The Internet of Things gives the world's cities a major lift

ThyssenKrupp Elevator - a leading global provider of elevators - has 1.1 million machines operating in 150 countries, 49,000 employees, and reported sales of EUR €6.2 billion (US $8.4 billion) in 2013. With installations in buildings worldwide, TKE wanted to further improve its competitive advantage by increasing elevator reliability and uptime. With help from Microsoft partner CGI, TKE created an intelligent, cloud-based solution based on Microsoft Azure Intelligent Systems Services, Power BI for Office 365.

For the first time in history, the majority of the world's population lives in cities — and that urban migration continues apace. By 2050, seven out of 10 people will live in cities — a staggering 3 billion more than today, according to the World Health Organization.

With city populations exploding, city planners and builders have critical problems to solve. To make room for 3 billion people to live, work and play, planners know that the best direction to go is up. Easing the flow of people through towering, high-capacity mega-structures is critical to the quality of life in cities; crowded lobbies are the traffic jams of the future. Keeping elevators running smoothly is key; in buildings that soar to more than 1,000 feet, taking the stairs is simply not an option.

Big cities can't exist without skyscrapers. And in turn, skyscrapers can't exist without elevators. ThyssenKrupp Elevator is one of the world's leading elevator manufacturers, specializing in innovative and energy-efficient products. It maintains more than 1.1 million elevators worldwide, including those at some of the world's most iconic buildings.

At New York's brand-new 102-story One World Trade Center — the tallest building in the Americas at 1,776 feet — ThyssenKrupp's elevators will carry an expected 3.5 million people every year. Traveling at 23 miles an hour, the building's elevators are the fastest in the Western Hemisphere, going from the bottom to the top in just 60 seconds on 198 miles of steel cable.

In Riyadh, Saudi Arabia, at the 1,263-foot CMA Tower — the country's tallest skyscraper and one of the tallest all-office towers in the world — ThyssenKrupp's elevators serve 5,500 workers, using an advanced shuttle system and touchpads that direct elevator traffic.

And in China, a steadily growing volume of passengers led to long elevator lines at the five-star Bayshore Hotel in Dalian — until ThyssenKrupp installed a system of new elevators that can carry significantly more passengers per hour.

ThyssenKrupp wanted to gain a competitive edge by focusing on what matters most to its customers in buildings the world over: reliability. Drawing on the potential of the Internet of Things (IoT) by connecting its elevators to the cloud, gathering data from its sensors and systems, and transforming that data into valuable business intelligence, ThyssenKrupp is vastly improving operations — and offering something its competitors do not.

"We wanted to go beyond the industry standard of preventative maintenance, to offer predictive and even preemptive maintenance," says Andreas Schierenbeck, ThyssenKrupp Elevator CEO, "so we can guarantee a higher uptime percentage on our elevators."

To do this, ThyssenKrupp teamed up with Microsoft and CGI to create a connected, intelligent line-of-business asset monitoring system that raises elevator reliability to new heights. The solution brings together technologies at the heart of Microsoft's platform for the Internet of Things.

Fix it — before it breaks

CGI is the world's fifth-largest independent IT and business process services firm, specializing in high-end business and IT consulting, systems integration, application development, and more. CGI developed a solution that securely connects ThyssenKrupp's "things" — the thousands of sensors and systems in its elevators that monitor everything from motor temperature to shaft alignment, cab speed and door functioning; the data they gather; and PCs and mobile devices used by its workforce of technicians — to the cloud with Microsoft Azure Intelligent Systems Service.

ThyssenKrupp can now use the Intelligent Systems Service to capture that data, transmit it into the cloud and combine it into a single dashboard that serves up two basic types of data: alarms that indicate an immediate issue and events, which are stored and used for management.

"This is a difference in time criticality, and Intelligent Systems Service handles both, which is important," says John Hicklin, principal Internet of Things consultant for CGI. The solution provides technicians instant diagnostic capabilities, using Power BI for Office 365 for rich, real-time data visualization — a powerful new tool in ThyssenKrupp's maintenance arsenal.

Now, instead of just reacting to a failure alarm, technicians can use real-time data to define a needed repair before a breakdown happens. And, thanks to a two-way flow of data, technicians can remotely put an elevator into diagnostics mode, or they can send it to another floor. It all adds up to less time traveling, better efficiency and reduced costs.

The virtual troubleshooter

CGI's solution also seeks to take much of the guesswork out of repair work. With Microsoft Azure Machine Learning service, ThyssenKrupp has an unprecedented view into elevator operations and maintenance now — and in the future. The system contains an intelligent information loop: Data from elevators is fed into dynamic predictive models, which continually updates datasets via seamless integration with the Intelligent Systems Service.

"I call it the 'virtual troubleshooter,'" says Rory Smith, director of strategic development for the Americas at ThyssenKrupp Elevator. "When the elevator reports that it has a problem, it sends out an error code and the three or four most probable causes of that error code. In effect, our field technician is being coached by this expert citizen."

Now, the elevators can actually teach technicians how to fix them, thanks to Microsoft Azure Machine Learning service. With up to 400 error codes possible on any given elevator, that "coaching" can significantly sharpen efficiency in the field. Smith expects the predictive models will continually improve with time as more and more datasets are fed into the system. The result? Dramatically increased elevator uptime.

ThyssenKrupp's use of machine learning for predictive analytics puts the company at the leading edge of an important trend. According to Gartner*, "The rapid growth in available data, particularly new sources of data — such as unstructured data from customer interactions and streaming volumes of machine-generated data — require greater levels of sophistication from users and systems to be able to capture their full potential." Harnessing the potential of ThyssenKrupp's elevator-generated data is leading directly to greater business intelligence from what Gartner calls "'non-data-scientist-friendly' tools" — and happier customers.

A flexible solution

CGI relies on the flexibility of Microsoft technologies, Hicklin says: "Azure is quite inclusive, in terms of things that it's able to host, and the Intelligent Systems Service is inclusive in terms of devices it can connect with. If you put those two things together, you have a very rich cloud environment that is enterprise-ready, and also the ability to deal with the real world and with different types of devices and applications."

ThyssenKrupp needed that flexibility, too. "Our typical maintenance services portfolio includes ThyssenKrupp elevators, as well as a significant percentage of units built by other manufacturers," Smith says. "That's not typical of the elevator industry — broad maintenance services is our specialty." The interoperability of Microsoft's technologies means ThyssenKrupp can connect the new service to multiple elevator makes and models — making it possible to extend its maintenance business to create new revenue opportunities.

By focusing on data and enhancing datasets with rich analysis and predictive modelling, the Internet of ThyssenKrupp's Things is giving the company a competitive edge, transforming maintenance operations, creating new efficiencies in workflow, cutting operating costs, increasing elevator uptime — and giving the world's burgeoning cities a lift they can rely on.

Read about how the Internet of Things is shaping cities and transforming enterprises in the retail, health and manufacturing industries. Read more about Microsoft's unique vision for the Internet of Things, and learn how to get started creating the Internet of Your Things.

*Gartner, Magic Quadrant for Advanced Analytics Platforms

For more information about ThyssenKrupp Elevator, visit the website at:

www.ThyssenKruppElevator.com

Create the Internet of Your Things with Intelligent Systems

The Internet of Things is not a futuristic technology; it's here today. When your enterprise puts together devices, software, cloud services and business intelligence tools from Microsoft, you create the Internet of Your Things. As a trusted technology leader, Microsoft can help you drive business value from new and existing technology assets, devices, and data to create one truly flexible, intelligent system. When you connect your people and your infrastructure, you can change the trajectory of your business in real time.

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