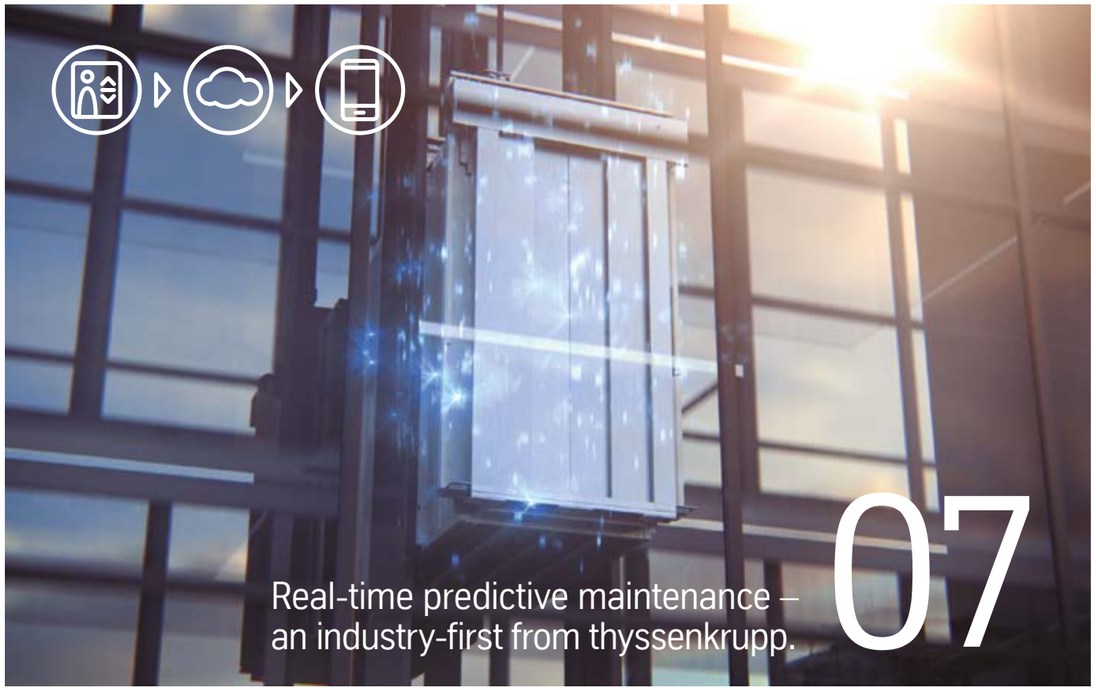
Elevator Technology

MAX

The game-changing predictive maintenance service for elevators.

thyssenkrupp

"In a MAX-connected city, elevators will run more consistently, offering additional availability, meaning minimal stress and more quality time."



Real-time predictive maintenance – an industry-first from thyssenkrupp.

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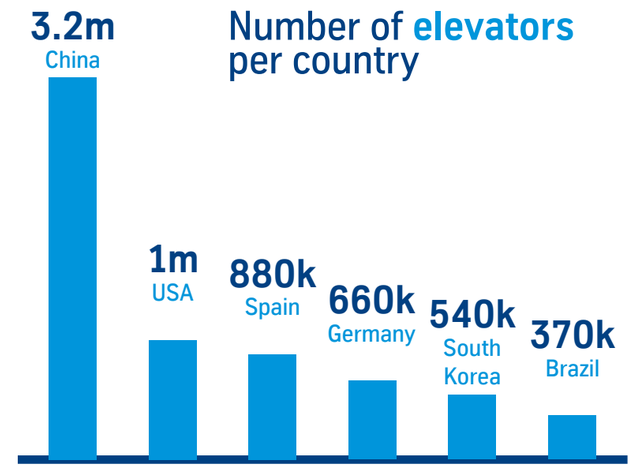
Keeping people moving in a rapidly urbanizing world.

An urbanized planet.
By 2050, 70% of the world's population will live in cities. As our urban populations grow and our cities become denser, they are also getting taller. Since 2000, the number of high-rises (>200 m) has tripled and over 180 buildings currently under construction are more than 250 m tall. All this means that the importance of elevators is also increasing. More than 12 million elevators make seven billion trips and move one billion people daily, making the elevator the world's most widely used (and safest) means of transportation.

Efficient mobility is essential.
In fast-paced urban environments, time is of the essence, and efficient mobility is essential. Elevator downtime has a massive impact on this efficiency. In a single year it is estimated that globally elevators are unavailable or out of service for a cumulative total of 190 million hours – a figure so huge it is barely tangible.

Need for improved elevator availability.
Clearly, there is a disconnect between traditional elevator maintenance procedures and the needs of today's urban environment. Although elevator maintenance technology had evolved to usage-based concepts by the 1990s, it is no longer adequate for today's world. Something dramatic is needed to improve elevator availability. That game-changer is MAX.

70% of the global population will be **living in cities** by **2050**



16.6 years **Cumulative time wasted by New York City workers waiting for an elevator in 2010**

MAX: The game-changing solution to maximize elevator availability.

Applying the Internet of Things (IoT) to elevator maintenance, experts from thyssenkrupp and Microsoft spent two years developing MAX, the industry's first real-time, cloud-based predictive maintenance solution. MAX leverages the power of Microsoft Azure, a cloud platform developed to advance IoT, in order to create a truly game-changing predictive maintenance service with the power to maximize elevator uptime.

Smart technology to the rescue.
In recent years, the massive advances in smartphone and mobile Internet technology have revolutionized the way we live our lives. Now, IoT is giving everyday objects network connectivity, allowing them to send and receive data. By the end of the decade, as many as 50 billion machines (including computers and mobile devices) will be connected to the Internet, and IoT communication between these portals is already well underway. In 2013, thyssenkrupp Elevator and Microsoft realized the game-changing potential of applying IoT to solve urban mobility challenges. Although the technology for data-driven maintenance had existed for more than a decade, it was cost-prohibitive. But now, ultra-fast, low-cost computing and data storage cost a fraction of what they did a few years ago, and have made the Big Data required for data-driven elevator maintenance commercially feasible.

50 billion machines
will be connected to the internet by 2020

12 million
elevators **in the world** today

Real-time predictive maintenance – an industry-first from thyssenkrupp.

MAX in action.
This is how MAX works in practice:

Data collected.
Machine data, such as door movements, trips, power-ups, car calls, error codes, etc., is collected from MAX-connected elevators worldwide.

Precise diagnoses.
This data is sent to the cloud where unique algorithms analyze it for patterns and compute the equipment's operation and the remaining lifetime of components.

Predictive intervention.
Precise and predictive diagnostics are delivered to the technician in real time, indicating where intervention is required.

Scaling new heights in elevator maintenance.

MAX will take elevator availability, reliability and efficiency to new heights. By analyzing data from all MAX-connected elevators worldwide, MAX's machine-learning capability converts every present-day issue into meaningful data in order to deliver a fully predictive and preventive maintenance service for elevators as well as for escalators.

Maximizing the benefits – for elevator users, owners and operators.

The combination of cloud technology, Big Data and machine learning makes MAX an invaluable asset for building owners and custodians. And the benefits MAX brings get bigger and better over time.

Increased uptime.
MAX increases overall elevator availability, serving as an unparalleled means of improving building efficiency.

Number of trips elevators make **every day** **7 billion**

MAX will **reduce** out-of-service elevators **by half**

Better capacity for planning.
Moving from reactive troubleshooting to proactively preventing failures, MAX provides advance information about the wear and tear of elevator components, allowing you to anticipate and plan for future costs and schedule disruptions.

More transparency.
MAX gives you the benefit of data-driven maintenance service based on clear and transparent data and hard facts. Real-time information about your elevator's operations, performance and service history are readily available.

All-round advantages.

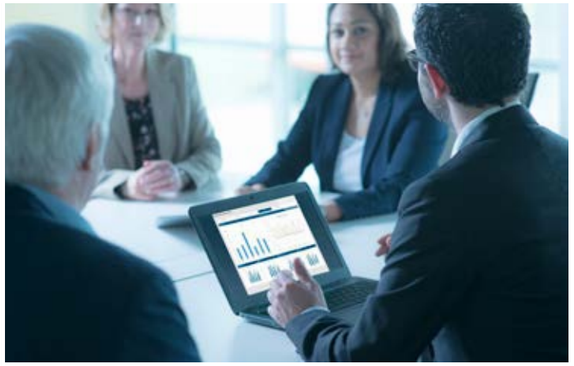
The benefits of maximizing elevator uptime will be felt not just by users through less time wasted and businesses through productivity gains, but also by building owners and custodians. After all, state-of-the-art, MAX-maintained elevators where downtime has been reduced by half add to the appeal of any building.

Enhanced safety and reliability.
Elevator safety and reliability are further improved as any anomalies are immediately reported to a technician – and when MAX is in full predictive mode, will be reported even before they occur.

Faster service.
Precise fault diagnoses and possible solutions sent to the technician in real time ensure that a solution is found quickly and service disruption times are minimized or even eliminated.

Prolonged elevator lifetime.
An enhanced maintenance service supported by MAX will ensure optimized maintenance for all elevator components, thus prolonging your elevator's overall lifetime.

MAX features.



Multiple-year capital expenditure planner:
In the near future, the wear and tear of elevator components will be predicted via the unique algorithms MAX uses. Hard facts on required repairs or replacements that are readily at hand can help you to plan your budgets well in advance, and are especially useful in planning the replacement of expensive components, such as ropes or doors.

24/7 availability of data:
Clear and transparent elevator information, including elevators in service and their availability levels, are always at hand. MAX also records service data, such as the number of maintenance visits and dates of visits.

Callback patterns:
MAX recognizes patterns between callbacks through continuous data analysis, enabling proactive contact with the customers to resolve the problem.

Service button:
The technician activates this digital button so that you can see in real time that your service request was answered and your elevator is being serviced.

Back-in-service signal:
The technician activates this signal to inform you that your elevator is available again.

Counters for trips and door movements:
How many trips has an elevator made? How many door movements have there been? Counters that clearly record this information can help customers and technicians see where and why any overuse or wear and tear occurs.

Optimized service quality.

MAX marks a game-changing moment in the relationship between elevator service providers and customers, transforming a previously reactive service into a more positive, proactive approach.

A good service gets even better.
With this digital-age partner at their side, thyssenkrupp's global team of 24,000+ highly trained service engineers will be able to offer an optimized service to minimize elevator downtime and related stress.

Maximum support.
This data-driven solution enhances the expertise of thyssenkrupp's service technicians. By supporting their technical skills and knowledge with hard facts and machine-learning power, MAX gives them more time to meaningfully interact with customers and improve the quality of each maintenance visit.

24,000 +
thyssenkrupp **global service engineers** who will use **MAX**

The future is now: thyssenkrupp Elevator – a MAX step ahead.

In 40 short years, we've become one of the world's leading elevator companies with unique engineering capabilities, offering next-generation solutions like MULTI, the rope-less elevator, ACCEL, an accelerated people mover, and MAX, a cloud-based predictive maintenance service. Whether building a new state-of-the-art system or optimizing and modernizing existing ones, our solutions deliver crucial energy and time efficiencies, helping to address the challenges of urbanization and transform cities into the best places to live.

Customers in **100+** countries	Over 1000 sales and service locations	Sales of over **€8.2** billion	**50,000+** employees

Figures for our Elevator Technology business

A trusted partner

We support our customers throughout their project lifecycle, from the design to the end-of-life phase. Every step of the way, we strive to fully understand their needs and consistently deliver the safest, highest quality passenger transportation solutions, maintenance and modernization packages.

Through our internal technical support function, ITS (International Technical Services), thyssenkrupp trains its service technicians in a multibrand portfolio, enabling them to successfully service more than 1.2 million units under maintenance.

thyssenkrupp – a technology group

thyssenkrupp is a technology group with strenghts in materials. Over 162,000 employees in 78 countries work with passion and technological know-how to develop high-quality products and intelligent industrial processes and services for sustainable progress. Their skills and commitment are the basis of our success.

engineering.tomorrow.together.

Find out more: www.thyssenkrupp.com

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Makkah Clock Tower / Source © SL Rasch

We provide smart and innovative products for a wide variety of applications:

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- Passenger boarding bridges
- Stair and platform lifts
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