Driving Efficiency in Logistics and Supply Chains at thyssenkrupp SE

The German steel manufacturer is further optimizing its internal processes with One Data and new applications.

thyssenkrupp

One Data

30-70%

faster creation of data products and data analysis with One Data.

With the help of One Data, data silos are broken down. Data is cleaned, structured, and automatically merged and organized in a meaningful way.

Based in Duisburg, thyssenkrupp Steel Europe (SE) AG is one of the world's leading manufacturers of flat carbon steel. The parent company in the steel segment of the thyssenkrupp Group is committed to pursuing innovation in steel and providing high-quality products for state-of-the-art applications. Its services range from standard steel production to customer-specific material solutions and materials-related services. Internationally, it operates in several industries, including automotive, mechanical engineering, packaging, energy, and construction. With premises measuring approximately 10 km², the Duisburg plant is almost five times the size of the Principality of Monaco and forms the heart of thyssenkrupp SE. The company employs around 27,000 people.

thyssenkrupp Steel Europe is widespread and highly specialized. During the production of its innovative steel products in Europe, it generates huge volumes of data, including customer offers and orders for raw material deliveries, quality assurance, storage and worldwide transport logistics using its own inland port or railway. The complexity of the enterprise makes planning challenging and time-consuming. As a result:

- Vast data volumes are distributed among departments, where they are isolated from each other and subject to different guidelines and naming conventions;

- Various databases and systems are deployed to manually connect data using processes which are inefficient and labor-intensive;

- Data often generates added value only when different information elements (e.g., 'product' and 'costs') are merged.

While some data may be consistent within individual departments and specialty fields, there is no clear insight or overview of jurisdictions, dependencies, and interrelationships across departments.

The problem

The solution

One Data Cartography
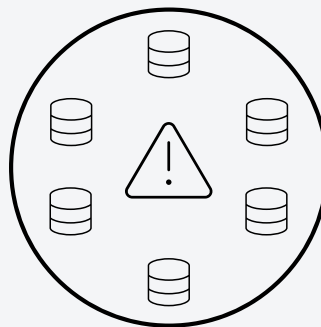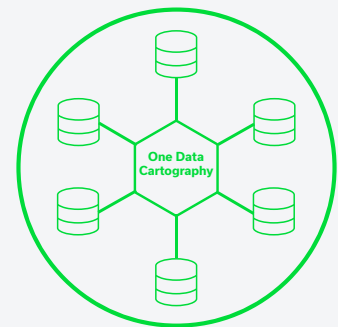
As a result, thyssenkrupp SE faced the challenge of fully exploiting the potential of its data. The company recognized this early on and began looking for solutions both internally and externally. To this end, the collaboration between thyssenkrupp SE and **One Data** began with the aim of using artificial intelligence (AI) to automatically connect existing and future company data and facilitate data analysis.

Without a cohesive data foundation, data was being handled administratively and lost in silos. It was important to transform disparate and labor-intensive data management into a process that is centralized, proactive, automated, and always up to date. Many activities in the field of data management that still run manually today will become automated in the future.

![thyssenkrupp logo]

Freeing data from transactional prisons

Dieter Grossmann, Head of Data Intelligence, is responsible for one of the new large-scale data projects at thyssenkrupp SE. "We want to do more than just manage data. We want to free data from its transactional prisons—our fragmented, subject-related "data landscapes"—where it serves a limited purpose, providing partial information for specific processes. We are creating a new, overarching data layer that we can utilize and evaluate consistently and comprehensively," he says of the challenge facing the company.

"We connect related and correlated data to open up new possibilities."

thyssenkrupp Steel Europe promises Its data project will deliver significant logistical and financial advantages:

1. More efficient order planning
Improved on-schedule deliveries with more efficient order planning

2. Improved networking capital
Optimized networking capital by linking warehouse, financial, production, and order data

3. Smoother transport logistics
Precisely planned complex, and global transport logistics—including journeys within factories and deliveries to leading automobile manufacturers via railway track rentals

4. Insight into impending costs
Ability to view investigations, calculations, and visualizations of possible risks and impending additional costs that may impact individual orders throughout the entire value creation process

**5. Better warehousing**
Optimized warehousing and planning

The data science and AI specialists from **One Data** apply their experience with AI technologies such as machine learning and artificial neural neural networks. In the project, they help thyssenkrupp SE to create and fill the data catalog, and use it as a basis for developing the data products.

"Without the willingness of the project managers and the team as a whole to keep looking at what thyssenkrupp Steel Europe wants to achieve from new angles, we wouldn't have come so far and wouldn't be where we are today," states Grossmann.

One Data | Data Integration Solutions

Data catalog: the central interface for all data

This complex project started in 2020 and is being implemented step by step. In a first step, the company's heterogeneous data sources and databases, IT and ERP systems, storage locations, and more were mapped and automatically linked in a data catalog using **One Data**. The goal is to create a centralized data storage system that serves as an interface for all company data.

The data catalog creates the central interface for the company's entire data landscape. One Data visualizes this data clearly.
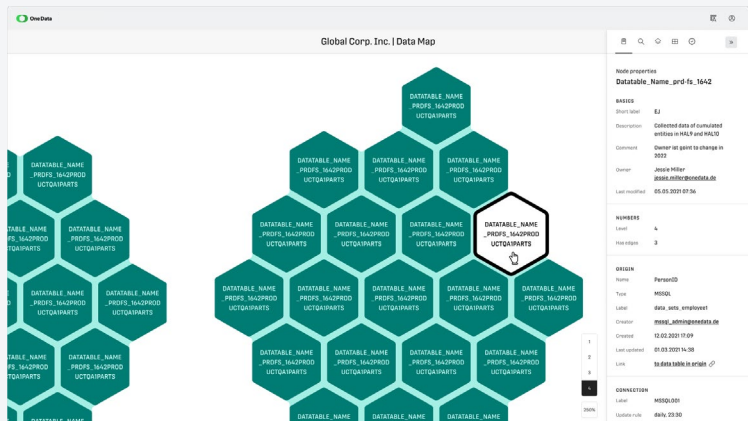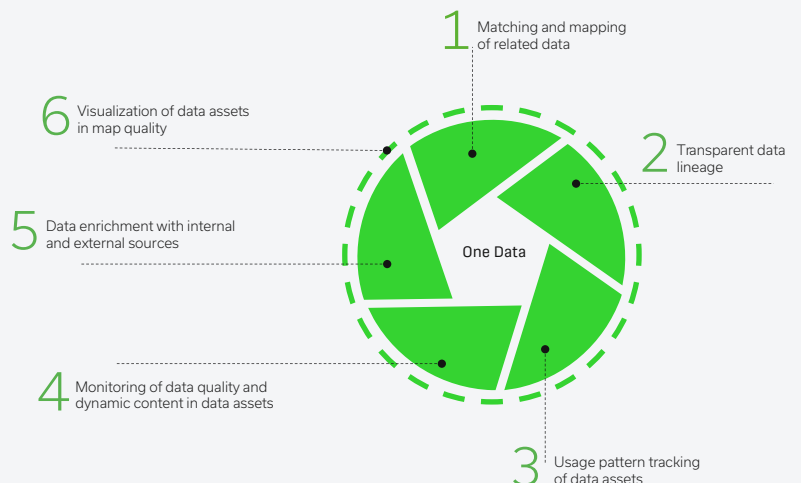

The next step is to expand data management and maximize technical and technological support for staff in data governance roles. **One Data** will help determine where the respective data is located and what qualities it possesses, as well as who is responsible for it, who has access to it, and the contact person available—should any questions or issues arise.

Data lake: linking data with the help of artificial intelligence

One Data merges vast data volumes to create the conditions to fill the data catalog. This process is AI-driven and based largely on a data lake comprising of billions of pieces of raw data as well as other systems.

By combining six functionalities in One Data, maximum potential is unlocked from existing data.

1 Matching and mapping of related data

2 Transparent data lineage

3 Usage pattern tracking of data assets

4 Monitoring of data quality and dynamic content in data assets

5 Data enrichment with internal and external sources

6 Visualization of data assets in map quality

One Data

In **One Data**, data is not simply copied and merged: Instead, 'fingerprints' are created for individual records, and these are stored as they would be in a fingerprint database. Here specialized techniques and customized AI are deployed to compare, transfer, and link data.

When matching and mapping, for example, these fingerprints are compared, analyzed, and harmonized according to the same criteria— such as quantity, weight, frequency, or storage period—using computer-based pattern analysis. They can then be grouped in a new data landscape.
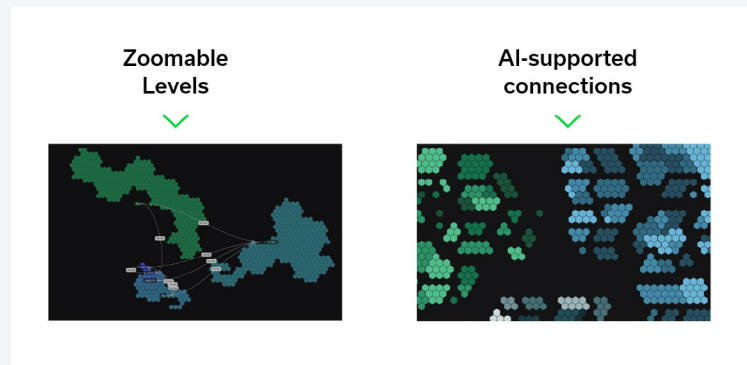
One Data provides a transparent overview of data, its properties, and relationships by graphically presenting databases as a map.

Zoomable Levels

AI-supported connections

During the lineage phase, the experts display the precursors and successors of individual data sets as family trees or lineages to better understand their history and development. When data is enriched, available external data sources are used to enhance and further improve data quality.

"**One Data** should also take on the role of a translator and interpreter," explains Dr. Andreas Böhm, founder and Managing Director of **One Data**. "The user speaks of data set X, means Y, and in the language of the data warehouses or IT system, this actually refers to Z. In fact, the three data sets X, Y, and Z are identical and can be merged or unified."

Dr. Andreas Böhm | Founder and Managing Director, One Data GmbH

Developing a smart holistic twin based on One Data

One Data is not only intended to help thyssenkrupp SE establish a framework for data governance. In the next project step, the steel company's data experts will work closely with the respective specialist departments to set up various applications and cockpits in **One Data**, and network and combine them.

Work is currently underway on applications for the supply chain sector, including order schedule forecasting and production simulation—typical scenarios for a digital twin. However, thyssenkrupp SE wants to go one step further to reach a new goal and create a Smart Holistic Twin as an AI-enhanced, complete creation that is more than simply a 'digital product twin'.

This will be achieved using **One Data** as the foundation.
The process will start by utilizing original heterogeneous data from different sources and systems as if it came from a coherent, interconnected, and linked system.

Dieter Grossmann explains: "In Smart Holistic Twins, we can accurately and promptly map the current state of the most important plants and processes in our entire value chain and provide these images centrally and with a high data quality. The Smart Holistic Twins provide the foundation for further data analytics use cases, business cases, and the training of further AI models."

Over the next few years, **One Data** will become a large, growing, learning, and self-improving neural data network, drawing on billions of pieces of company data from different sources, departments, and processes. These will be AI-controlled, logically and technically connected, and available in a central data catalog for the planning and control of a wide variety of orders, projects, and processes.

End-to-End visualization across the entire value creation chain

The data analytics application of the Smart Holistic Twin is illustrated here: It was used to develop a holistic control cockpit with high usability.
All orders, including all items and materials, were visualized in user-friendly dashboards.

Visualization of data relationships.
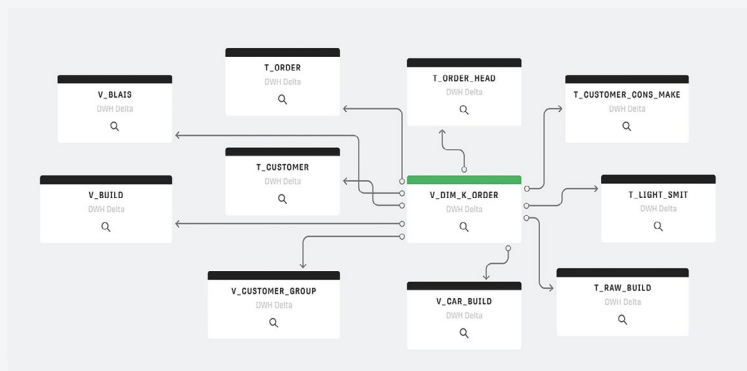
Big data graphs, features, and visualizations are calculated and built based on One Data and the Smart Holistic Twin. These visualize the end-to-end process of each order—and thereby the entire steel manufacturing process—from quotation to invoicing.

While production could previously only be controlled via tonnage, in the future thyssenkrupp Steel Europe will be able to use its new production plan to set prices when preparing proposals. It can also forecast inventories, completion dates, EBIT contributions, and possible disruptions over the entire production process.

As Dieter Grossman explains: "First, we break down the entire production flow. Thanks to **One Data** or the Smart Holistic Twin, we can display it in individual steps in such a way that we can predict what will happen with a certain degree of probability. This is important, because it allows us to plan and steer the entire process with the benefit of foresight instead of hindsight. In other words, we are not taking stock afterwards of what we can improve in future."
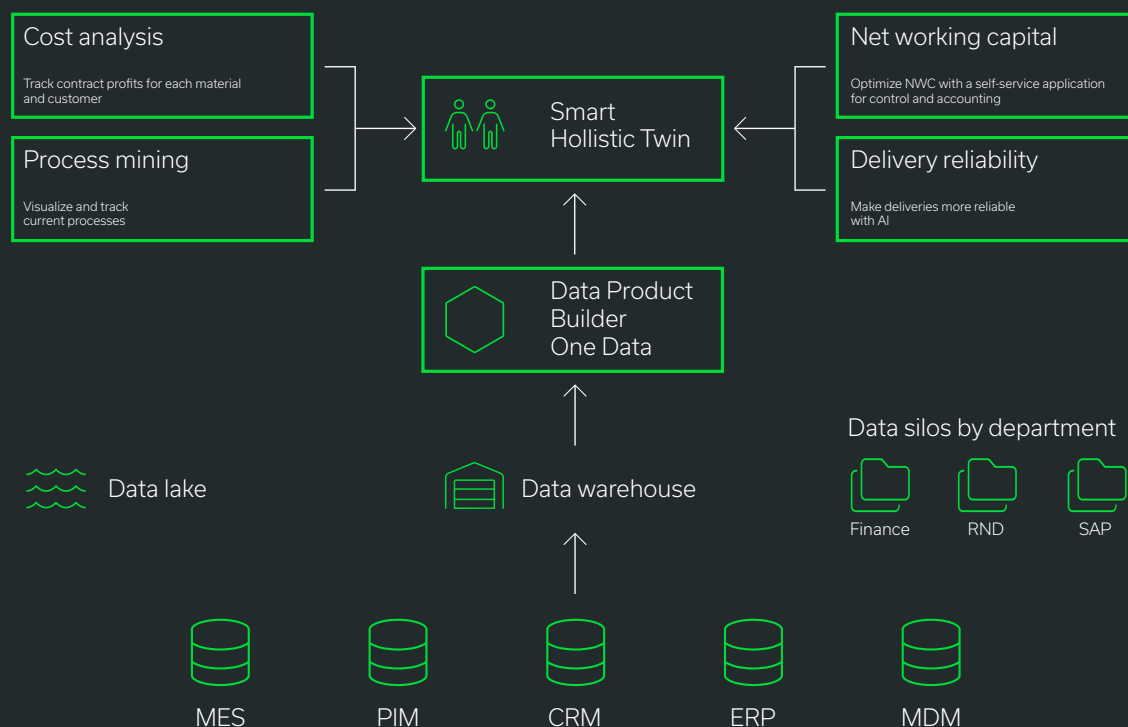
With the help of end-to-end visualization, thyssenkrupp Steel Europe will be able to foresee cost increases for every order much earlier, as well as how they are likely to impact profit margins and even the overall calculation of the order.

New powers and big savings

Developing **One Data**, the Smart Holistic Twin, and other solutions has empowered thyssenkrupp Steel Europe with its rapid digital transformation. Working more proactively and transforming company data into tangible added value can unlock new potential and open up new possibilities while driving down costs.
One Data will continue to support thyssenkrupp Steel Europe on this path to a data-driven future.

For a reference call, contact:

Dieter Grossmann | Head of Enterprise Platforms & Data Intelligence, thyssenkrupp Steel Europe

The data landscape at thyssenkrupp Steel Europe

Cost analysis
Track contract profits for each material and customer

Process mining
Visualize and track current processes

Smart Hollistic Twin

Net working capital
Optimize NWC with a self-service application for control and accounting

Delivery reliability
Make deliveries more reliable with AI

Data Product Builder One Data

Data silos by department

Data lake

Data warehouse

Finance   RND   SAP

MES   PIM   CRM   ERP   MDM

**Are you interested in our expertise and
One Data? Please get in touch.
We're always happy to advise you on the requirements
and specific opportunities for your company.**

Contact Person

Dr. Stefan Roskos
Managing Director
One Data GmbH
sales@onedata.de

Contact

Passau: Kapuzinerstraße 2c, D-94032 Passau
Munich: Prinzregentenstraße 50, D-80538 Munich
Frankfurt / Main: Eschenheimer Anlage 1, D-60316 Frankfurt / Main
Berlin: Köpenicker Str. 31, D-10179 Berlin

Web: www.onedata.de
LinkedIn: linkedin.com/company/one-data-it

Managing directors:
Dr. Andreas Böhm, Dr. Stefan Roskos, Dr. Gregor Wiest,
Prof. Dr. Andreas Pfeifer (ppa.)

www.onedata.de

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