



GKN POWDER METALLURGY

# Additive Manufacturing

From Rapid Prototyping to serial manufacturing  
Dr. Simon Höges | 31<sup>st</sup> of May 2016, Engine Expo



# Agenda



Introduction to GKN & Additive Manufacturing

Market overview

From Prototyping to serial production

# GKN Powder Metallurgy – The industry leader

## HOEGANAES

- Powder production -

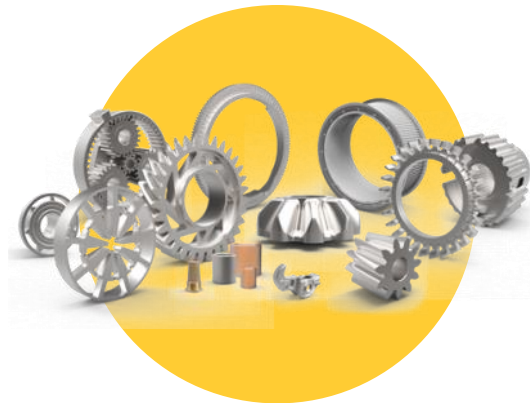


> 285,000 tons of powder per year

**25%**  
Global market share

## GKN SINTER METALS

- Component manufacture -



> 11 million parts produced daily

**18%**  
Global market share

## CUSTOMERS

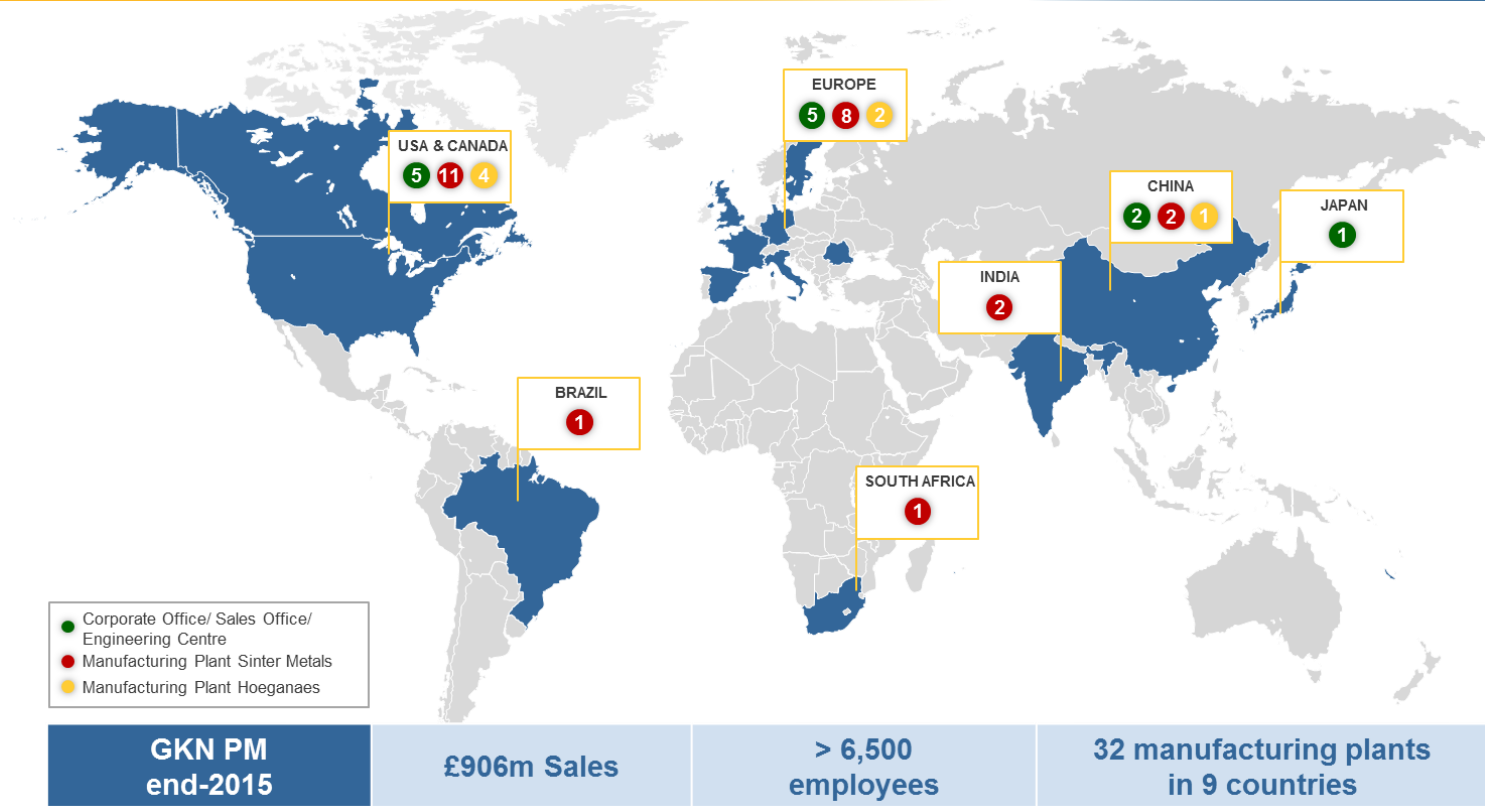
- Diverse customer base -



> 80% Automotive

**> 3,000**  
Customers globally

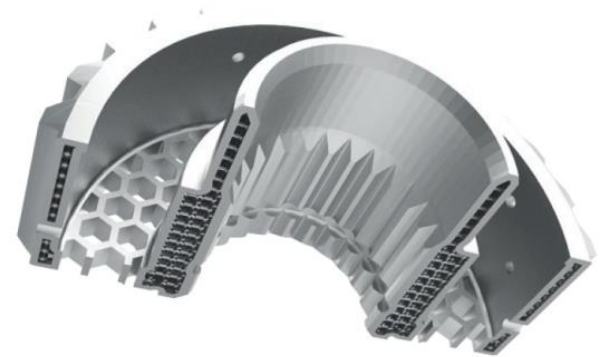
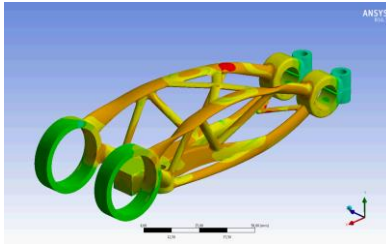
# GKN Powder Metallurgy – Global presence



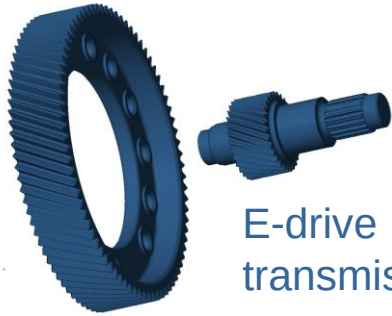
# Additive Manufacturing

# From Prototyping to serial production

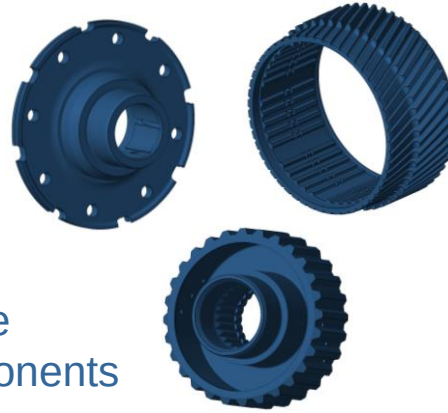
- **State of the art: Rapid Prototyping**
  - Use existing technology / machines to build prototypes
  - GKN materials: 316L, tool steel 1.2709
- **Future: Serial production**
  - Enhance value through Design for AM
  - Overcome economical challenges of AM



# AM Prototype production



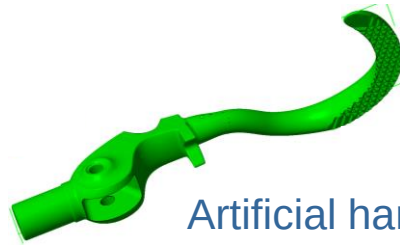
E-drive  
transmission



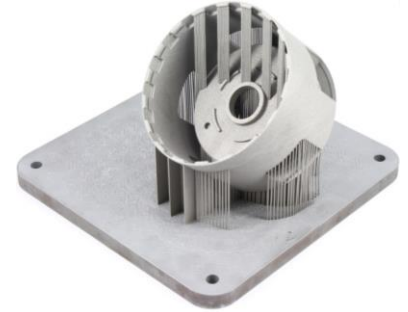
eDrive  
components



Individualised gear shaft  
component



Artificial hand



Automatic drive carrier

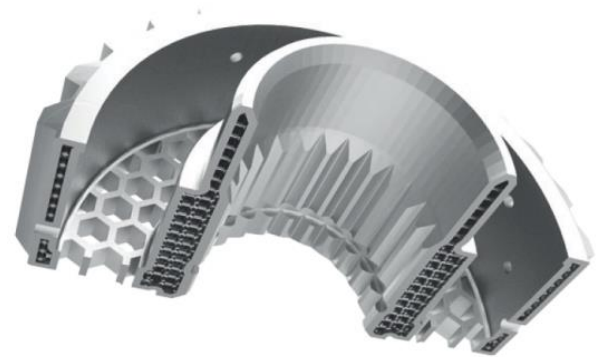
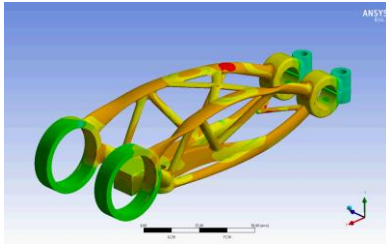


Racing piston



# From Prototyping to serial production

- **State of the art: Rapid Prototyping**
  - Use existing technology / machines to build prototypes
  - GKN materials: 316L, tool steel 1.2709
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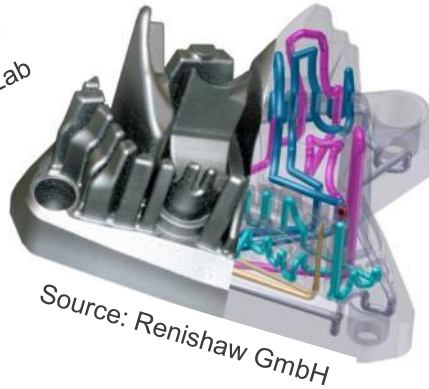
# Design for Additive Manufacturing

Bionic  
Design



Source: WithinLab

Internal  
structures

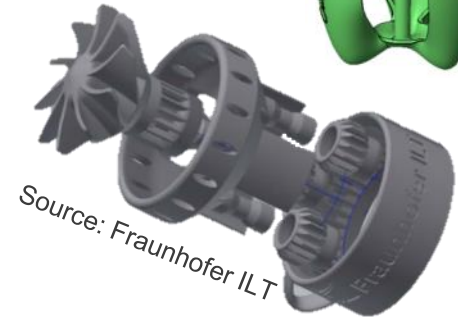


Source: Renishaw GmbH

Freeform

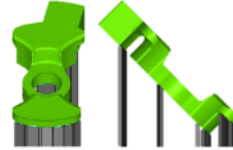
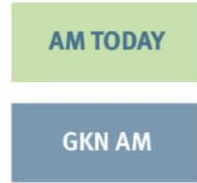
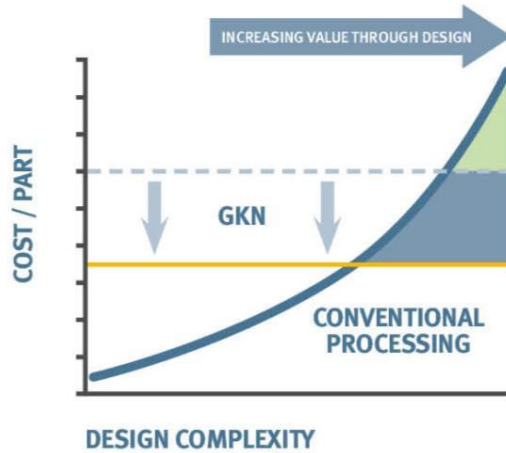


Monolithic  
Design

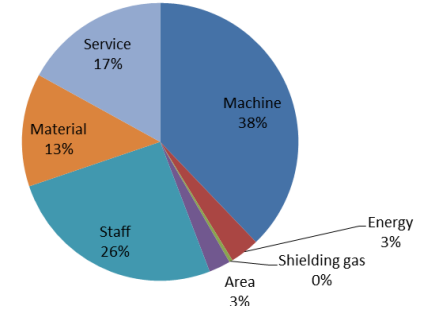


Source: Fraunhofer ILT

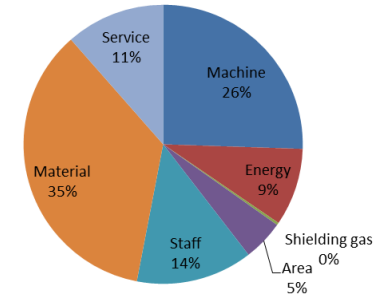
# Economic Additive Manufacturing



Today's AM part cost distribution

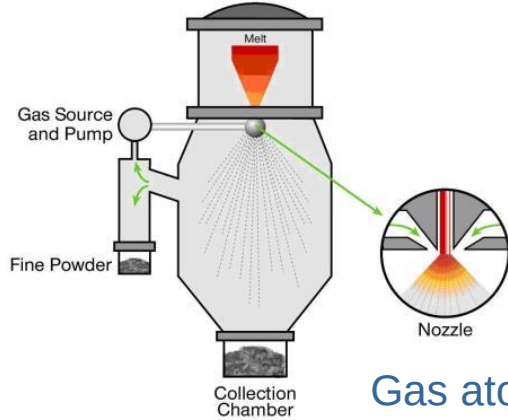


Tomorrow's AM part cost distribution

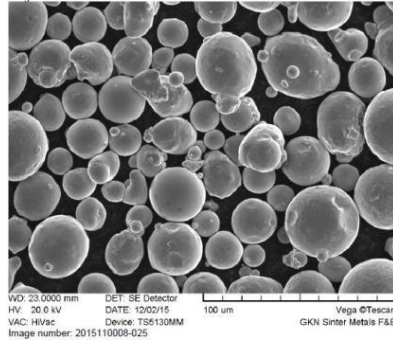


> **GKN: Material, Process, Machine**

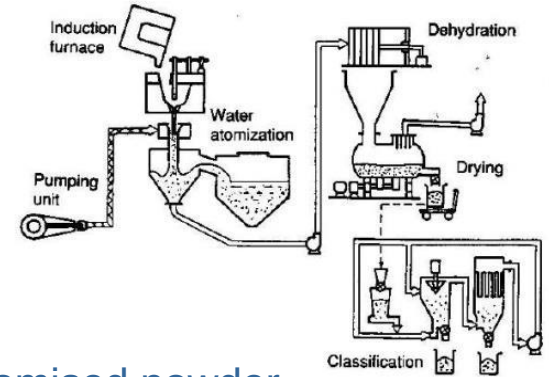
# Powder for Additive Manufacturing



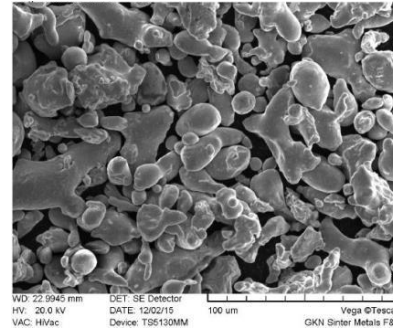
Gas atomised AM-powder



Gas atomising  
vs.  
Water atomising  
of metal powder



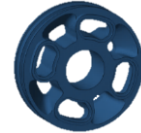
AM water atomised powder



# Potential application in AM series production

Prototypes

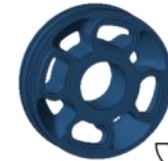
Smallest series for racing



200 parts / year

Medium scale series 1,000 – 50,000 parts/year

- > Weight reduction → Comfort
- > Height reduction → compact system



-75 % Gewicht

-80 % Höhe



Large scale production



1-2 Mio. parts / year

Thank you for your kind attention!

Questions?

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