

ADVANCED QUALITY CONTROL SOLUTIONS for Molten Aluminum Alloys

Dissolved Hydrogen Measurement & Process Verification



AT-LINE Hydrogen Analysis



RPT with Density Measurement
& Density Index (DI) Calculation



IN-MELT Hydrogen Analysis



Qualitative Hydrogen Assessment
By Reduced Pressure Test (RPT)



Density Measurement

Bettamil



NewReturn
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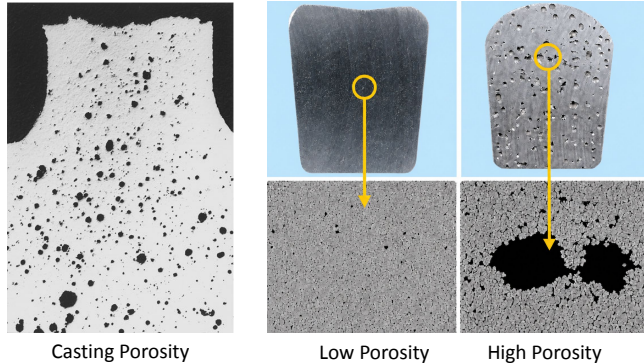
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MELT-RELATED QUALITY DEFECTS

Different Defect Mechanisms—Multiple Product Impacts

CASTING PRODUCTS

Sand Casting, Gravity Casting, Low-Pressure Casting, Die Casting



Hydrogen Gas Porosity

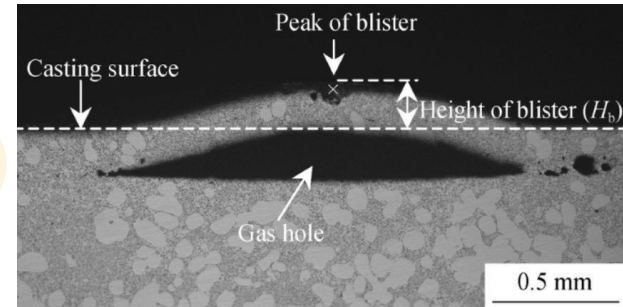
Dissolved hydrogen forms H_2 gas during solidification, forming pinholes, spherical pores and microporosity



Shrinkage Porosity
Non-hydrogen-related

BILLET, SLAB & WROUGHT PRODUCTS

Extrusion, Rolling, Forging, Heat Treatment



Blistering Ref. Lu et al., *Rare Met.* 42 (2023)

Potential Blistering

Melt-origin gas pores may remain hidden in billets or slabs, become elongated during forming, and potentially develop into surface blisters during subsequent heating.

Not all porosity has the same origin—identifying the defect mechanism is essential for effective melt-quality control.

WHERE EACH INSTRUMENT FITS

Close the loop: degas, measure, release—or correct

					
Production condition	CHY-03B AT-LINE	CHY-03C Density Eq.	CHY-02D IN-MELT	RPT100 Qualitative	ALDLink Density Eq.
Stable launder, ~700°C	Suitable	Suitable sample	BEST FIT	Suitable	Suitable sample
Furnace / holding furnace	BEST FIT	BEST FIT (cast alloys)	Possible with access	BEST FIT	BEST FIT (cast alloys)
Transfer ladle	Possible with access	Suitable sample	Possible with access	Possible with access	Suitable sample
Direct dissolved H ₂ value	YES	NO-combined melt quality	YES	NO-combined melt quality	NO-combined melt quality
Casting alloys	YES	YES	YES	YES	YES
Wrought / high-Mg alloys	YES	Use alloy-specific validation	YES	YES	Use alloy-specific validation