AMEPA
Process Measurement Systems

Safe Tundish Drain with Residual Steel Detection

RSD 300

Measure it. Control it.

AMEPA Residual Steel Detection:
Increase Yield by Draining your Tundish Safely

The RSD 300 measuring system is specifically designed for use in tundishes on continuous casting lines in steelworks to monitor low steel levels. It is used where the existing tundish scale is inadequate for accurately measuring the remaining steel quantity.

Key Purposes for Accurate Steel Level Measurement

Prevention of Undetected Emptying
Accurate measurement of the remaining steel level is critical to prevent undetected tundish emptying, which can lead to slag carryover into the mold. This can result in strand breakage, damage to the caster, costly repair downtimes, and pose serious risks to the safety of casting personnel. It is essential to avoid these hazards.

Optimization of Steel Grade Changes
During a casting sequence, different steel grades are poured into the tundish. The new steel grade mixes with the existing grade, creating a mixing zone within the casting strand. The goal is to minimize the length of this mixing zone by pouring the new grade into the tundish only when the remaining steel level is at a minimum. This helps reduce contamination and improve the quality of the final product.

Maximization of strand length
When a casting sequence is ending on a multi-strand casting machine, closing individual strands once the optimum strand length is achieved can help optimize production. Accurately knowing the remaining steel height in the tundish is critical for maximizing strand length and improving overall system efficiency.

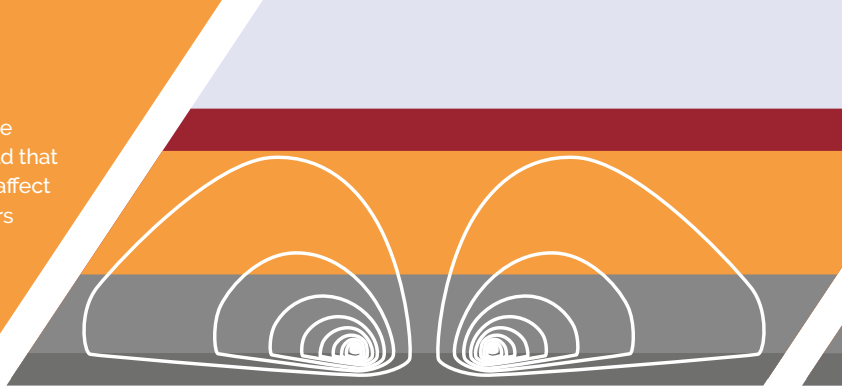
Final Emptying
Various strategies are employed for the final emptying of the tundish at the end of the sequence, including:

- **Emptying as completely as possible without slag carryover, ensuring maximum discharge.**
- **Strand length optimization for efficient casting.**
- **Closing the tundish at the optimum steel level, allowing for easy removal of the cooled skull.**
- **Enabling automatic closure at the end of the sequence for improved operational efficiency.**

"The RSD system has been an invaluable asset for our customers, significantly improving yield and reducing scrap and downgrades during grade changes in the tundish. Its precision and reliability have enhanced overall productivity and operational performance."

Pete Krause, President AMEPA America Inc.

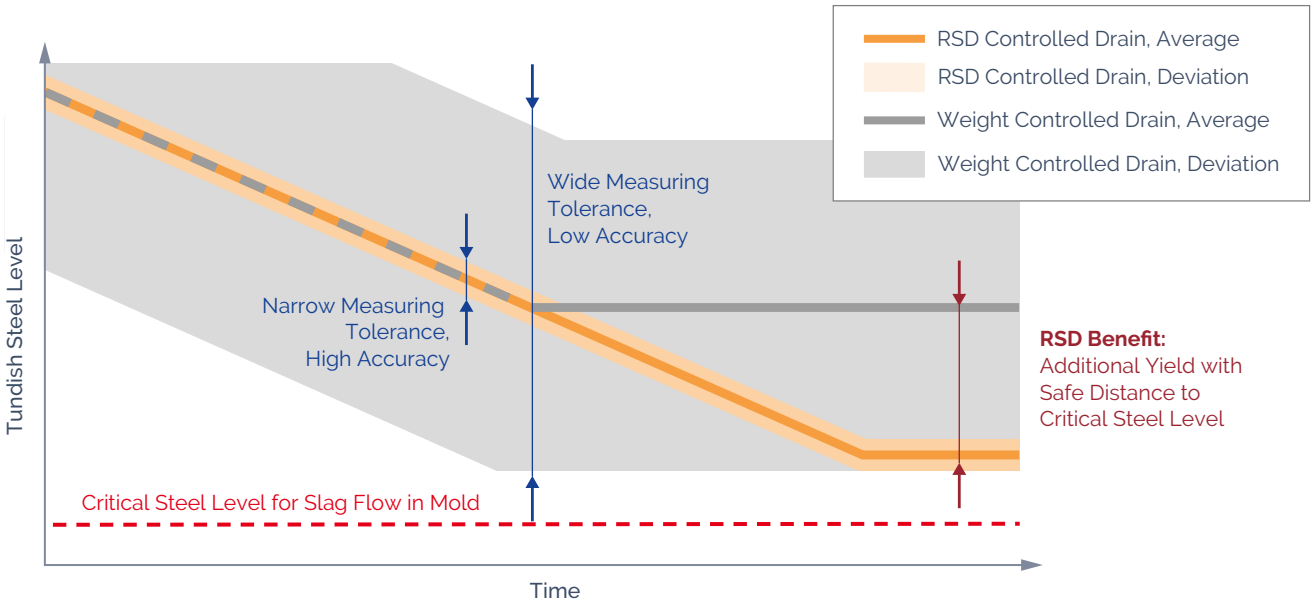
Measurement principle:
The sensor contains a transmitting coil and a receiving coil. The transmitting coil generates an alternating electromagnetic field that causes eddy currents in the liquid steel. These eddy currents affect the voltage induced in the receiving coil. As soon as slag enters the measuring range of the sensor, the eddy currents change and consequently the induced voltage. The RSD measuring system records these voltage changes and uses them to calculate the remaining height of steel in the tundish.



Drain your Tundish Safely at Sequence End

By using the RSD, yield is maximized at the end of the sequence by optimizing tundish drainage down to the critical height just before slag carryover becomes a risk.

Comparing Weight-Controlled Drain and RSD-Controlled Drain for managing steel levels in a tundish over time reveals the following:



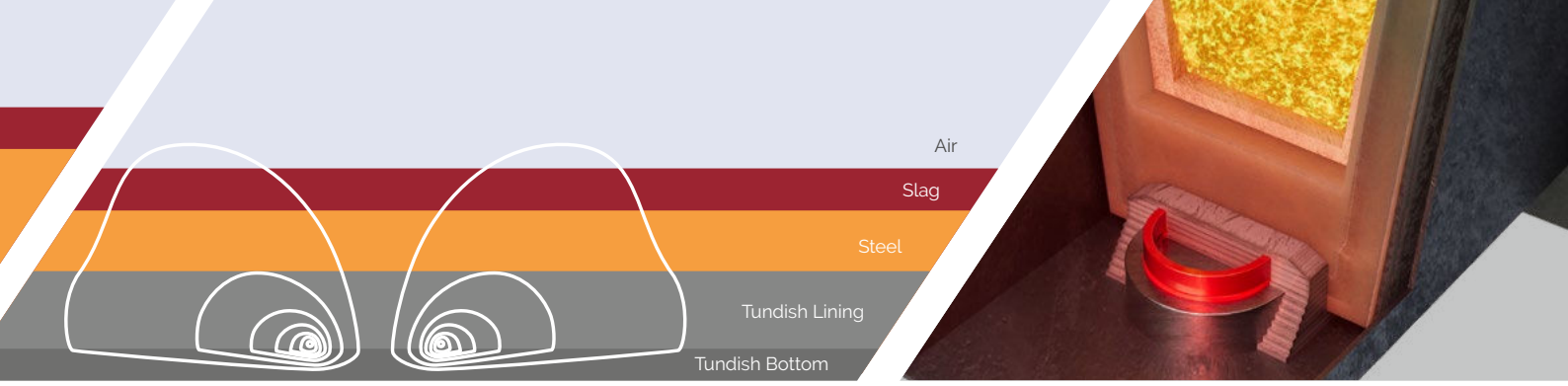
The accuracy of the two methods for measuring steel levels in a tundish differs significantly. Using a scale introduces considerable inaccuracies because it relies on an indirect measurement principle, leaving the exact relationship between slag and steel unknown. In contrast, the RSD system directly measures the distance to the steel/slag interface, providing a much higher level of precision.

This improved accuracy allows the steel level to be safely lowered closer to the critical threshold without risking slag transfer into the mold.

As a result, the RSD-controlled drain offers increased yield (highlighted with red arrows) due to its reduced deviation, enabling a more:

- **Safe**
- **Reliable**
- **Reproducible**

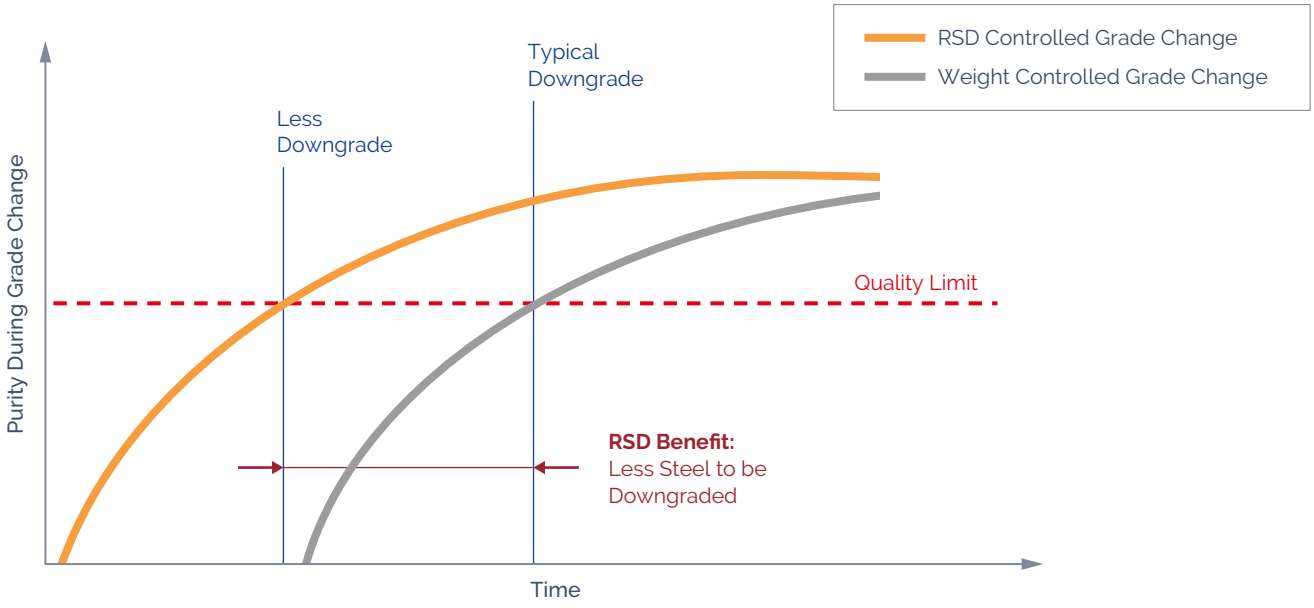
approach to reaching the critical steel level compared to the weight-controlled method.



Improved Yield by Optimized Grade Changes

Minimizing residual steel levels during a grade change reduces mixing zones, leading to less downgrading and higher profitability.

A comparison of purity levels over time between Weight-Controlled Drain and RSD-Controlled Drain during a tundish grade change can be illustrated as follows:



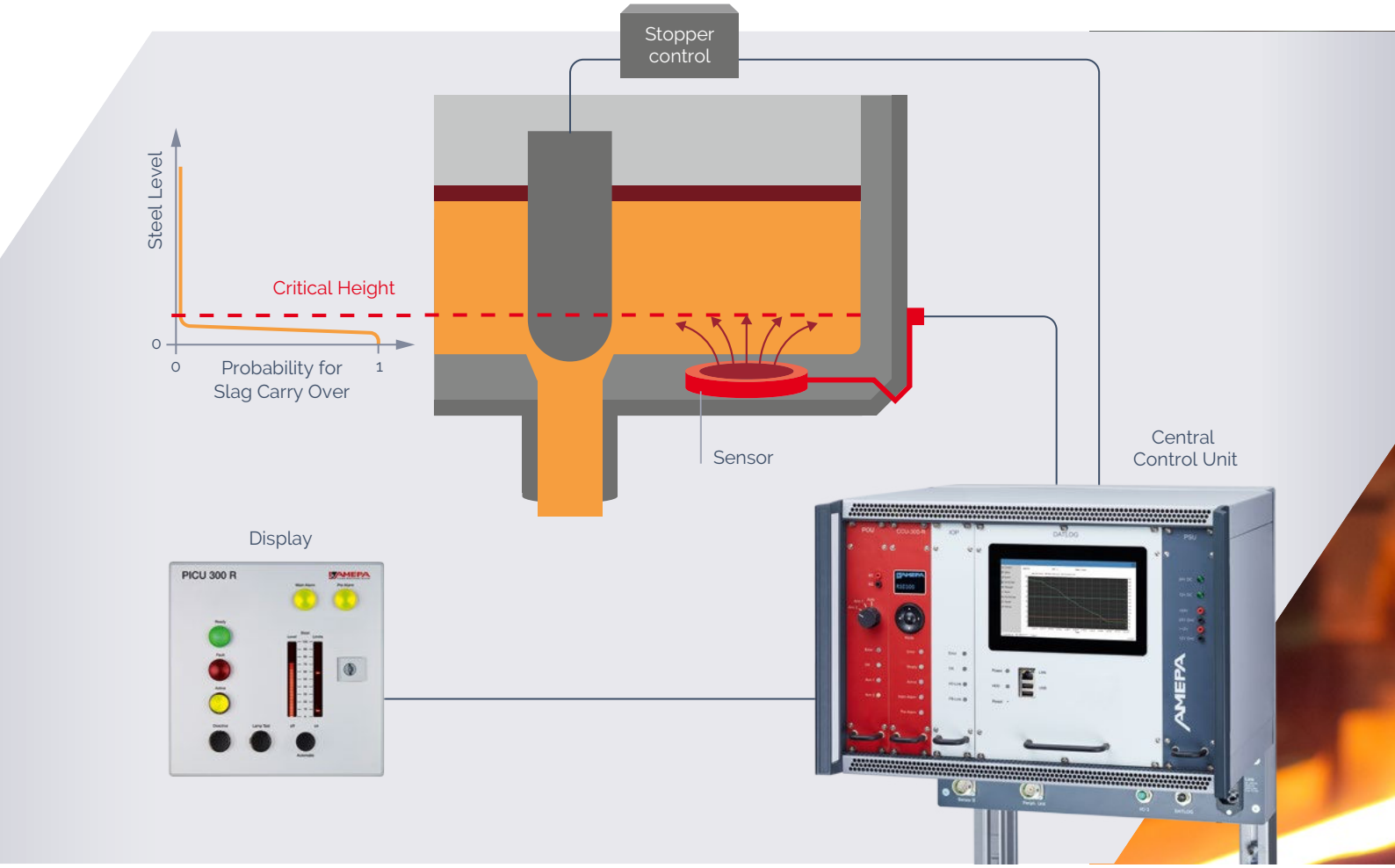
The ability to safely drain the tundish to a significantly lower steel level provides a key advantage during a grade change.

A lower residual steel level from the previous grade results in a significantly smaller intermix zone when filling the next grade, allowing the intended steel quality to be achieved and stabilized much more quickly.

Compared to weight-controlled grade changes, AMEPA's Residual Steel Detection (RSD) system makes your process significantly more:

- **Efficient**
- **Cost-effective**

by substantially reducing the amount of downgraded steel.



Working Principle

The sensor is installed on the tundish steel shell at the bottom, securely protected from direct contact with molten metal by the refractory lining. As the steel/slag boundary layer enters the RSD sensor's measuring field—within a range of 0 to 20 cm above the refractory lining—the system detects the remaining steel height in the tundish based on a characteristic signal curve.

When the predefined critical level is reached, just before slag flow occurs into the mold, the RSD system triggers an alarm. This signal is used to close the tundish via a stopper, preventing slag transfer.

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Maximized Yield

By using the RSD, tundish skulls are minimized at the end of the sequence through optimized tundish drainage, ensuring the steel level is lowered just above the critical height where slag carryover becomes possible.

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Less Downgrading

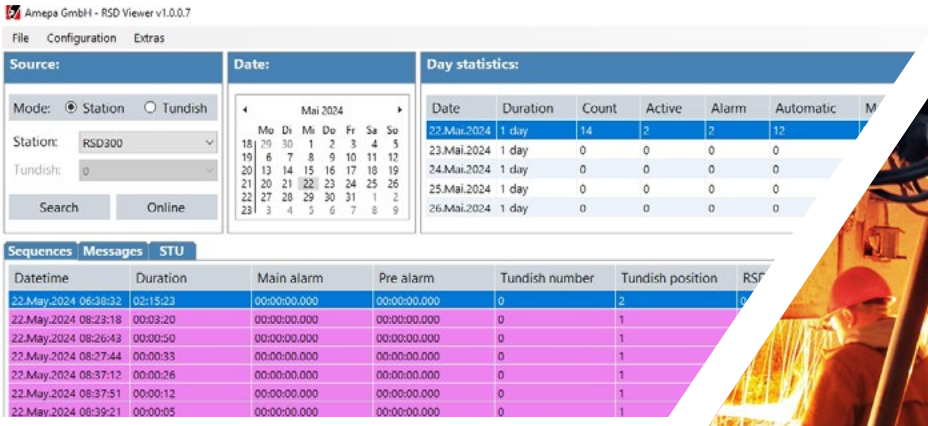
Minimizing residual steel levels during a grade change reduces mixing zones, resulting in less downgrading and higher profitability.

Extensive Reporting

The AMEPA REPORT software provides users with comprehensive measurement results and status messages in both tabular and graphical formats. Additionally, automated email reports can be sent to predefined user groups at scheduled intervals, such as by shift or as a daily summary.

By enhancing cross-plant process networking, the system stores measured data and results in a centralized database, giving users access to detailed real-time and historical data within their company network.

The database contents can be accessed anytime within the customer network using standard web browsers. This ensures round-the-clock availability of data, presented in a user-friendly format tailored to different user groups.



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Safety

There is no risk of uncontrolled tundish emptying, which could lead to slag carryover into the mold and create hazardous situations.

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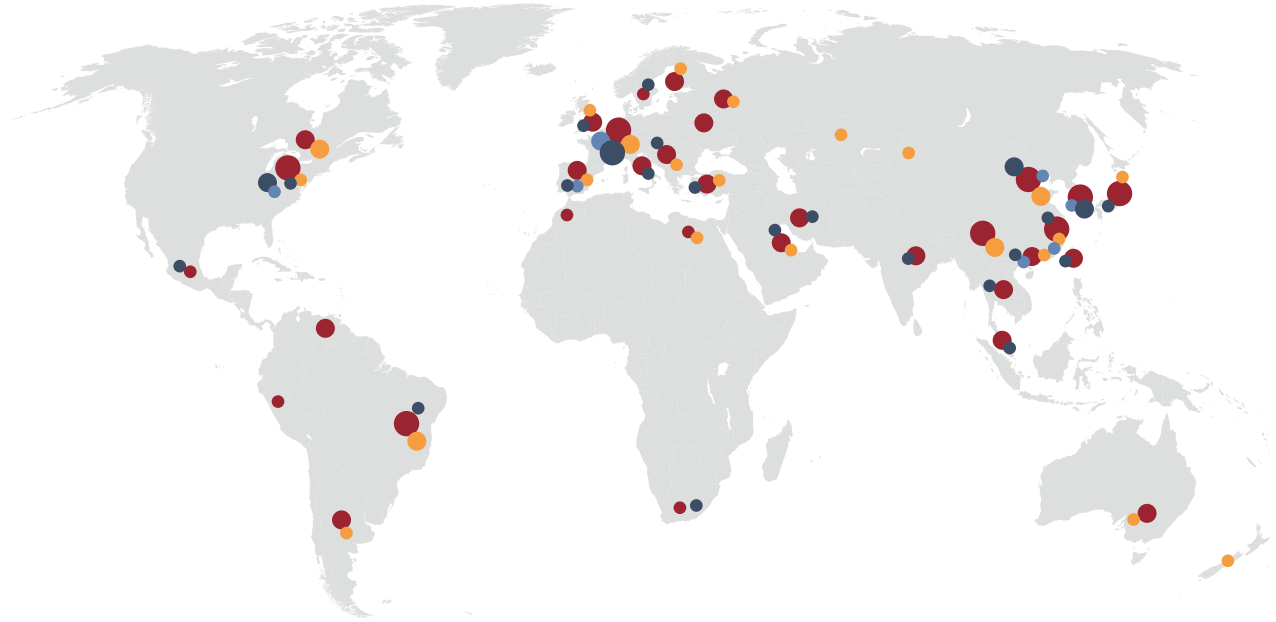
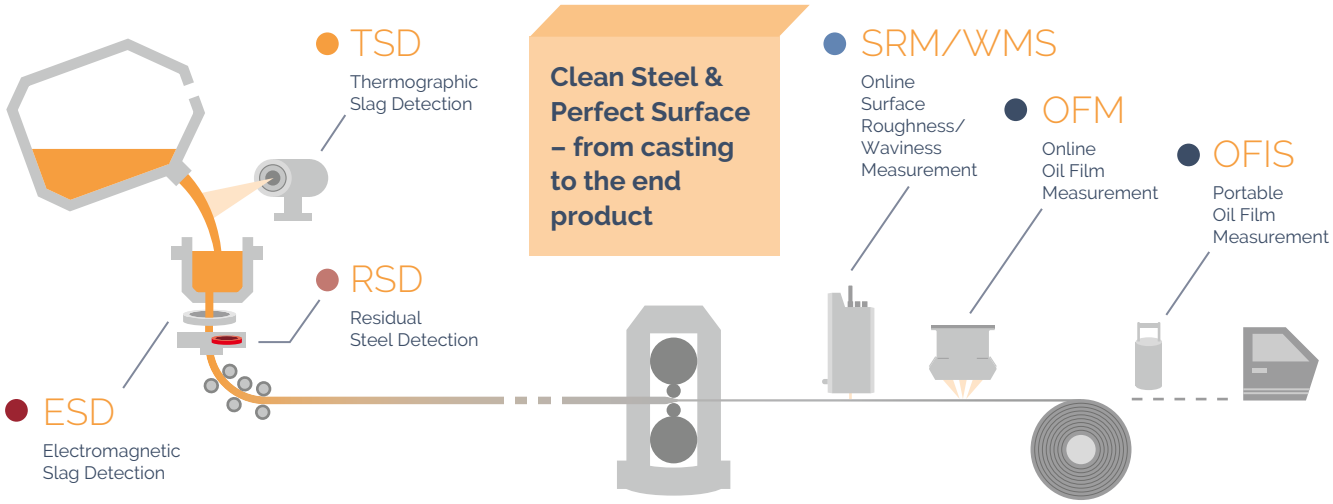
Process Measurement Systems

Worldwide successful





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