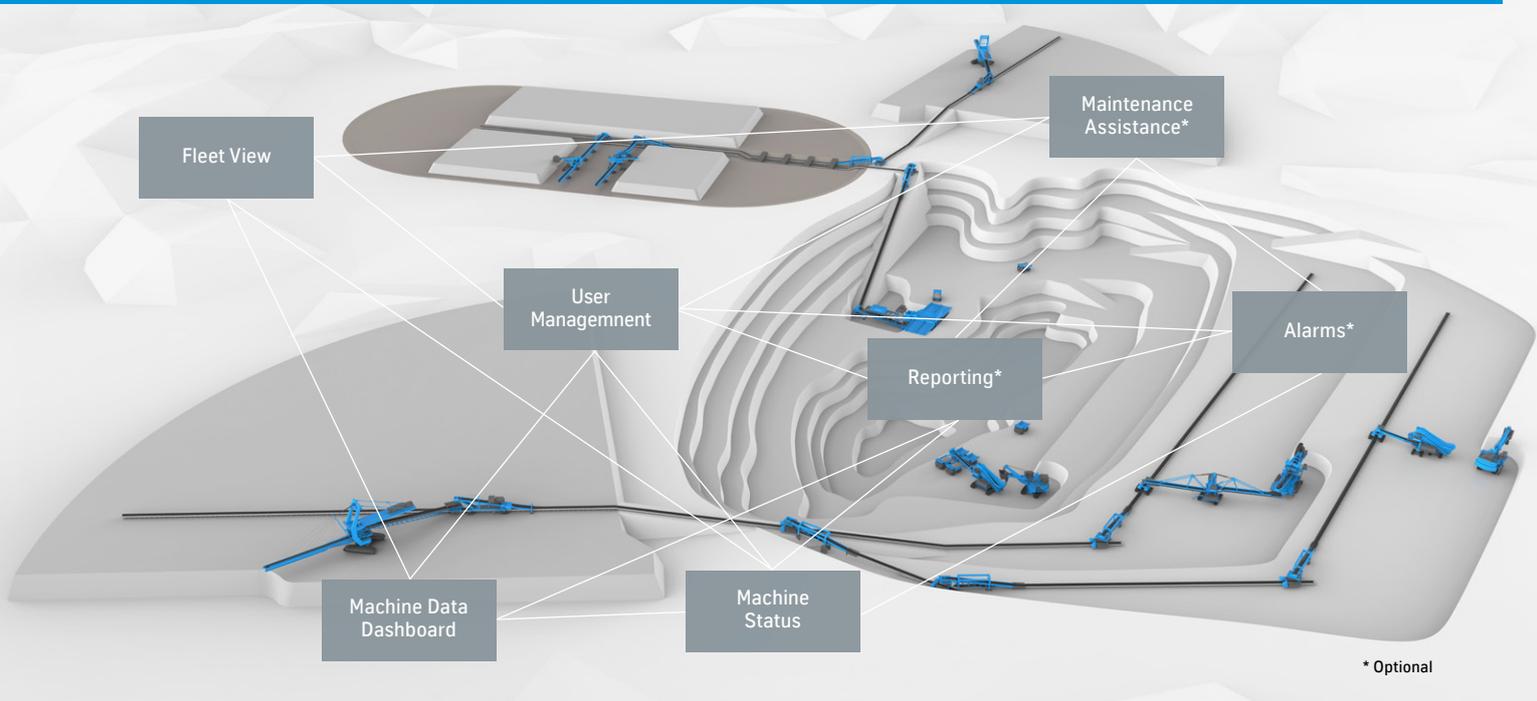


Digitalized Expertise Network (DEN)



thyssenkrupp



* Optional

Real data – the lifeblood of efficient mining

Do you know the exact status of all your mining machines? The widespread complexity of mining operations makes this a far-from-easy task. As data are the lifeblood of efficient operations and optimized performance, we took up the challenge of developing a unique live-data solution that ensures you stay connected to your equipment and can take command of your data every time from every place in the world. We call it Digitalized Expertise Network.

Take command of your data

Stay connected for 100% transparency and valuable insights – 24/7

Your need to stay connected to your mining equipment was our motivation to develop this unique solution. Digitalized Expertise Network (DEN) provides you with full transparency by monitoring, gathering, analyzing, and visualizing your machine data. DEN comprises two major components: our edge device, which is installed on the respective machine and connected to its PLC; and the DEN cloud system. The robust edge device, which is designed to work in any harsh environment, gathers the relevant data for processing in our cloud – in line with your specific wishes and with a separate and entirely secure database for each machine and plant. The results are visualized on a DEN dashboard and you enjoy user-friendly access to well-structured and clearly presented real data.



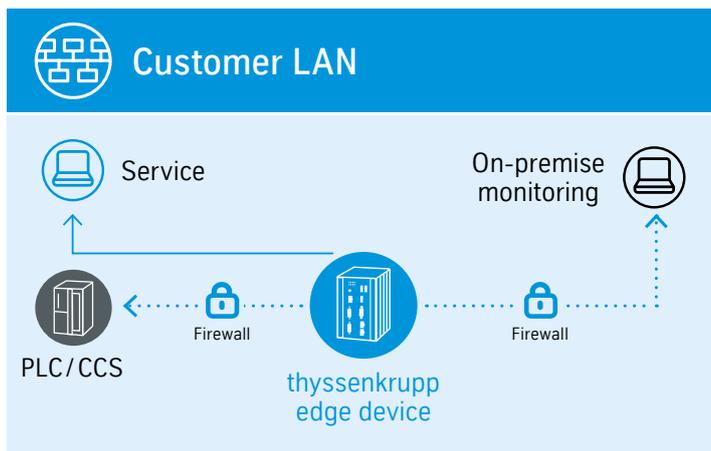
digitalized expertise

How you benefit

- Real data so you stay connected to your equipment 24/7
- 100% data and process transparency
- Precise information on the status of your machines
- Monitoring of performance to enable debottlenecking
- Optimization of maintenance through additional products

Edge device – data gathering

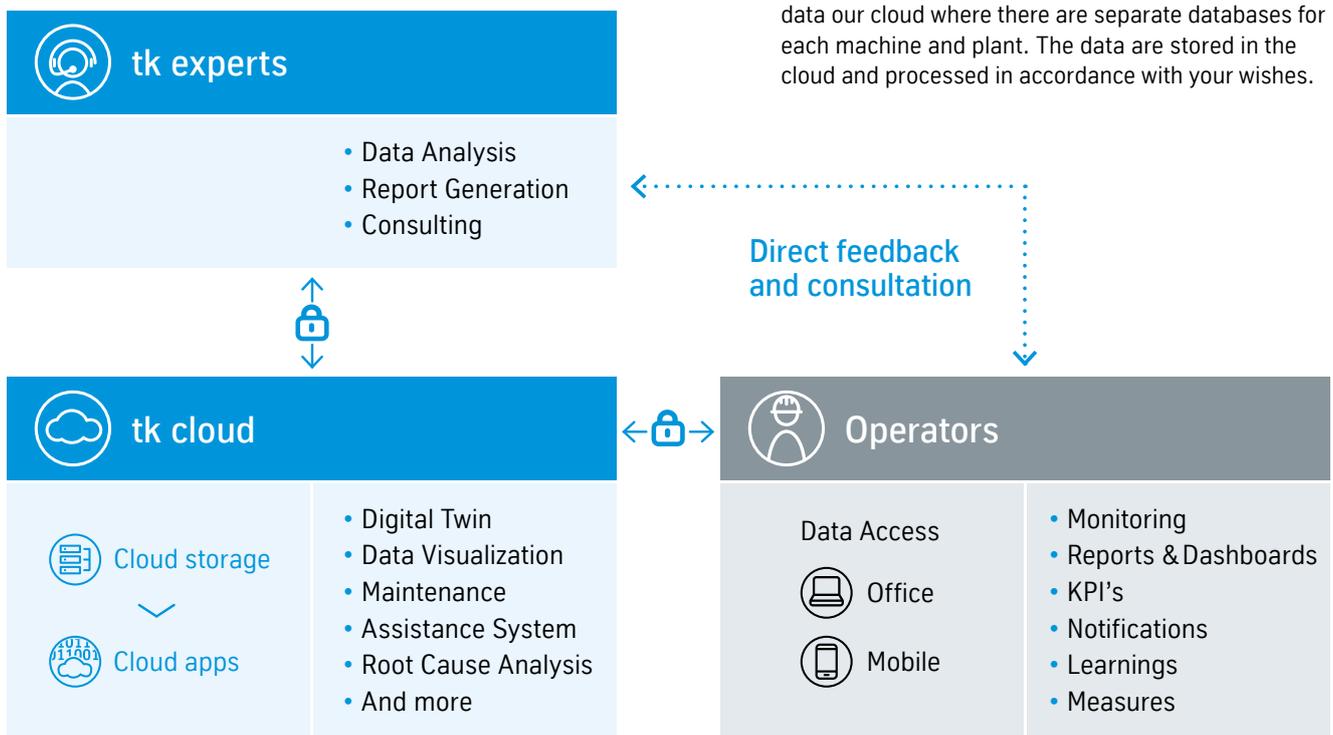
This small local device gathers data from each machine in a local LAN set-up such as this:



Key features of edge device:

- Powerful asymmetric data encryption function so your machine data are 100% secure
- No data lost if there is a weak network connection
- Small data bandwidth thanks to compression and delta transfer
- No third-party services involved
- Synchronized sampling rate of >100 Hz possible
- Easy-to-use web interface
- Easy firewall set-up for your IT staff
- Easy updates or upgrades thanks to small packages with dependency control

DEN cloud – data processing



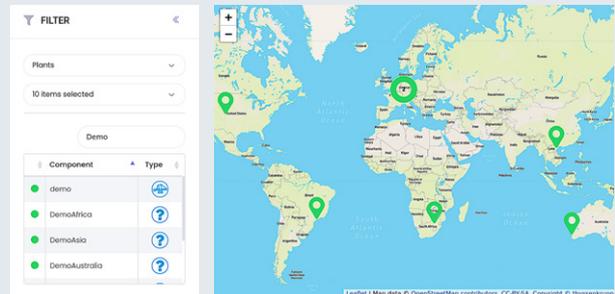
The edge device securely transmits your machine to data our cloud where there are separate databases for each machine and plant. The data are stored in the cloud and processed in accordance with your wishes.

Visualization

The **fleet view function** gives you a comprehensive overview of all your connected machines – from anywhere and at any time.

The **online dashboards** give your operators 24/7 access to the live data which are clearly– presented to display important information:

- Overview of machine operation modes
- Visualization of process KPIs such as production rate
- Trends, forecasts, plant condition, wear analysis
- Warnings and alarms



More efficient and more profitable operations

Once collected and processed, the real data will give you valuable insights to make your mining operations more efficient – and more profitable. This can be done by additional feature beyond data visualization such as:

- Anomaly detection
- Root cause analysis
- Reports

Digitalized Expertise Network is a unique solution that was developed to meet your needs in a process of ongoing interactive collaboration. Your operators can consult with our experts as required and use the insights gained to implement process adaptations or improvements.



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