Four approaches for TiAl LPT-Blade production

1. LPT-Blade

4. approaches
Four approaches for TiAl LPT-Blade production

Image: GE9X

Low Pressure Turbine

Material: Titanium Aluminide

Thin long Blade Body

Shroud with fences and fins
Four approaches for TiAl LPT-Blade production

Starting point – raw material billets

how casting compares and contributes to each production route
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Starting point – raw material billets

how casting compares and contributes to each production route
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Starting point – raw material billets

how casting compares and contributes to each production route
LPT-Blades machined from a solid block

stable process and lean supply chain compared to alternative routes

reduced feed material due to optimized chill mould
LPT-Blades machined from a solid block

stable process and lean supply chain compared to alternative routes

reduced feed material due to optimized chill mould
Manufacturing Process

casting  fettling  machining

development  state of the art
LPT-Blades machined from a solid block

development of cast preform for machining

reduced feed material due to optimized chill mould
Manufacturing Process

casting  

fettling  
machining

development

state of the art
Isothermal forged LPT-Blades

highest mechanical properties compared to alternative routes

streamlined manufacturing process by pre-shaped cast blank
highest mechanical properties compared to alternative routes

streamlined manufacturing process by pre-shaped cast blank
Manufacturing Process

- Development
- Casting
- Fettling
- Isothermal Forging
- Machining

State of the art
Lowest buy-to-fly ratio compared to alternative routes

reduced feed material and machining costs due to “near net shape”
Lowest buy-to-fly ratio compared to alternative routes

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Lowest buy-to-fly ratio compared to alternative routes

reduced feed material and machining costs due to “near net shape”

Leicomet 5TP

Investment Cast LPT-Blades

Access e.V.
Manufacturing Process

- Development
- Shell manufacturing
- Casting
- Fettling
- Machining

State of the art
Electron Beam Melting LPT-Blades

highest recycling share compared to alternative routes

high geometric design freedom and economical from small quantities
Electron Beam Melting LPT-Blades

highest recycling share compared to alternative routes

high geometric design freedom and economical from small quantities*

Machine and Video content by ARCAM
Manufacturing Process

Electron Beam Melting  cleaning  machining
Four approaches for TiAl LPT-Blade production

- Machined
- Isothermal forged - TNM
- Investment cast
- EBM additive

Root section

Blade section
Microstructure of Finished Parts

- Microstructure of finished part in root section – TNM forged
- Microstructure of finished part in root section – EBM

150µm
Four approaches for TiAl LPT-Blade production

- MACHINED
- FORGED
- INVESTMENT CAST
- EBM
Four approaches for TiAl LPT-Blade production

Further information at Farnborough Air Show
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