ArcelorMittal

SmartSheetPile

Smart steel solutions for innovative infrastructures

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«We are transforming the life of steel – how it's made and how it's used. Because while a developing world needs more steel, a sustainable world needs new steels – smarter and decarbonized.»

Aditya Mittal, CEO, ArcelorMittal

Secure your assets

The data transmitted by the SmartSheetPile solution helps prevent irreparable damage to the infrastructures. It detects accidental and weather-induced damage. Real-time monitoring of the infrastructure provides early warning of potential catastrophic structural failure, allowing for preventive action to be taken.

Minimize downtime

Whether it is a quay wall, a bridge abutment or a dike, an unscheduled shutdown can be very disruptive and expensive. It leads to reduced revenue, costly repair work and inconvenience to users. The SmartSheetPile solution provides all the data needed to plan the required maintenance work well in advance, minimizing downtime.

Achieve preventive maintenance

The availability of accurate data on the structural condition of an infrastructure helps optimize its maintenance. Asset owners know exactly when and where maintenance is needed, eliminating the need for costly inspections and unscheduled repair works.

Reveal hidden capacities

The collected data provides accurate information on the state of the structure, the forces involved and their impact on the sheet pile walls, allowing for the discovery of any hidden unused capacity. The usage of the structure can be optimized to benefit from its full potential.

Take on the digital transformation

Digitalization is a key driver of innovation in design and operation. Live data collected by the SmartSheetPile solution can be integrated into the digital twin of the infrastructure, providing a multi-dimensional overview of the structure's design, performance and interactions with the world. It is a single model that brings together all the information needed for effective asset management.

Water Transport Solutions	Hazard Protection Solutions	Mobility Infrastructure Solutions	Environmental Protection Solutions
• Uncover hidden quay wall capacities to improve productivity. • Monitor corrosion in real time with precise remaining thickness measurement.	• Raise the alarm on water levels and water pressure. • Detect early signs of potential catastrophic failure.	• Monitor the health, loads and deformation of bridge abutments in real time. • Reduce downtime and traffic disruption with more efficient preventive maintenance.	• Guarantee the integrity of the sheet pile wall against declutching. • Ensure the imperviousness of the sheet pile wall.

The future is here

SmartSheetPile is an innovative solution designed to make infrastructure safer and more cost-effective. The sheet pile wall is monitored in real time by multiple sensors, measuring a variety of parameters. The data is collected and transmitted via 4G/Wi-Fi to a cloud-based database, which can be displayed on online monitoring dashboards or fed into the asset's digital twin.

The SmartSheetPile is constantly connected and communicating through the cloud with other smart objects/ structures. It provides information on the structural health of the sheet pile wall (corrosion, deformation, tilt, etc.) and can alert in case of accidental events (anchor failure, wall impact, earthquake, etc.). It continuously collects and transmits high quality and precise data that can be analyzed and used for informed decision-making, thus reducing maintenance costs, optimizing the use of structures and preventing catastrophic and accidental failures.

Furthermore, the development of Artificial Intelligence (AI) will take asset management to the next level, achieving predictive maintenance. The considerable amount of data collected from the SmartSheetPile solution will be processed and analyzed by advanced AI algorithms. They will identify the correlations between the different monitored characteristics and parameters, predicting upcoming critical issues and optimizing the maintenance plan to prevent them.

ArcelorMittal is part of the iRON research program (intelligent pRediction of cOrrosioN of sheet piles), starting from January 2023. It aims at developing an AI-based data model predicting the corrosion of steel sheet piles. The research program is driven by the University of Bielefeld in Germany, with the participation of major German port authorities, such as Port of Hamburg, Port of Bremen, Rostock port, as well as the HTG (Hafentechnische Gesellschaft) and the BAW (Bundesanstalt für Wasserbau).

Embark on the digital journey

Smart solutions have become possible with rapid innovation in sensor technologies. Smart structures with built-in sensors will be widely used as a tool for real-time monitoring and modeling of asset condition. Supplied with the collected data, the digital twin of the infrastructure provides a multidimensional overview of the asset's design, performance and interactions with the world. It displays the real-time conditions of the asset (deformation, corrosion, impacts, etc.).
The digital twin compounds in a single model all the information needed to improve operations, reliability and sustainability.

A gold mine for further optimization

The data collected from the SmartSheetPile solution provides a better understanding of the performance of sheet pile walls. It is a goldmine for designers and academics to develop new models, improving design methods and standards. This will lead to further design optimization, reduced material consumption and effectively contribute to the global environmental challenge of reducing CO_2 emissions.

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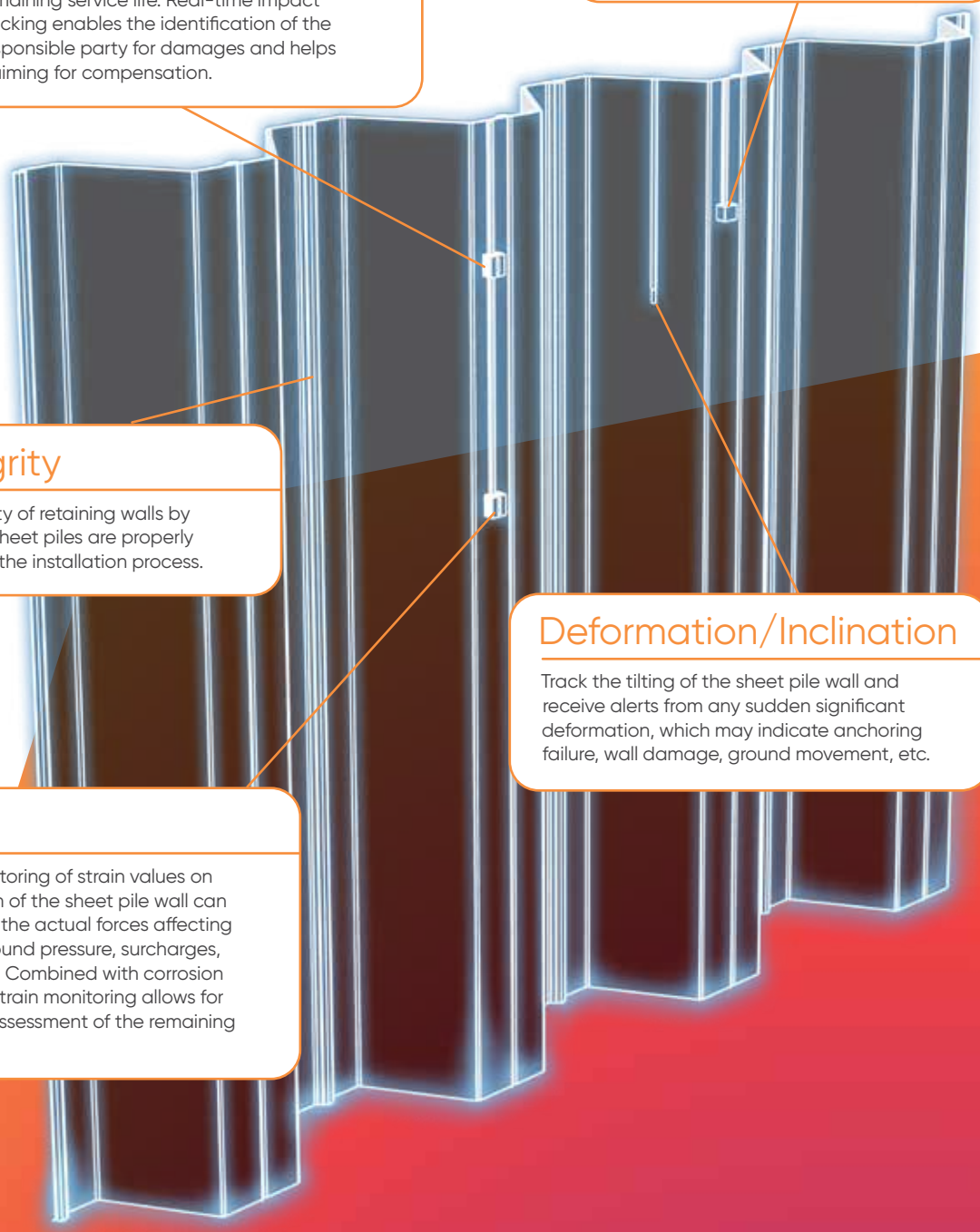
Corrosion

Corrosion is one of the most important aspects to monitor for a steel sheet pile, as it is directly related to the remaining service life of the structure. Corrosion sensors provide real-time information on the loss of thickness over time. Several sensor types are available: ER (Electrical Resistance) probes, ultrasonic sensors, corrosion coupons.

Shocks/Impacts

Detect shocks and collisions to identify point loads that have a negative impact on the remaining service life. Real-time impact tracking enables the identification of the responsible party for damages and helps claiming for compensation.



Wall integrity

Monitor the integrity of retaining walls by ensuring that the sheet piles are properly interlocked during the installation process.

Deformation/Inclination

Track the tilting of the sheet pile wall and receive alerts from any sudden significant deformation, which may indicate anchoring failure, wall damage, ground movement, etc.

Strain

Continuous monitoring of strain values on a specific section of the sheet pile wall can be used to track the actual forces affecting the structure: ground pressure, surcharges, tidal activity, etc. Combined with corrosion measurements, strain monitoring allows for a continuous reassessment of the remaining service life.

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