

"Bear in mind that in all cases we are still in design development mode with our technology and therefore implementation and testing is going on at present and will continue to do so for the next 2 years at least" (Managing Director).

Lessons Learned

This case shows that technology is under development to track and trace garments from manufacture through to distribution. The current challenge for this project is to get financial support for such innovations.

References, Related Case Studies and Further Reading

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Classification Index

Ekblom's crime classification	Misappropriation
BCS crime classification	Theft
DAC	Tracking flow
Primary motivation	Product Protection
Type of designer	Engineer
Approach	Development and application of technology
Sector	Retail
Location	Factories and Distribution routes
Authors	David Jephcott, Mike Press and Caroline Davey

DAC – TrackingSystem