

# Altair<sup>®</sup> Material Data Center<sup>™</sup>

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5 Ways Artificial Intelligence is  
Transforming the Materials Sector

# Changing Tomorrow, Together.

**180+**

Software Products

**ALTR**

NASDAQ Listed

**16K+**

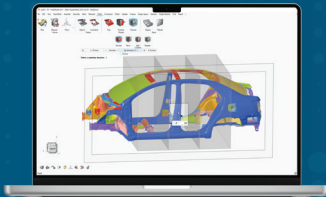
Customers

**8 of 10**

Fortune 10 Companies Use Altair Software

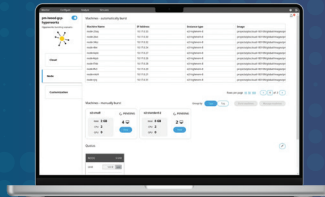
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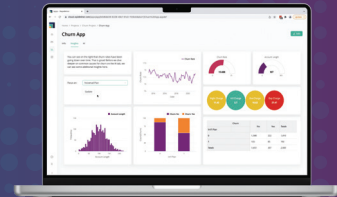
**Altair® HyperWorks®**

Design and Simulation Platform



**Altair® HPCWorks®**

HPC and Cloud Platform



**Altair® RapidMiner®**

Data Analytics and AI Platform



Altair Graph Studio

Model Product

Manage Ontology Sets

Search Ontology Names

- Canonical Labeling Model
- Active Ingredient
- Product
- Active Ingredient
- Generic Name
- Link to Clinical Trial
- Link to Disposition
- Link to Drugs At FDA
- Link to FAERS
- Link to NDCs
- Link to Samples
- Trade Name

CREATE NEW DATA MODEL

Save

Product

View Comments

View

- Canonical Labeling Model
- ClinicalTrials.gov - Auto
- Drugs At FDA - Auto
- US FDA FAERS - Auto
- OrangeBook - Auto
- Document Metadata Ontology
- Large Knowledgebase Annotator Annotation Ontology



# How the Materials Sector is Demonstrating the Value of AI

Amid all the hype surrounding artificial intelligence (AI), it's easy to overlook a simple truth: across numerous industries, AI-enabled tools are delivering game-changing improvements in the speed, efficiency, and quality of processes and outcomes.

The materials sector offers some striking examples of what's possible. In this eGuide, we highlight five ways Altair's powerful yet accessible AI and data science tools are helping enterprises cut costs, optimize quality, and speed the development of innovative new products.

These use cases underline the fact that AI has evolved into a highly accessible tool, helping enterprises exploit and enhance their existing data assets to achieve quantifiable commercial returns. Moreover, they demonstrate how the people best placed to identify the opportunities and apply the technology are often not pure data scientists, but the professionals with firsthand experience of the processes where AI can have most impact.

# Five Ways AI is Transforming the Materials Sector



## AI-augmented material data

AI overcomes the challenge of missing data, reducing the need for physical testing and saving costs.



## Machine learning-enabled smart data for enhanced quality control in steel production

Machine learning models predict potential quality issues earlier, resulting in significant energy and cost savings.



## AI-powered metal casting

A machine learning model identifies the best additive mixtures, saving on physical testing costs, reducing the use of expensive additives, and ensuring quality standards.



## Machine learning for faster tire innovation

A machine learning model trained on historic data accelerates the identification of optimal material combinations, cutting production costs and time to market.



## Automated, scalable material outlier detection

Machine learning-enabled predictive models enhance test data quality, reducing physical testing, lead times, and costs.



**By embracing innovative, low-carbon materials, circular economy principles, and advanced engineering technologies grounded in data and simulation models, industries can reduce their carbon footprint while meeting demand for infrastructure and products. This transition is key to protecting the planet, ensuring raw material independence and significant business opportunity.**

**Kamila Klug**

Director of Business Development, Material Solutions, Altair



# AI-Augmented Generation of Missing Material Data

## The Challenge

Data is a strategic asset. However, for many enterprises looking to exploit historical or real-time information sources, missing data creates serious issues.

Altair recently worked with an enterprise in the materials sector facing this challenge. Missing data directly impacted the company's decision-making capabilities, increasing product lead times – which was compromising competitiveness and customer satisfaction. The physical testing of materials required to fill data gaps also consumed significant time and resources.

## The Solution

Altair's solution automates data acquisition from a variety of sources and consolidates and prepares that data for machine learning models. This results in effective generation of high-quality synthetic data to fill in the missing gaps.

## The Business Value

The enterprise benefits from reductions in the need for physical testing, leading to significant cost savings. Generation of missing data also accelerates early-stage decision making, further streamlining processes and product delivery. Altair's AI-augmented solution systematically exploits the company's historical information, fostering innovation and maximizing the value and impact derived from existing data assets.

# Machine Learning-Enabled Smart Data for Predictive Quality Control in Steel

## The Challenge

Steel production is an exacting, expensive operation involving high energy costs, significant lead times, and extensive resource allocation. The ability to predict early whether product quality standards will be met is vital for controlling costs and meeting delivery deadlines. However, to achieve early, accurate product quality predictions, manufacturers must be able to manage large volumes of data characterized by high levels of variability.

## The Solution

Altair worked alongside a number of stakeholders, including ArcelorMittal<sup>1</sup>, the world's leading steel and mining company, on an EU-funded research project to develop and deploy new machine learning models that predict whether the project would meet product quality standards.

## The Business Value

The solution enabled ArcelorMittal to halt the manufacturing process as early as possible if they detect or predict quality issues. By doing so, the company saves on energy and other costs that would otherwise be wasted on the manufacture of substandard products/materials.

<sup>1</sup> [https://www.industrial-data-science.de/talks/2017/11\\_gabriel\\_fricout\\_\\_arcelor\\_mittal\\_\\_product\\_quality\\_prediction/](https://www.industrial-data-science.de/talks/2017/11_gabriel_fricout__arcelor_mittal__product_quality_prediction/)





# AI-Powered Metal Casting

## The Challenge

Manufacturing cast iron alloys requires costly additives. Minimizing the use of these additives is a key business objective for producers.

## The Solution

Altair worked with a producer of cast iron alloys to train a machine learning model on historical data from previously manufactured additive mixtures. The model predicts the minimum quantity and optimal mix of additives required to achieve target quality standards in the finished product.

## The Business Value

Machine learning runs virtual tests on numerous additive combinations, identifying the most promising candidates for physical testing. This approach eliminates the costs associated with physical testing, minimizes the use of expensive additives, ensures quality standards are met, and avoids waste.



# Machine Learning-Accelerated Tire Innovation

## The Challenge

Developing innovative new rubber mixtures for tires traditionally involves running costly, time-consuming physical tests on numerous material combinations. This reliance on physical testing compromises efficiency and time to market, and fails to take advantage of historical data.

## The Solution

Altair's solution enabled a tire manufacturer to utilize and exploit data from previous tests, experiments, and manufactured products. A machine learning model is trained on this data and can rapidly predict new material mixtures' key properties.

## The Business Value

Machine learning-enabled virtual testing accelerates the design of promising rubber mixtures and reduces the time and resources dedicated to non-viable combinations. As a result, the tire manufacturer benefitted from lower development and production costs. Moreover, faster time to market for high-performance material solutions provides a sharper competitive edge.





# Automated, Scalable Detection of Material Outliers

## The Challenge

Raw material data often contains noise and variability that obscures key patterns. Effective pre-processing techniques are essential to filter out noise and identify outliers.

## The Solution

Altair's solution automates data consolidation and transformation prior to applying unsupervised machine learning (such as K-means clustering) to detect material data outliers.

## The Business Value

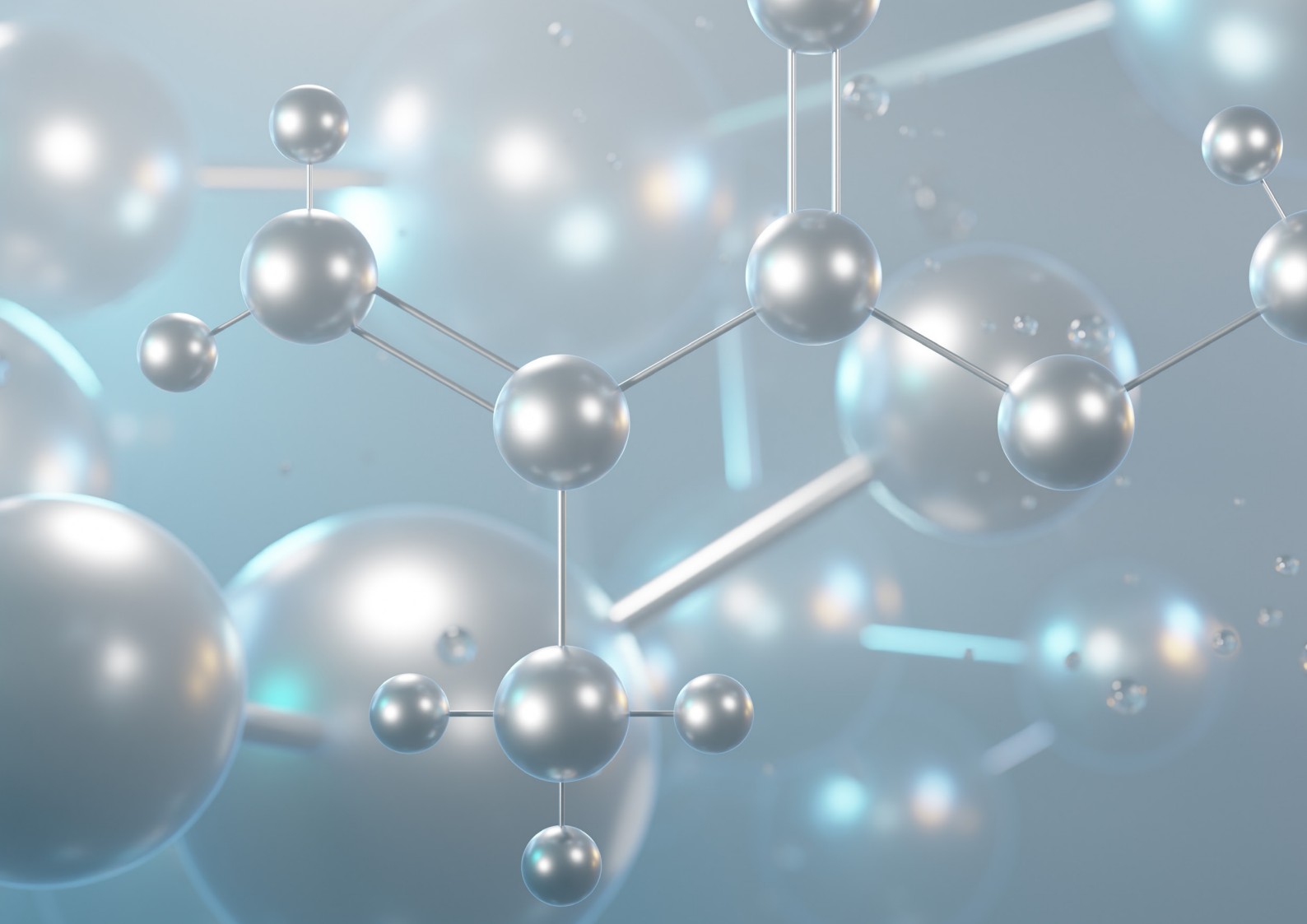
Automating the identification of material outliers enhances the quality of test data and the accuracy of material models. This allows enterprises in the materials sector to create machine learning-enabled predictive models that reduce the need for physical testing. Benefits include lower costs, reduced use of resources, and faster development and manufacture of quality products.

# Conclusion

As more people in the materials sector recognize AI's value and how easily they can implement the technology, the number and variety of use cases will grow. In addition to driving innovation and commercial success, AI has a critical role to play in advancing sustainability. The pursuit of net zero initiatives is both a challenge and an opportunity. In all the featured use cases, business value is at least partly achieved by reducing energy consumption and conserving finite resources. Commercial and environmental progress go hand in hand.

AI isn't a magic bullet. But it's also not a solution in search for a problem. Apart from the hype, AI is delivering on its promises. Altair's approach ensures the power of AI is accessible to all. Low- and no-code tools such as Altair RapidMiner unlock human creativity and insight and free talented people from the monotonous, laborious tasks that add time and cost to a business, not value.

To learn more about how Altair can help you harness the untapped power of data in your organization, visit at [altair.com](https://altair.com).



# Learn more: [altair.com/material-data-center](https://altair.com/material-data-center)

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