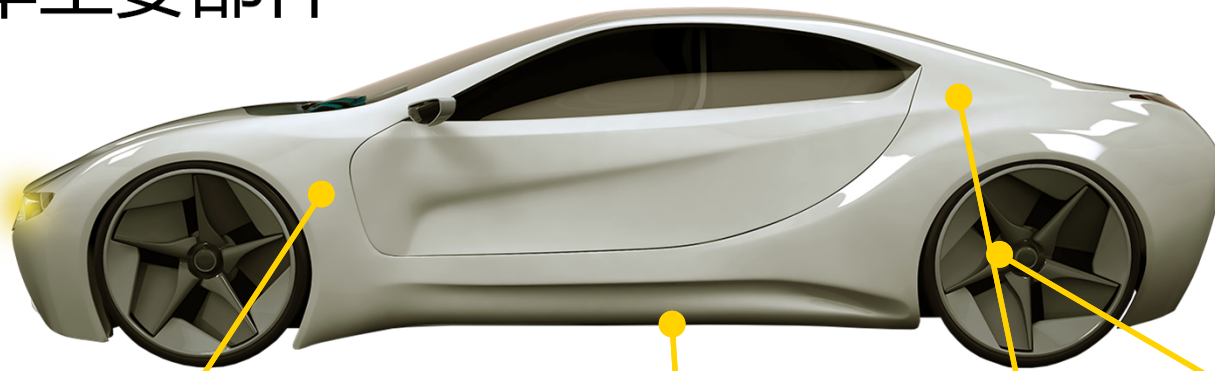


# 新能源汽车部件加工解决方案

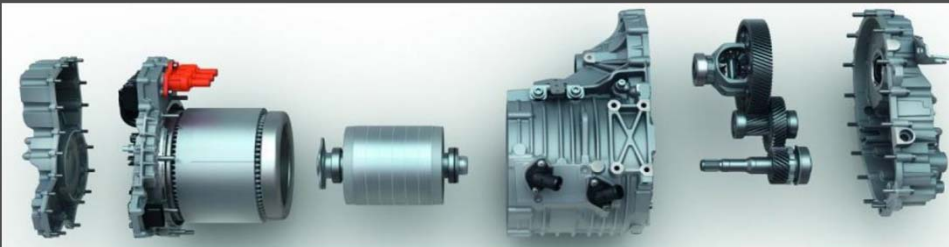
肯纳金属  
Kennametal



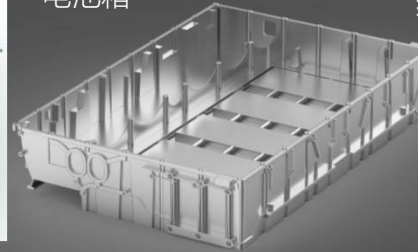
# Main Components of Electric Vehicles 电动汽车主要部件



Stator Housing & Transmission Case  
电机壳和变速箱壳体



Battery Housing  
电池箱



Structural Components  
结构组件



Traditional Components  
传统组件  
such as例如

- Differential 差速器
- Gears 齿轮
- Axles 轴类
- CV Joint 万向节
- Brakes 刹车组件
- Drive Train 传动组件

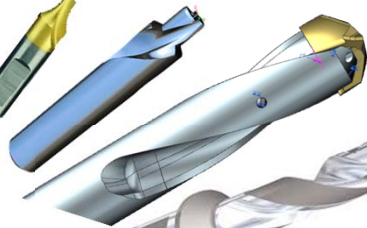
# Rotor & Gear Shaft 转子轴和齿轮轴

STEEL 钢

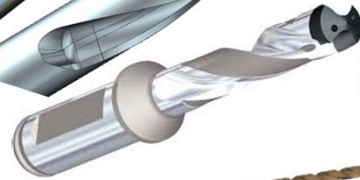
**Pilot 引导钻**  
(Catalogue)



**Cross Holes 定制孔刀具**  
60207985



**KSEM Modular Drilling 模块式  
钻削**  
(Catalogue)



**KenTIP FS**  
(Catalogue)



**Deephole Drilling 深孔钻削**  
(Catalogue)

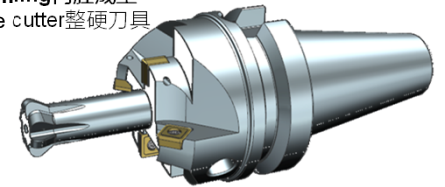
**External Turning 外圆加工刀具**  
(MM 1023224)



**Internal Turning 内孔镗销刀具**  
(60697886)



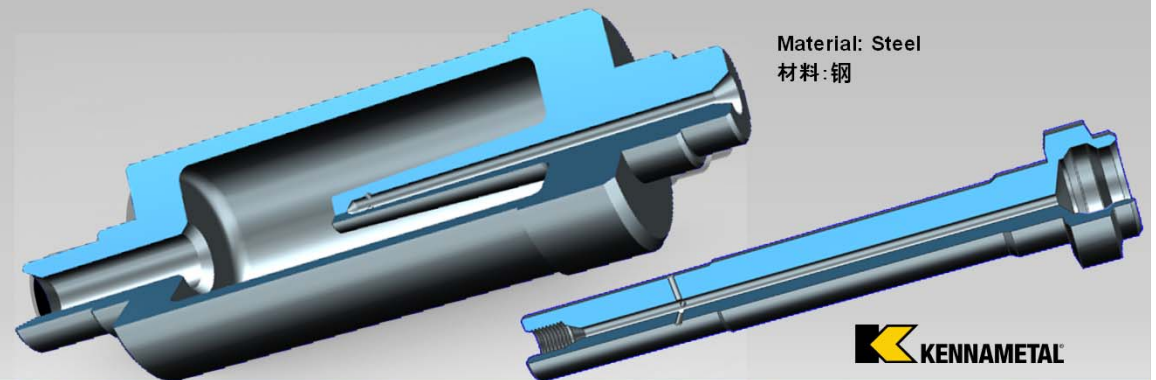
**Internal Profiling 内腔成型**  
Solid carbide cutter 整硬刀具  
(61541997)



**Cut to Length 两端面加工**  
KSSR / Dodeka  
(Catalogue)



## Examples of Standard & Modified Standard Tools 标准和定制刀具的范例

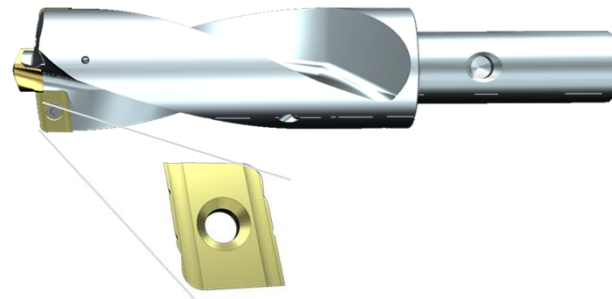
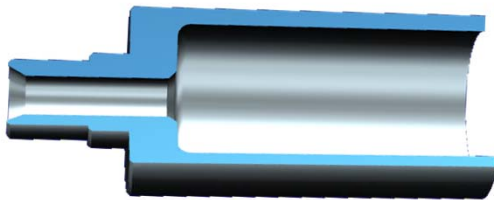
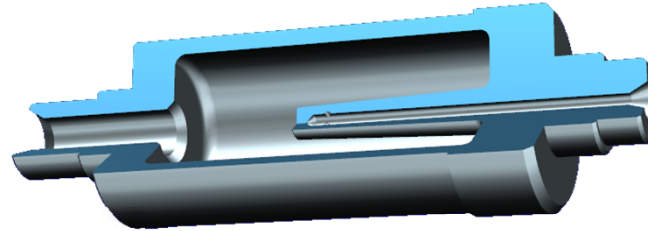


Material: Steel  
材料: 钢

# Rotor & Gear Shaft 转子轴和齿轮轴

STEEL钢

材料: 42 CrMo4



KSEM 模块化钻头

Cutting Conditions:

Vc:	173 m/min
F:	0,15 – 1,02
D/L	D50 / 120
Coolant:	Emulsion

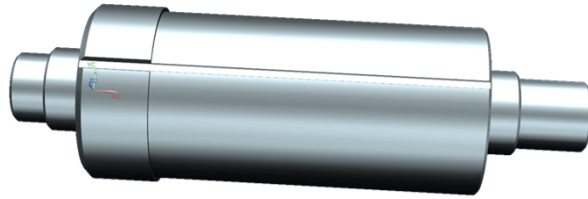
整体硬质合金深孔钻  
Catalogue: MM 5506111



Cutting Conditions:

Vc:	80-110 m/min
F:	0,15 – 0,25
L	D6/150
Coolant:	Emulsion

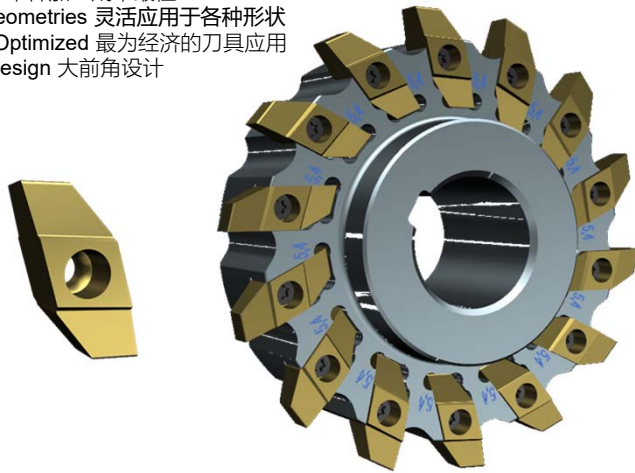
# Rotor & Gear Shaft 转子轴和齿轮轴



材料: 42 CrMo4

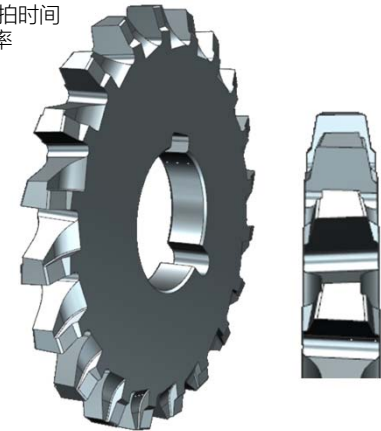
## Indexable Profile Cutter 可转位成形槽铣刀 (61297347)

Tool 刀具尺寸: D=80 / z=14  
 CPP Optimized 单件加工成本最佳  
 Flexible with Geometries 灵活应用于各种形状  
 Lifecycle Cost Optimized 最为经济的刀具应用  
 High Positive Design 大前角设计



## Solid Carbide Profile Cutter (61170278) 硬质合金成形刀具

Tool: D=80 / z=20 刀具尺寸  
 Cross-Toothed 错齿结构  
 Max. Number of Teeth 最多有效齿  
 Cycle Time Optimized 最优化节拍时间  
 Frequency Optimized 最优化频率



## Stator Housing & Transmission Case 电机壳和变速箱壳



NON FERROUS  
非铁金属

### Material 加工材料:

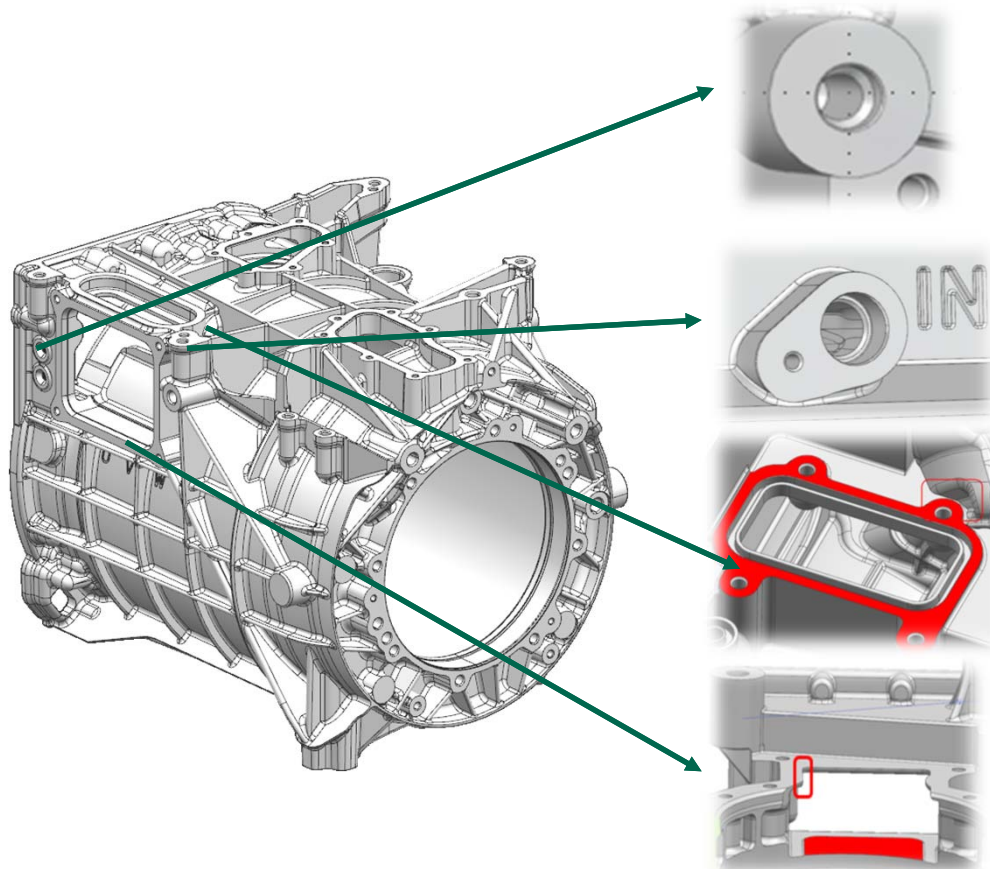
- Aluminum Alloys 铝合金  
e.g. AlSi7Mg0,3 / AlSi9Cu3(Fe) / AlSi10MgCu / AlSi12Cu / AlSi10MnMg
- occasionally steel for the bearing seat 轴承座偶尔用钢

### Challenges挑战:

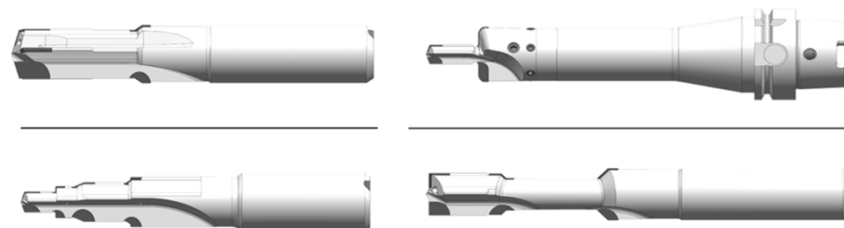
- Large diameters with IT 6 tolerance IT6级精度的大直径孔
- Geometric tolerances such as coaxiality and concentricity between main bore, bearing seat and case cover diameter 主轴孔、轴承座和端盖定位孔之间的同轴度等形位公差
- Simultaneous machining of material combinations (e.g. aluminum housing vs. steel bearing seats) 同时加工不同材料 (例如铝外壳与钢轴承座)
- Thin wall thickness is susceptible to vibration 薄壁易受振动影响
- Lightweight design of tools 刀具的轻量化设计
  - Manual as well as automatic tool changer handling 手动和自动换刀操作
  - Tilting moment 换刀扭矩
  - Vibration avoidance 避免振动
  - Moment of inertia (acceleration / deceleration time and power consumption of machine) 转动惯量 (加减速时间和机床功耗)
  - reduced wear of machine components 减少机床部件的磨损
- Temperature expansion requires optimized coolant flow and adjustable tools 温度提升会影响加工尺精度, 需要优化的冷却液流向和刀具可调整

# Stator Housing & Transmission Case 电机壳和变速箱壳

NON FERROUS  
非铁金属



PCD Drilling, Reaming & Milling PCD定制钻削, 铰削和铣削应用  
Application-Oriented Custom Solutions



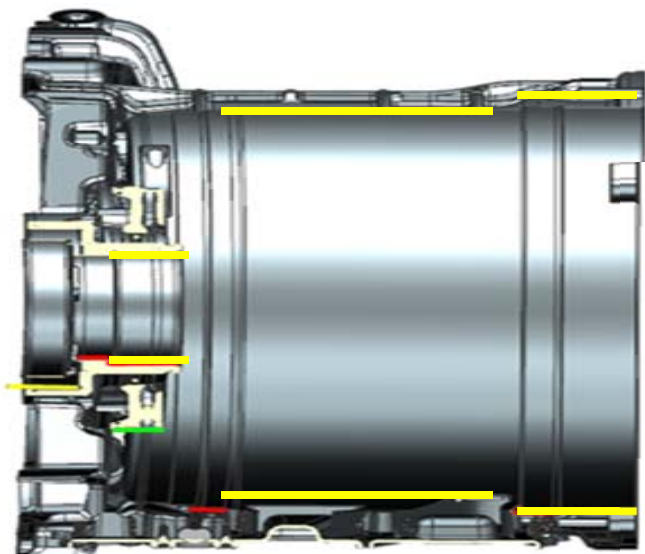
PCD – Solid Carbide End Mill PCD 铣刀  
for Special Milling Operations 用于特殊的铣削加工



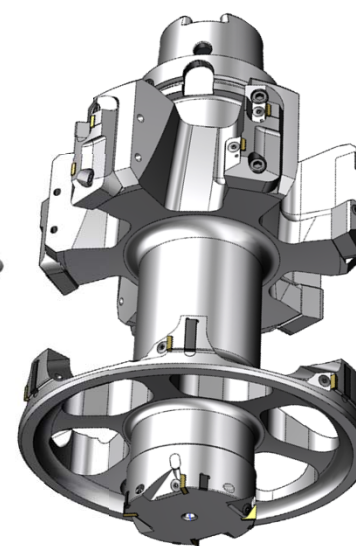
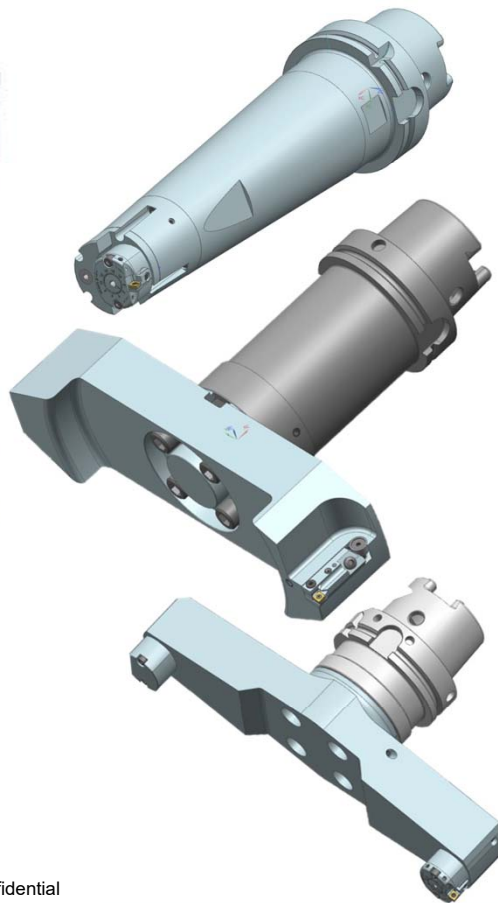
- Reduced shank diameter 减小刀杆直径
- Helical or straight fluted 螺旋或直槽刃口设计
- Center cutting 刃口过中心

# Stator Housing & Transmission Case

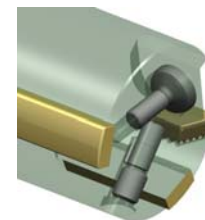
## 电机壳和变速箱壳



- Typical Tolerances 公差 ~ IT6 Quality
- Typical Surface Quality 表面要求 ~ Rz 6.3  $\mu\text{m}$
- Typical Cylindricity 圆柱度 ~ 0.01 to 0.025 mm
- Typical Roundness 圆度 ~ 0.01 mm
- Typical Concentricity 同心度 ~ 0.02 to 0.05 mm
- Large Diameters 加工直径 typically > 200 mm
- Great Depth 轴向悬伸 typically > 200 mm



重量22Kg  
换刀扭矩24.6Nm



重量10.6Kg  
换刀扭矩12.9Nm

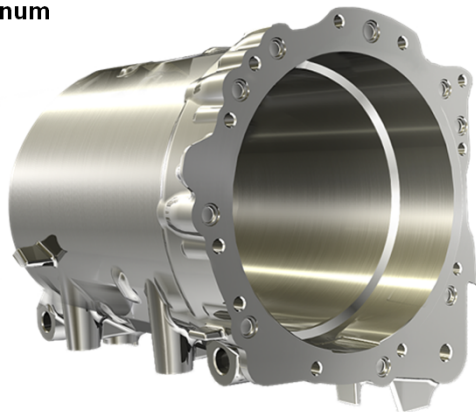


# Stator Housing & Transmission Case

## 电机壳和变速箱壳

NON FERROUS  
非铁金属

**Material: Aluminum**  
材料: 铝合金



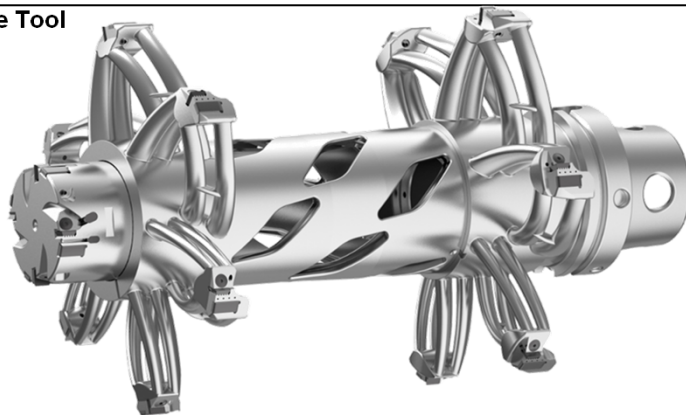
**Rotor Bearing Seat / Stator Seat / Case Cover Seat** 转子轴承座/电机孔/箱盖孔  
**Machining process:** Finishing Statorhole / Bearing bush

- Workpiece material: AlSi7Mg(Cu) – C60
- Coolant: wet
- Stock amount: 0,3mm

**Process data:**

- Cutting Speed: 600 m/min
- Feed/tooth: 0,15 mm
- Teeth: 4/6/6
- Diameter: D68/D220/D234

**ALM Stator Bore Tool**  
ALM电机孔刀具

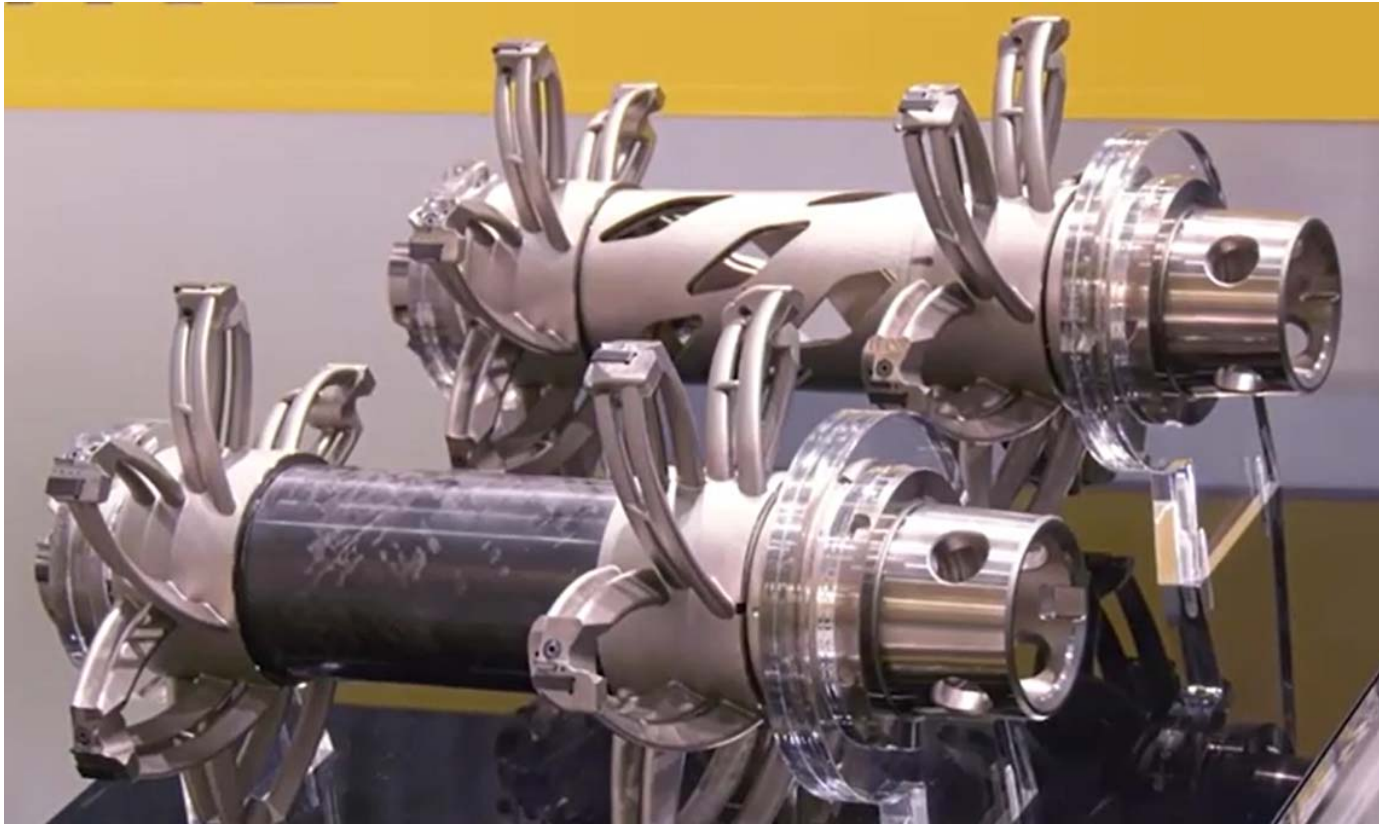


**Additively Manufactured Tool (Drawing No. 61568575)** 增材加工制造刀具

- Weight限重: 10,6 kg
- Tilting Moment换刀扭矩: 12,9 Nm (Gripper Slot)
- Moment of Inertia转动惯量: 0.02563185003 kg/m<sup>2</sup>
- Adjusting system可调系统: RIQ inserts with damping pads  
带支撑导条的RIQ刀片系统

- Allows use on smaller machines允许在较小的机床上使用
- Allows faster acceleration / deceleration允许主轴更快的加速/减速
- Less energy consumption in use在用能耗低
- Less wear of machine components减少机床部件的磨损
- Easy handling操作简单

# Stator Housing & Transmission Case 电机壳和变速箱壳

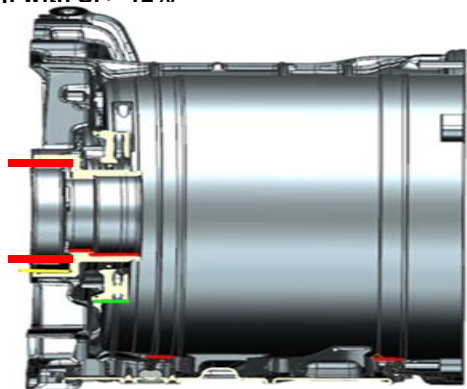


# Stator Housing & Transmission Case 电机壳和变速箱壳

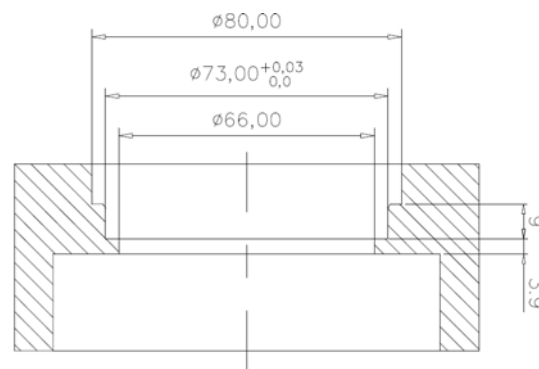
NON FERROUS  
非铁金属

Material: Aluminum with Si > 12%

材料: 铝合金

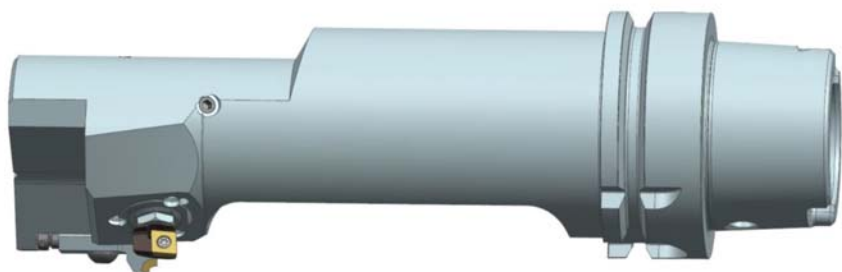


Requirements 加工需求



Picture of tool

刀具示意图

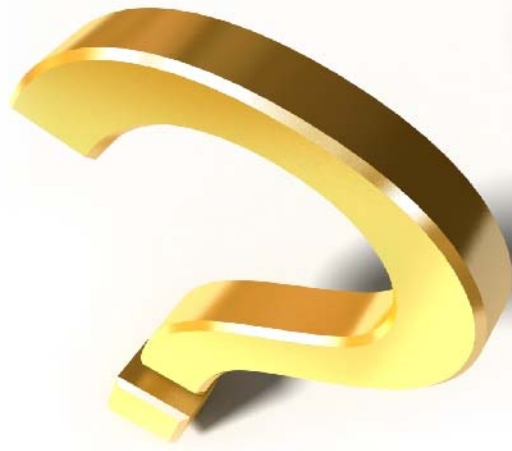


Backward Fine-Machining 反精镗加工

- Long Reach 加工大长径比
- Internal Coolant 内冷设计
- Balanced by design 平衡设计

# 提问

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AUTOMOTIVE