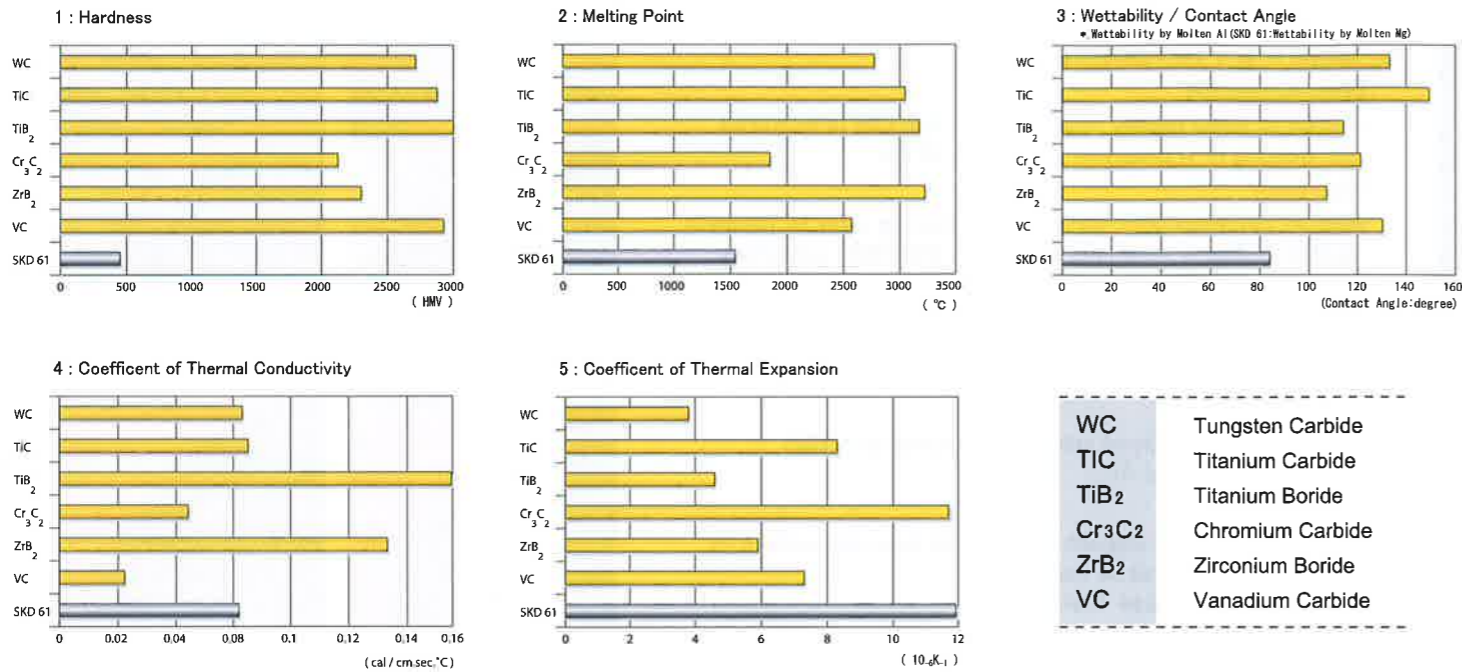


Special Feature of Electrode

Various Electrods for Coating



WC	Tungsten Carbide
TiC	Titanium Carbide
TiB ₂	Titanium Boride
Cr ₃ C ₂	Chromium Carbide
ZrB ₂	Zirconium Boride
VC	Vanadium Carbide

Reducing Defective Products by Overlay Repair

The minor casting defects found on casting aluminum products after finishing can be filled by overlay repairing. These works with low heat input have achieved reduction of production defects and eliminated distortion, residual stress, or under-cuts. And the repaired products have also passed hydraulic leak tests.



Overlay

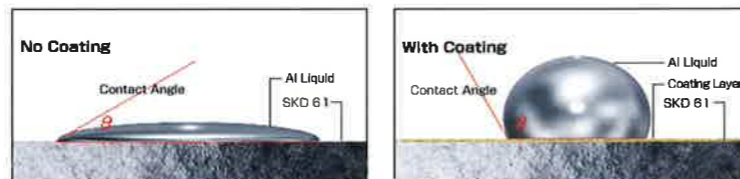
《 Filling Pin Holes in a Cast Al Wheel 》



Wettability is ...

contact angle of adhesive dropped onto a material indicates the materials wettability. The lower the contact angle, the more wettable is the surface.

TechnoCoat coating procedure on casting die improves wettability (higher the contact angle, the less wettable is surface) by Al or Mg liquid and achieves increasing a better liquid flow, gas release, and adhesion of release agents, and also preventing erosion, scuffing, and heat cracks.



■ No Coating Occurred Seizing and Scuffing ■ With Coating No Occurred Seizing and Scuffing

series Depo

Coating & Overlay

ELECTRO-SPARK DEPOSITION DEVICE

Depo Series

Innovative Technology of Coating & Overlay for Maintenance and Repair



Application on Aluminum Die Cast Dies & Casting Molds



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Coating for Preventive Maintenance & Cut the Percentage of Defective

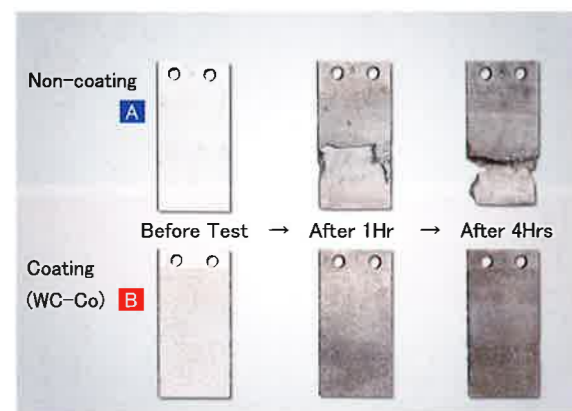


Erosion by molten aluminum, abrasion damage and heat checks in aluminum die casting dies are common problems. The damage can be reduced dramatically by applying tungsten and/or titanium carbide in the problem prone areas of new or repaired dies using the electro-spark process. The coating protects the die surface due to its extremely high anti-wetting property against molten aluminum and maintains high hardness at operating temperatures. The coating minimizes erosion, scoring and heat checks and extends the die life. As an added benefit the coating increases product quality by providing excellent release properties, liquid flow and gas release.



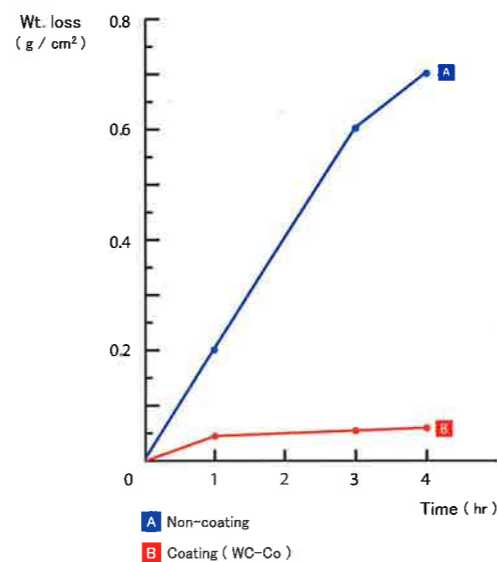
Erosion test of coating in molten aluminum

Comparison of liquid metal erosion between coated & non-coated samples



Test method / Sample : SKD61 Molten Al : ADC12 (680°C) rotated at 30rpm

The weight loss of the coated sample was less than 10% of the non-coated piece.



Proper Coating Roughness with High Performance Materials

Required Surface Roughness by Possible Adjustment

Coating Condition

Model : SparkDepo Model 300
Appliator : Miniature Applicator
Electrode : WIC-90-H dia. 4.0 x 100mm
Base Metal : SKD 61



Rough Smooth Very Smooth

Effect by Depo Coating Procedure

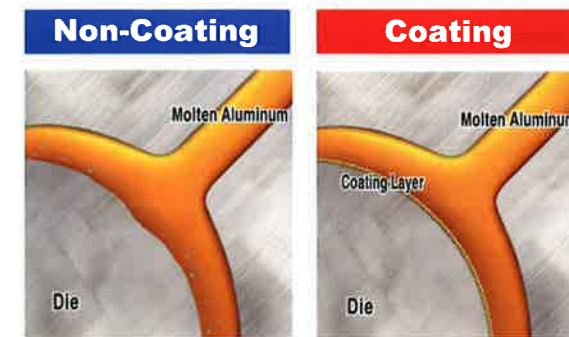
1. Wearing Prevention

Non-Coating

Molten Al flows rapidly into die. Then, fraction is occurred and wearing is in progress on surface of die.

Coating

Against hardness 350-400HVM die, Coating layer by cermet electrode that is hardness more than 2000HVM extremely protects die surface.



2. Erosion Prevention

Non-Coating

Die surface is occurred erosion contacting with high temperature molten Al.

Coating

Preventing erosion amount within 1/10 from die surface by worse wettability coating material.
* Referring to Erosion Test Results



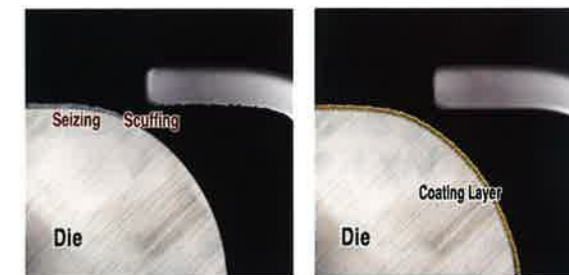
3. Seizing & Scuffing Prevention

Non-Coating

Molten Al and die surface are easy to react each other, seizing and scuffing are occurred at contact area.

Coating

Preventing seizing and scuffing by uneasy-react (worse wettability) coating material against molten Al.
* Referring to Wettability



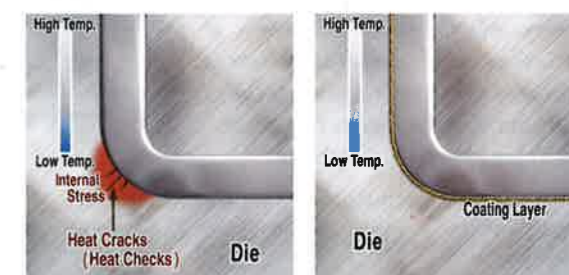
4. Heat Cracks Prevention

Non-Coating

Stress is accumulated in die surface with repetition of Heat by teeming molten Al (Expanding) and Cooling by die lubricant (Shrinkage) occurring Heat Cracks.

Coating

Insulation effects of Intercalated minute air in slight roughness die surface (tungued and grooved face) by coating controls expanding and shrinking to prevent Heat Cracks occurred.



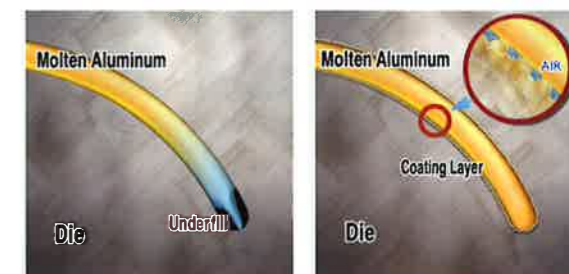
5. Maintain Liquid Flow and Underfill Prevention

Non-Coating

Underfill is occurred in product when molten Al contacts cooled die surface and cooling down to reduce liquid flow.

Coating

Insulation effects of Intercalated minute air in slight roughness die surface (tungued and grooved face) by coating keeps liquid temperature and flow to prevent Underfill occurred.



6. Control Flow Direction and Liquid Flow Line Prevention

Non-Coating

Liquid flows along die design and is occurred Flow Line at cold shut.

Coating

Coating with certain degree of surface roughness at cold shut controls flow directions uniformly to prevent Flow Line by its turbulence.

