Welcome to the Port of Rotterdam, where the containers at Maasvlakte 2 sit in one of the world’s most automated terminals, operating largely autonomously, and with remote operators. “Over the past ten years, the container business has seen an enormous expansion,” says Rotterdam World Gateway’s Niels Dekker. “Ships have become bigger and carry more containers. To ensure we can continue to handle them fast and efficiently, a terminal such as ours has been designed.” The terminal opened in 2015 and has a capacity of 2.35 million TEU (standard 20 feet shipping containers).

Drone ships
The driving force behind an automated terminal is artificial intelligence: the creation of devices that exhibit (human) intelligence. This comes in various shapes and sizes. In shipping, innovation manifests itself in developments such as unmanned and remote-controlled vessels. Engineering giant Rolls-Royce for example, is developing cargo vessels that don’t need a crew and are controlled from land, so-called ‘drone ships’. They can be safer, cheaper and more efficient than crew-manned vessels.

At the RWG terminal nearly everything is automated: ships are loaded and unloaded by automatic cranes. “We have remote process operators, working from an office. They monitor a crane’s movements,” explains Dekker. A crane lifts a container and loads it onto an automated vehicle. “These are our AGVs; they transport containers to the storage area. They are also unmanned and fully automated. They even know when their battery is almost empty: they then drive to the battery swap station where a robot equips them with a new battery.”

Robotics and computer systems therefore play an increasingly bigger role across the logistics sector. Markus Kuckelhaus is Vice President of Innovation and Trend Research at logistics company DHL, which operates in more than 220 countries. “There is an enormous shift in how people feel about robots,” he notes. “Recently, companies have started to show an interest; finding investors has become easier.”

In the first five months of 2015 investments in robots exceeded total investments in 2014. “The times are changing now,” Kuckelhaus adds. However, they won’t be moving to a fully automated sector all at once between now and three years from now; it will happen gradually, step by step. The first robots will mainly support people in their tasks.
From mobile phones to robotic cleaners

DHL is now experimenting with a robot called Sawyer, the brainchild of technology firm Rethink Robotics. “This is a collaborative machine that works together with people. It also learns by copying people: we move its arms and that helps it understand what is being asked.” The robot is still in a testing stage.

Many of the new innovations involving artificial intelligence and robots originate from new tech firms. “Start-ups are a source of creativity and as such they also inspire existing companies that focus on innovation,” says Emile Hoogsteden, Director of Containers, Breakbulk and Logistics at the port. “That is why, as the Port of Rotterdam Authority, we try to attract start-ups and to help their further development by investing in accelerator programmes.” In March of last year, the Port of Rotterdam Authority and YES!Delft launched the Port Innovation Lab programme. Nine port start-ups are currently working on making their business ideas scalable.

11 to 24 kilometres

The advantages of robots are evident. They eliminate tasks that are dangerous, don’t mind doing work that is dull or repetitive, and are more efficient, more accurate and stronger than people could ever be. Kückelhaus explains: “It has been calculated that warehouse workers walk about 11 to 24 kms per shift. If robots could bring the products to them, they wouldn’t need to walk that much themselves.” Today, 80% of the warehouses in the world are still mainly operated by people. DHL is a front runner in making them more automated. According to Kückelhaus, 15% of DHL warehouses are being operated mechanically.

“Having a robot move parcels around and unload vessels, how hard can it be?” “Quite hard,” he says. “The product is the tricky factor here: cargo comes in various sizes and weights. People are good at distinguishing between types of cargo, and deciding how much force is needed to lift a parcel. But so far, it has been hard to teach a computer to do this. Car manufacturers, for example, use robots for repetitive tasks such as tightening a screw. But in logistics, it differs per parcel. Sure, you could design a specific robot for a specific parcel. But if the contract with this client is terminated, you would have a useless robot on your hands.”

And there are more challenges to tackle before the robot can become a success in logistics. “Logistics involves transport: they have to be able to move, Kückelhaus reminds us. “To do this, they have to understand what kind of environment they are operating in, so that they do not bump into everything.” Fortunately, the number of innovations in the field of camera technology and sensors is increasing, and robots are learning to identify what sort of product is in front of them.

In fact, ports are the ideal testing grounds for robots, Kückelhaus adds. “It is a controlled area with lots of space. So you have the advantage of being able to set the conditions for a robot yourself. This is totally different for self-driving cars for example, which will have to use the existing road network.”

It will still be a while before we’ll see robots across the logistics sector, but as Kückelhaus concludes, “Today’s robots can mainly perform simple tasks. Think of robots that can vacuum your house, or mow your lawn automatically. In logistics, it will be the same: the first robots will probably learn how to clean warehouses.” He estimates that it might be another five to ten years before we can let them perform really complex tasks. “But you know how it was with the mobile phone,” he says. “Twenty years ago, no one had ever heard of a smartphone. Now, our children cannot imagine a world without it. The next generation will most likely feel that way about robots.”

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