The Difference Between Know-How and Know-Why on a TiAl Application

Feinguss Blank GmbH
Feinguss Blank USA, Inc.
Structure

- Business Group Blank Overview
- Digital Twin
- Part Design
- Pros and cons for TiAl
- Requirements for TiAl
- Know Why Behind TiAl Castings
- Summary
Feinguss Blank GmbH Location
Feinguss Blank GmbH Location
Sales Classification

Sales by Market Segment
- Automotive (68%)
- Mechanical Engineering (20%)
- Automation (3%)
- Energy Technology (2%)
- Medical Technology (2%)
- Food & Packaging Technology (2%)

Sales by Alloy Type
- Steel (68%)
- Super Alloys - Vacuum Casting (30%)
- Aluminum Alloys (2%)
- Copper Alloys (0.3%)
Feinguss Blank: Systems Supplier

Investment Casting

Machining

Assembly

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Innovation: The Blank-ID

- All-time identification
- Complete traceability
- Unique technology
- Full plagiarism protection
Innovation: Digital Twin

Know-how

Digital Twin

Know-why

Alloy Simulation

Casting and Solidification Simulation

Topological Optimization

Product and Process FEM

Traceability

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Innovation: Digital Twin

Speed

Money

Know-why

Quality

Partnership
PROS AND CONS FOR TITANIUM ALUMINIDES (TiAl)
Advantages of TiAl
- Lightweight
- Heat Resistant
- Good Strength
- Less Inertia
- More Power
- Less Emissions

Disadvantages of TiAl
- Expensive
- Difficult to Cast
- Difficult to Machine
- Not Weldable
Uses of TiAl

Source: www.Wikipedia.de #F22Raptor#

Source: www.ge.com #GEnx#

Source: www.autoferrari.com #458#
REQUIREMENTS FOR TiAl
Wax

- Ash Content
- Drop Point
- Melt Point
- Expansion
- Filler Content
- Viscosity
- Strength
- Penetration
Ceramic

- Yttria / binder without SiO2 (Reactions)
- Aluminum oxide / Silica
- Aluminum silicate / Silica

- Yttria Price $68.00/LBS
- Alumina Price $1.30/LBS
Cast

Time [s]: 360.100
Temperature [°C]

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KNOW WHY BEHIND TiAl CASTINGS
Wax

- Wax cleanliness is very important
- Use only low ash wax
Ceramic

- Completely dry layers are needed
- Ensure no voids or hollows are present
Ceramic II

- Use a separate line
- Cleanliness is paramount
- Use the most advanced materials
Cast

Every geometry has its individual „perfect“ rpm
Cast II

Every geometry has its individual "perfect" rpm

- Mistake
- Reactions
- Miss-runs
- Shell Temperature
- Correct Temperature

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SUMMARY
Summary

- Clean and proper wax
- Non-reactive ceramic
- Proofed dry time
- Separate line
- Identify exact cast parameters
Danke! Thank you!

- For more information, please visit our website, [http://www.feinguss-blank.de/en/home](http://www.feinguss-blank.de/en/home)

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