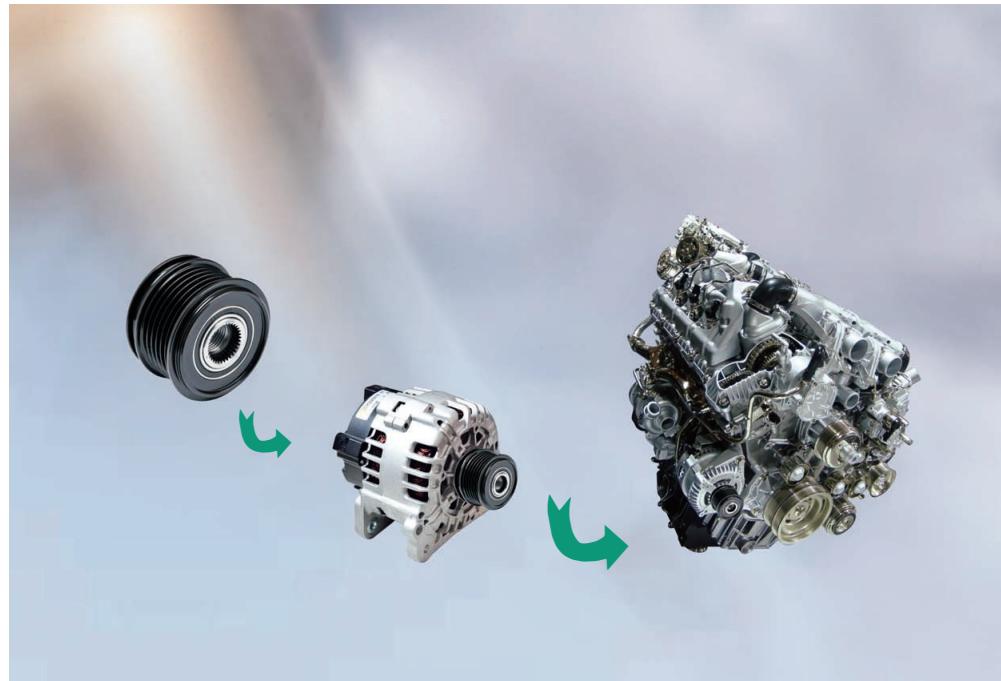


汽车发电机单向皮带轮 Overrunning Alternator Pulley(OAP)



HeFei LuKin Auto Parts Co., Ltd.

2018.1

- ◆ Brief Introduction
- ◆ OAP function and application
- ◆ Design and verification of LUKIN OAP
- ◆ Application and Advantages of LUKIN OAP

公司介绍

Brief Introduction

Hefei LuKin Auto Parts Co., Ltd.

- 专业的单向皮带轮生产商
Professional OAP manufacturer
- 研发、生产、销售一体
Development, manufacture and sales



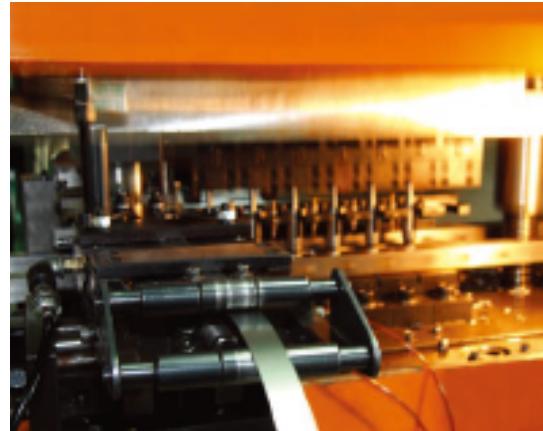
Testing Equipment



Testing Equipment



Inspection Equipment



Production Equipment



Production Equipment

公司介绍

Brief Introduction

Hefei LuKin Auto Parts Co., Ltd.

- 独立的加工车间和无尘装配车间
Independent machining factory and clean assemble workshop
- 每月15000-20,000套向全球售后市场供应
Supplied to global aftermarket with monthly volume 15,000-20,000 pcs
- 2017年底， OAP累计销售50,0000套
Until the end of 2017, the total volume of OAP is 50,0000 pcs



公司介绍

Brief Introduction

Hefei LuKin Auto Parts Co., Ltd.

- 严格的质量管理体系
Strict quality management system
- ISO 9001/14001/TS16949
- 质量方针
Quality policy



质量为本 诚信服务
持续改进 客户满意

Quality first and best service



公司介绍

Brief Introduction

Hefei LuKin Auto Parts Co., Ltd.

- 专业的研发、销售及服务团队
Great development, sales and service system
- 自主知识产权及产品专利
Intellectual property owner and patented product
- 产品开发及试验验证能力
Capability of development and verification



OAP的工作原理

Function of OAP

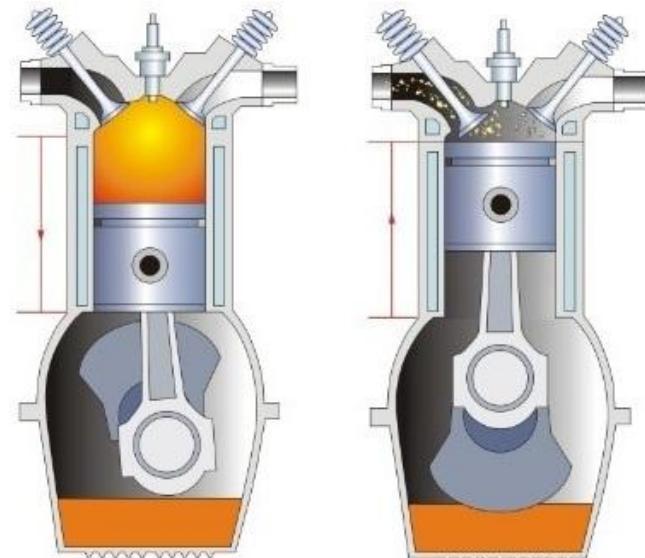
Hefei LuKin Auto Parts Co., Ltd.

- 较大的曲轴角振动
Excessive C/S Angular Vibration
- 角振动传递到附件系统并放大
Transmission and Enlarge of Angular Vibration to all accessories

恶劣的影响

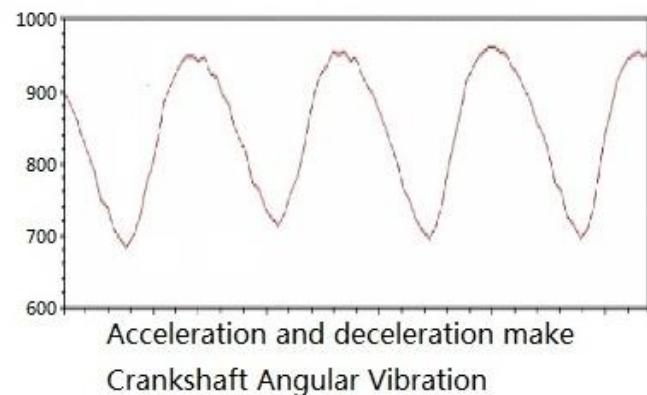
Bad influence

- ➔ 皮带打滑及抖动
Dynamic belt slip and span vibration
- ➔ 张紧器的过渡振动
Excessive tensioner vibration
- ➔ 恶劣的NVH性能
Poor NVH performance



Ignition causes acceleration

Compression causes deceleration

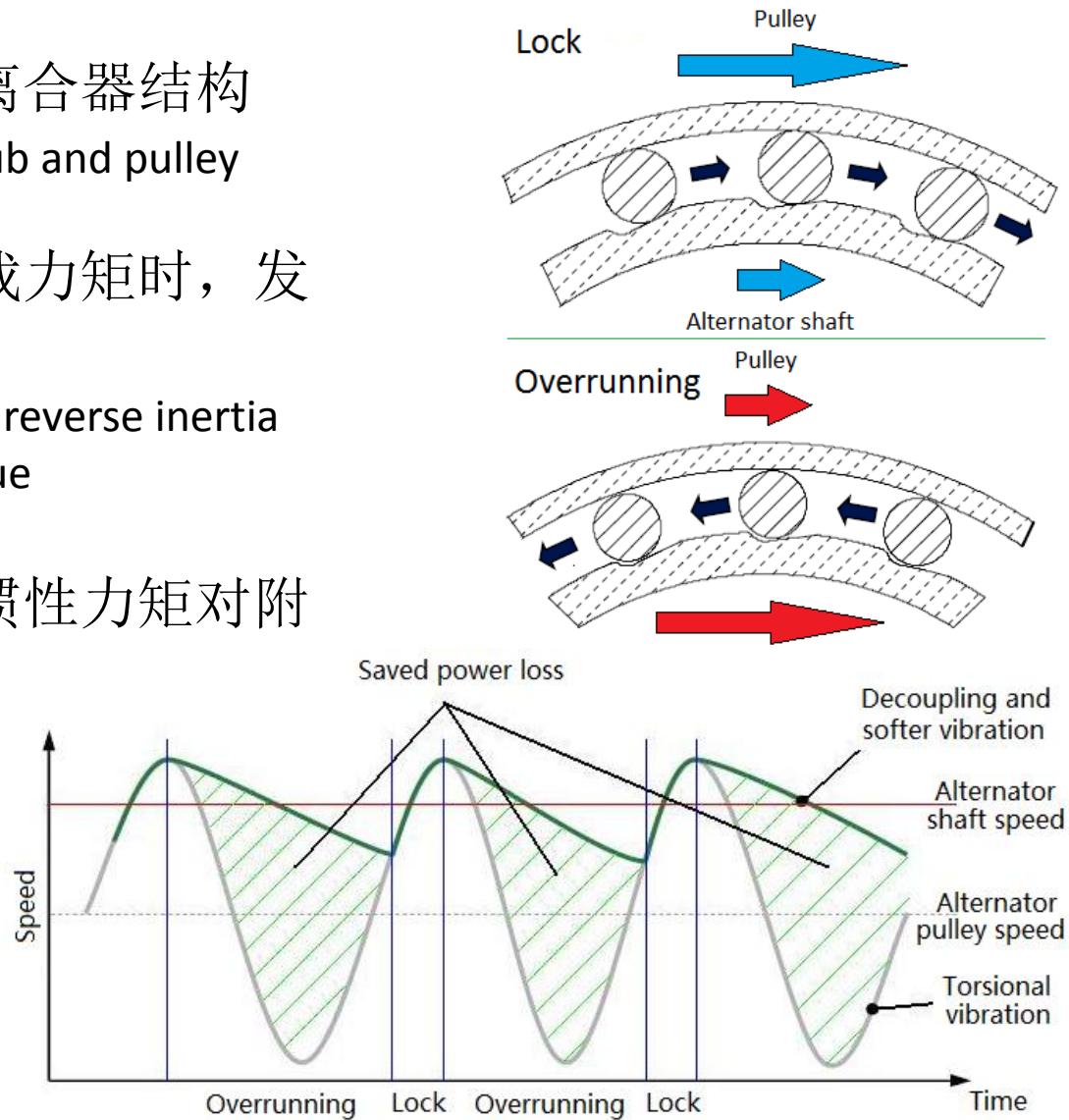


OAP的工作原理

Function of OAP

Hefei LuKin Auto Parts Co., Ltd.

- 皮带轮内部具有单向离合器结构
One-Way Clutch between hub and pulley
- 反向惯性力矩大于负载力矩时，发电机被解耦
Alternator decoupling when reverse inertia torque is higher than load torque
- 解耦前，发电机的高惯性力矩对附件系统影响最大
Highest inertia moment of alternator is major reason for these bad influence.

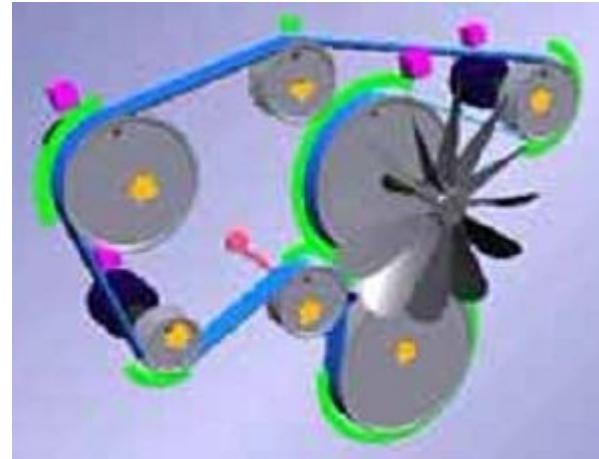


OAP的作用

Summary of the benefits

Hefei LuKin Auto Parts Co., Ltd.

- ↗ 降低了皮带的张力及抖动
Reduced vibrations and force level
- ↗ 降低了张紧器的张力及摆幅
Reduced forces and movement of tensioner
- ↗ 提升了附件系统的寿命
Extended system life
- ↗ 提升了NVH性能
Improved NVH performance
- ↗ 降低了油耗及排放
Reduced consumption and emissions



OAP的应用

Application of OAP

Hefei LuKin Auto Parts Co., Ltd.

⊕ 柴油机及缸内直喷的汽油机

Diesel engines or Gasoline Direct Injection (GDI) engines

⊕ 匹配了高换挡冲击的自动变速箱

Automatic transmissions with high gear shift impulse

⊕ 配备了高转动惯量的发电机

Alternators with high inertia moment

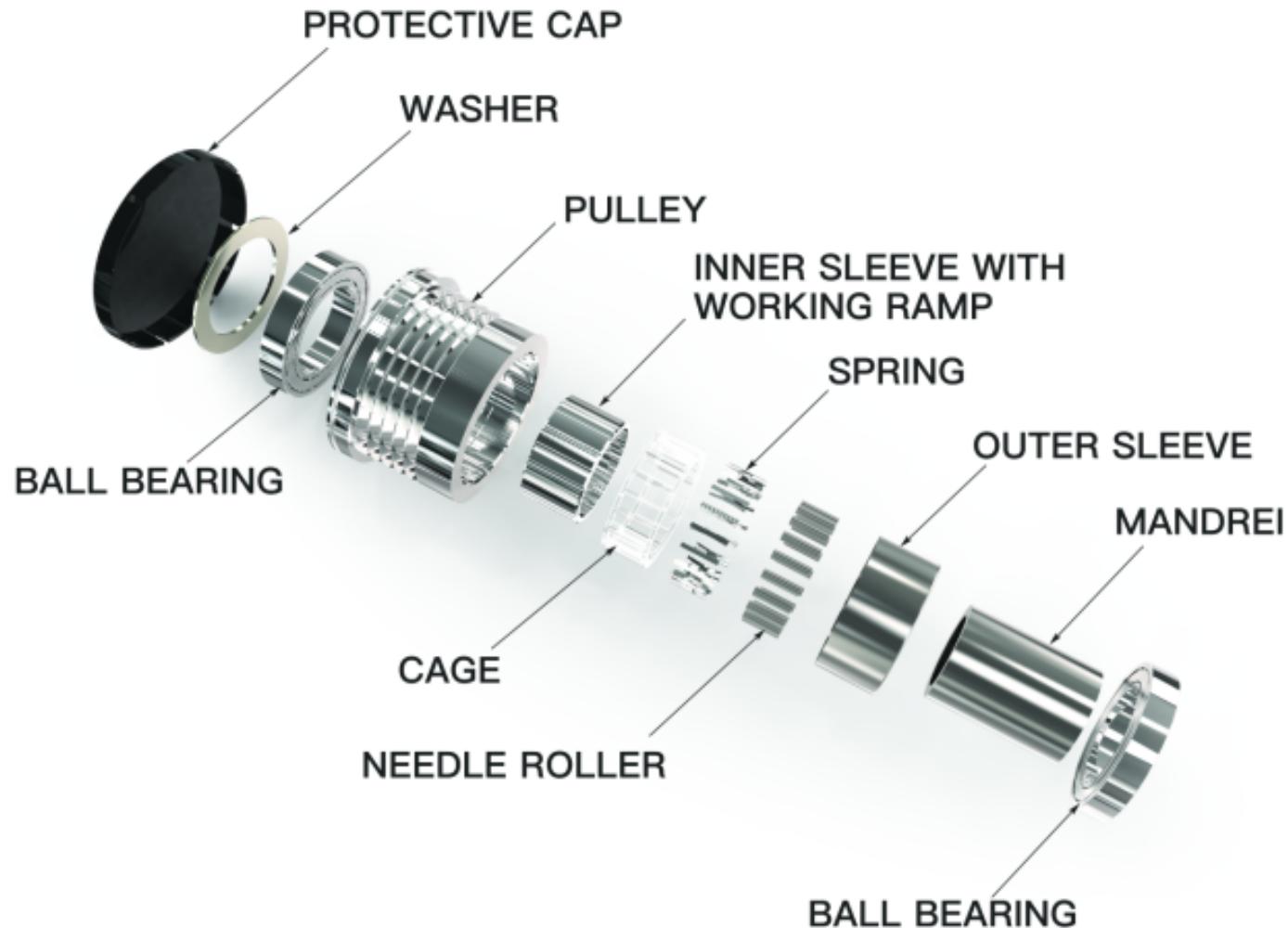
⊕ 应用双质量飞轮技术

Use of a dual mass flywheel

⊕ 停缸技术或均质压燃汽油机

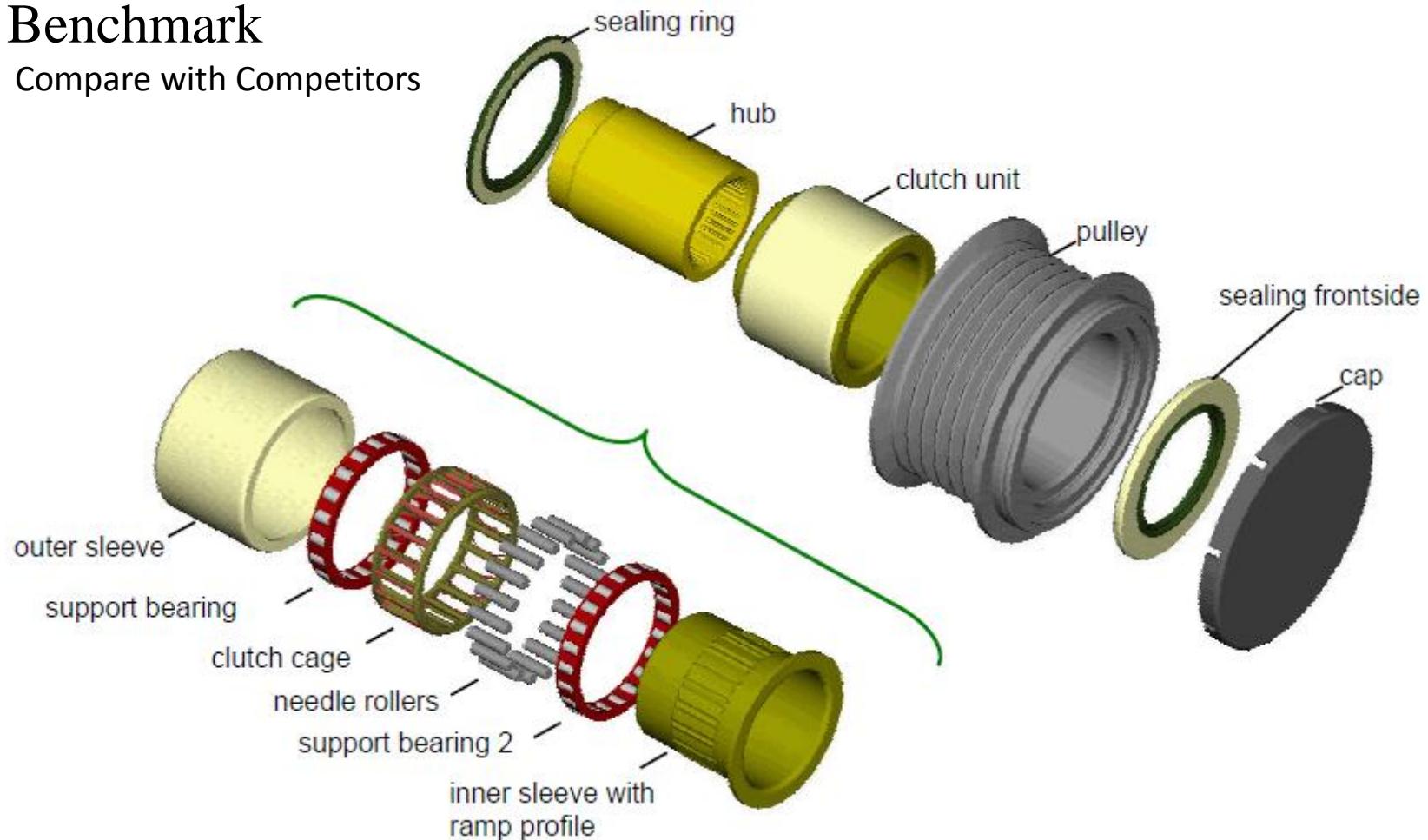
Engines with cylinder bank shut-off or HCCI engine





Benchmark

Compare with Competitors



优势

Advantages

Hefei LuKin Auto Parts Co., Ltd.

单向轴承 OWC bearing

⊕ 设计寿命 240,000km

Target life 240,000km

⊕ 日本进口协同ET-K润滑脂
Japanese Kyodoyushi ET-K grease

⊕ 最大松脱力矩0.2Nm

Max static loose torque 0.2Nm

⊕ 额定扭矩 90Nm

Rating torque 90Nm

⊕ 许用转速22000rpm

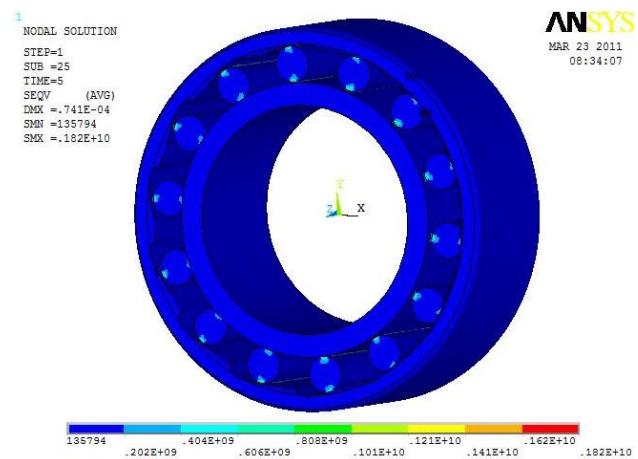
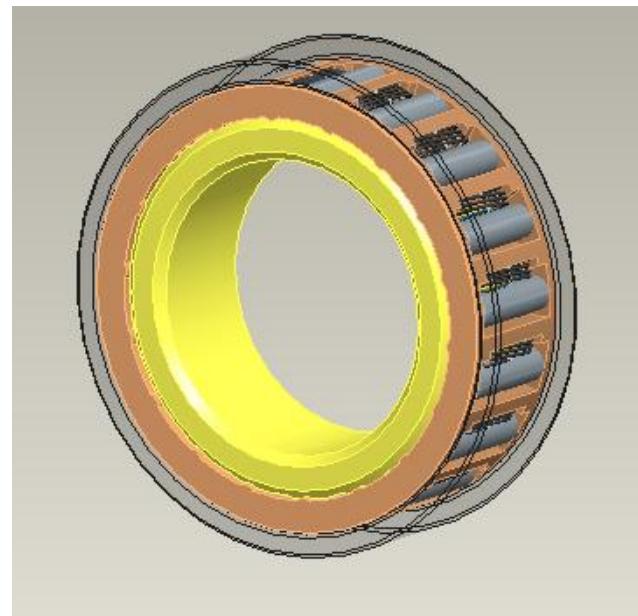
Max pulley speed 22000rpm

⊕ 许用温度-30 — +110 °C

短期峰值温度 -40 — +140 °C

Rating temperature -30 — +110 °C

Peak values -40 — +140 °C for a short time



优势

Advantages

Hefei LuKin Auto Parts Co., Ltd.

星轮 Inner ring with ramp

- 优质GCr15轴承钢材
Special bearing steel GCr15

- 冷挤压成型
Cold extrusion

- 整体淬火，硬度HRC62-65
Completely harden to HRC62-65

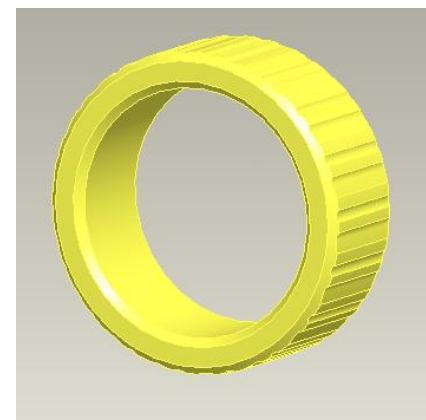
- 极佳的韧性和耐磨性
Best toughness and abrasion performance

✖ 薄壁冲压应力应变较大，材料容易出现内部缺陷

Internal defect is easy formed after stamping

✖ 仅表面渗碳变硬，耐磨性差
Surface harden with poor abrasion performance

✖ 变形量大，精度差
Big deformation and low accuracy



优势

Advantages

Hefei LuKin Auto Parts Co., Ltd.

外圈 Outer ring

→ 优质GCr15轴承钢材

Special bearing steel GCr15

→ 高精度磨削

Granding with high accuracy

→ 整体淬火，硬度HRC61-64

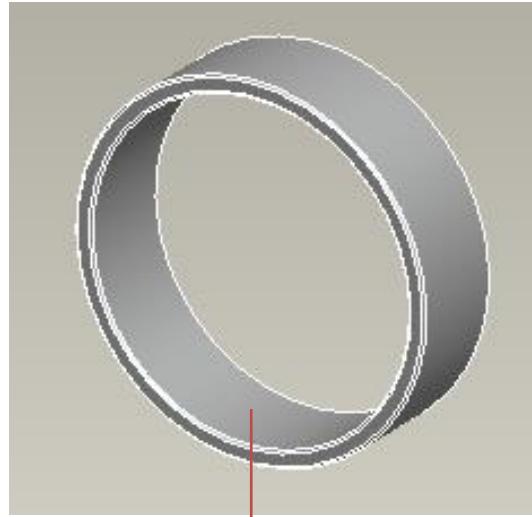
Completely harden to HRC61-64

→ 极佳的表面质量

Best surface integrity

→ 极佳的韧性及耐磨性

Best toughness and abrasion performance



◎ 工作面粗糙度低于Ra0.2

Roughness of work surface is no more than Ra0.2

◎ 低滚动阻力和摩擦

Low rolling resistance and friction

优势

Advantages

Hefei LuKin Auto Parts Co., Ltd.

支撑轴承 Support bearing

→ 人本61905-2RSL特殊定制轴承

Special C&U 61905-2RSL bearing

→ 特殊加严的高温密封件

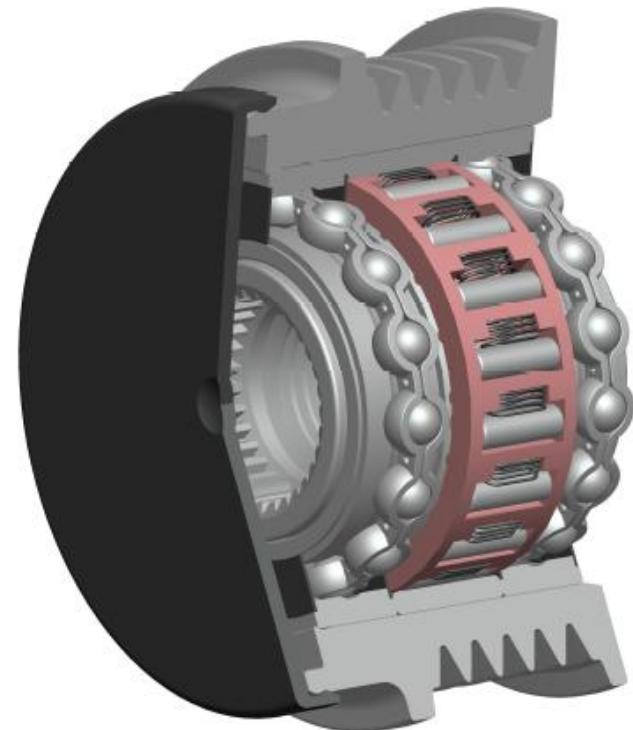
Special seals of support bearing

→ 德国进口高温轴承润滑脂

Germany high temperature grease

→ 支撑轴承与单向轴承完全独立密封

Separated space for each bearing



优势

Advantages

Hefei LuKin Auto Parts Co., Ltd.

装配 Assembly

- ◆ 采用专门设计的工装，可以实现皮带轮的一次压装完毕

Only one step to assemble the OAP
with fixture special design

- ◆ 节约时间及人力成本

Save time and cost

✖ INA皮带轮需压装3次

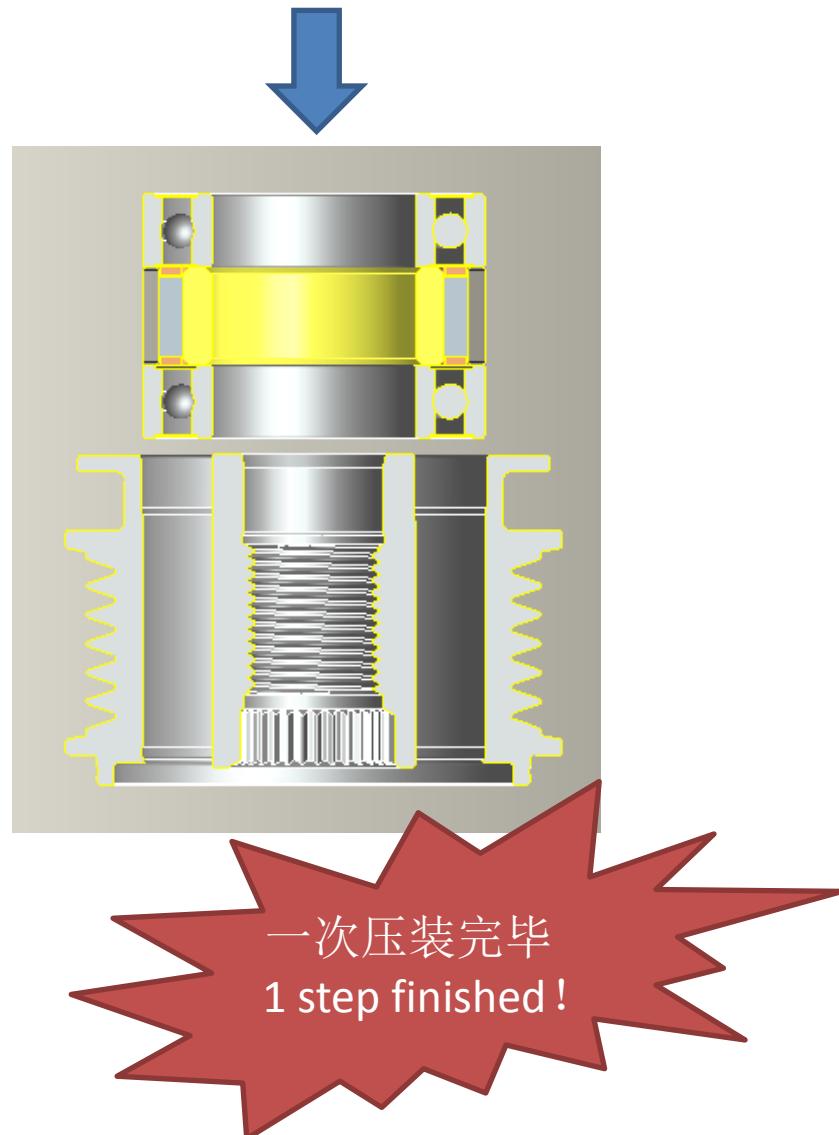
At least 3 step to assemble the OAP with C&U
OWC bearing

✖ 压装过程对压力、工装精度要求高

High requirement with equipment and fixture

✖ 配合尺寸精度要求高

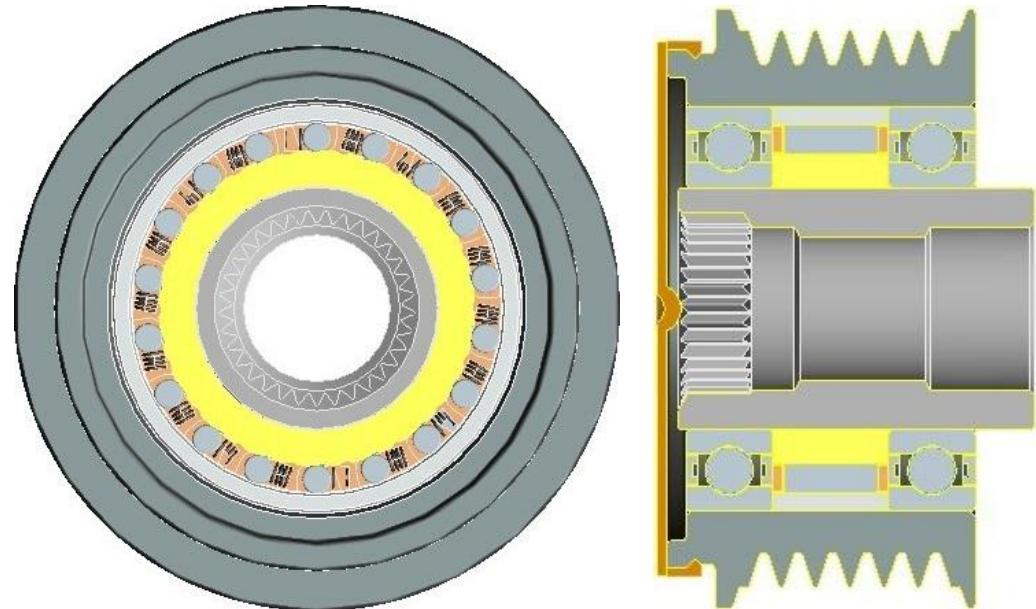
High fit precision of hub and pulley



- 设计指标

Design specifications

- ✓ 额定扭矩: 90 Nm
Rated torque
- ✓ 许用温度: -40 ~ 140 °C
Rated temperature
- ✓ 许用转速: 22,000 rpm
Max pulley speed
- ✓ 松脱力矩: Max 0.5Nm
Loosen torque
- ✓ 不平衡量: Max 30 gmm
Imbalance
- ✓ 设计寿命: 240,000 km
Target life



试验验证

Experimental verification

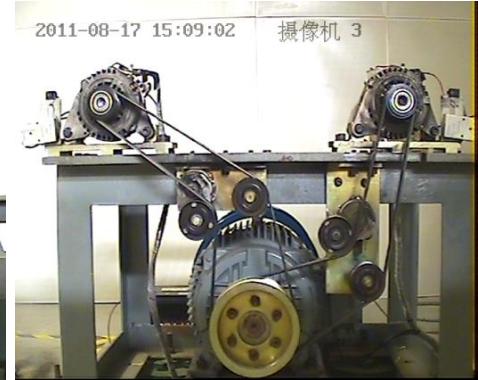
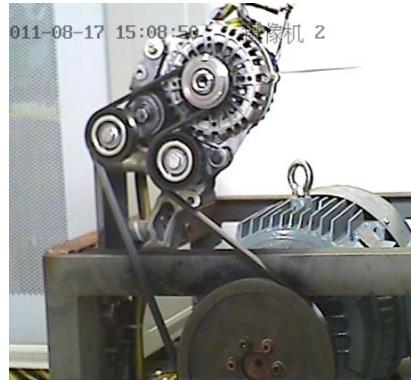
Hefei LuKin Auto Parts Co., Ltd.

- 台架试验

Simulation bench test

- ✓ 高温急变速负荷试验

High temperature speed vibration test



- ✓ 全速全负荷试验

Full load and speed test



- ✓ 低温启动试验

Cold start test at lower limit temperature

试验验证

Experimental verification

✓ 高温急变速负荷试验（法雷奥测试规格）

High temperature speed vibration test

环境温度 110° C

Ambient temperature

皮带张紧力 Min 1000 N

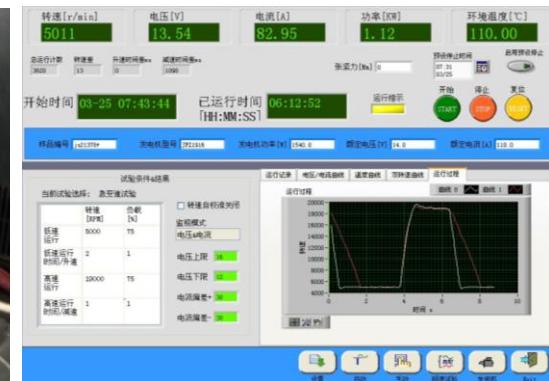
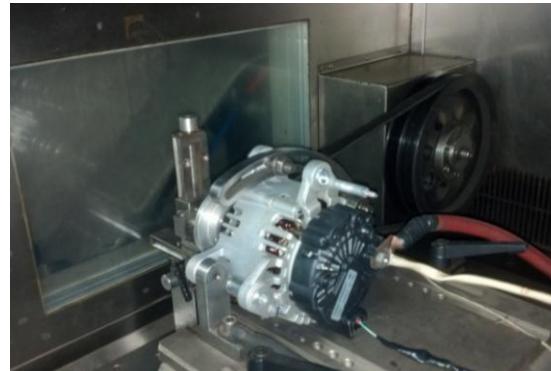
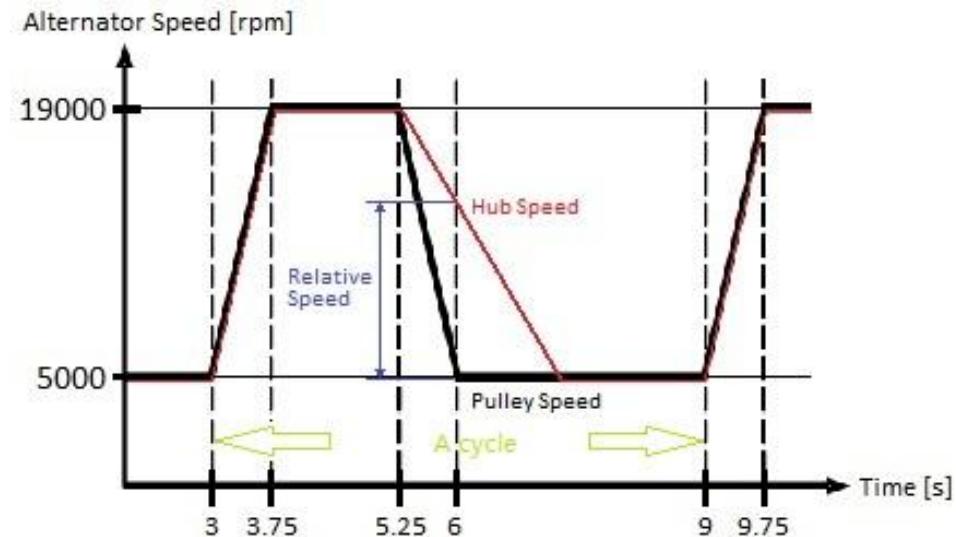
Radial load

发电机负载 82.5A

Alternator load

试验周期 160,000 cycles

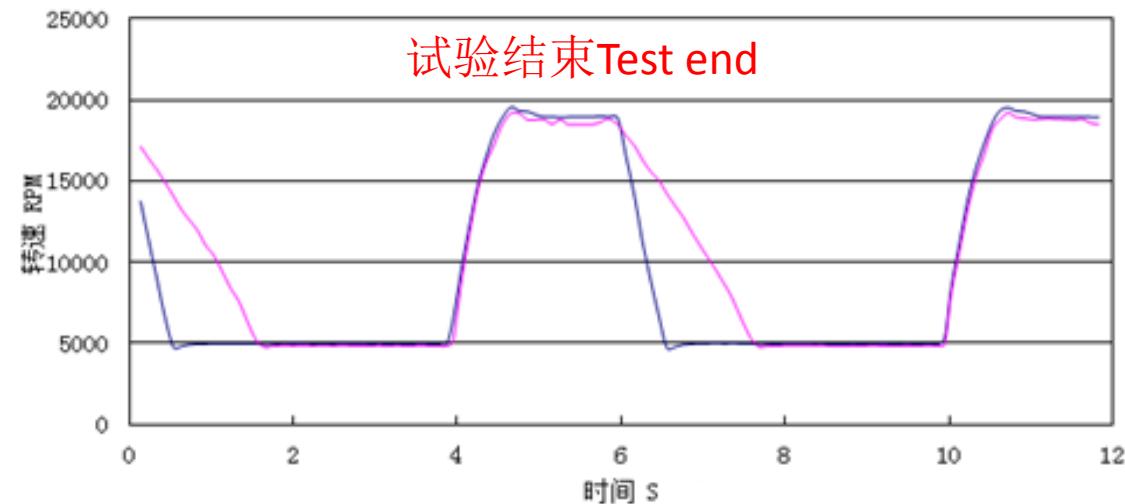
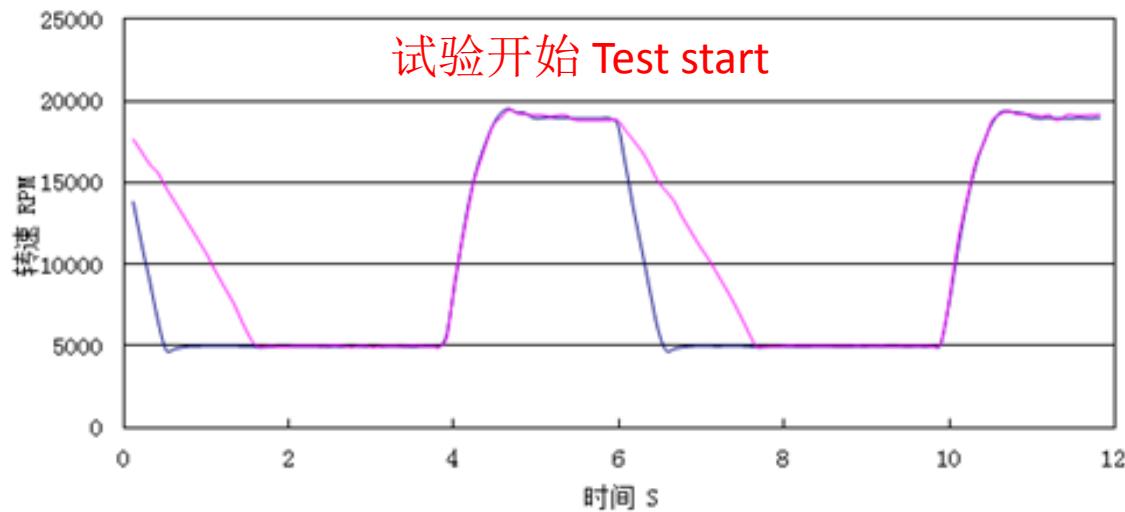
Test period



试验验证

Experimental verification

Hefei LuKin Auto Parts Co., Ltd.



试验验证

Experimental verification

Hefei LuKin Auto Parts Co., Ltd.

- 整车道路试验

Engine and vehicle test

- ✓ 出租车道路试验

Taxi road test

- ✓ 天津/丰田卡罗拉1.6/ 20台次/年

Toyota Corolla 1.6 gasoline in Tianjin, 20 cars per year

- ✓ 杭州/奇瑞新东方之子1.9D/ 10台次/年

Chery New Eastar in Hangzhou, 10 cars per year



试验验证

Experimental verification

Hefei LuKin Auto Parts Co., Ltd.

其他试验

Other test

✓ 皮带轮振动试验
Pulley vibration test

✓ 盐雾试验
Salt spray test

✓ 弹簧疲劳耐久试验
Durability test of spring

✓ 轴承漏脂、温升、防尘等试验
Bearing test

✓ Reach(EC)认证
Reach(EC) authentication



试验验证

Experimental verification

Hefei LuKin Auto Parts Co., Ltd.

- 其他整车试验

Other vehicle test

- ✓ 江铃陆风X8柴油版整车10万公里高环试验
100,000 km high speed road cycle test in JMC X8 Diesel
- ✓ 奇瑞东方之子1.9D柴油版8万公里道路试验
80,000km road test in Chery Eastar 1.9 Diesel
- ✓ 开瑞优优1.0D柴油版性能对比试验
Performance test compare with INA in Karry Yoyo 1.0 Diesel



试验验证

Experimental verification

Hefei LuKin Auto Parts Co., Ltd.

✓ 性能对比试验

Performance test compare with INA

车辆/发动机

Car and engine

测试对象

Test object

测试工况

Test condition

试验设备

Test equipment

奇瑞开瑞优优5MT 3缸1.0L柴油机SQR372A

Karry Yoyo 5MT with 3-cylinder 1.0L diesel engine SQR372A

INA F-552498及LUKIN AT60801单向皮带轮

OEM INA F-552498 OAP and LUKIN AT60801 OAP

怠速/2挡全负荷/3挡全负荷工况

Idle/2nd WOT/3rd WOT condition

德国Rotec扭转振动测试分析系统

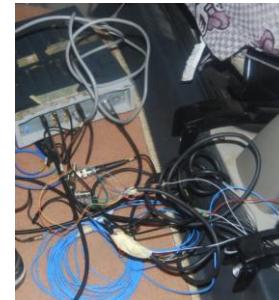
Rotec tensional vibration measure and analysis system

皮带轮1 – INA OAP

零件号: F-552498



皮带轮2 –AT60801OAP



试验验证

Experimental verification

Hefei LuKin Auto Parts Co., Ltd.

怠速工况 Idle condition

1、曲轴角振动

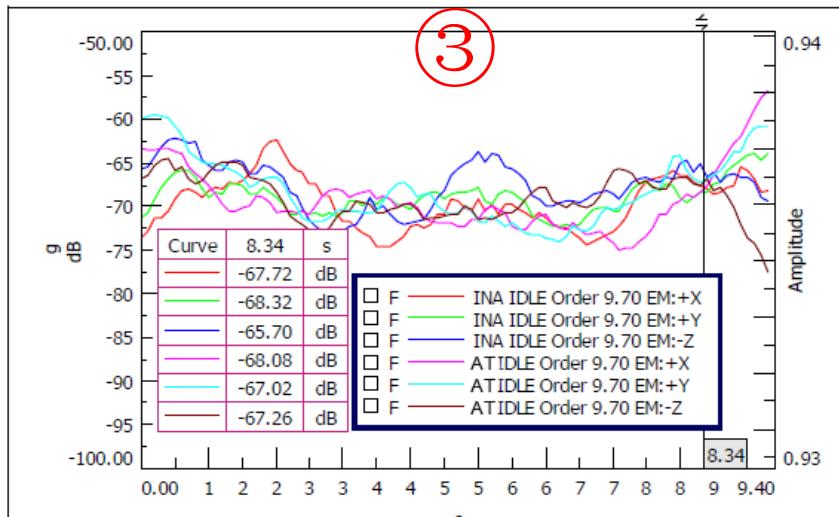
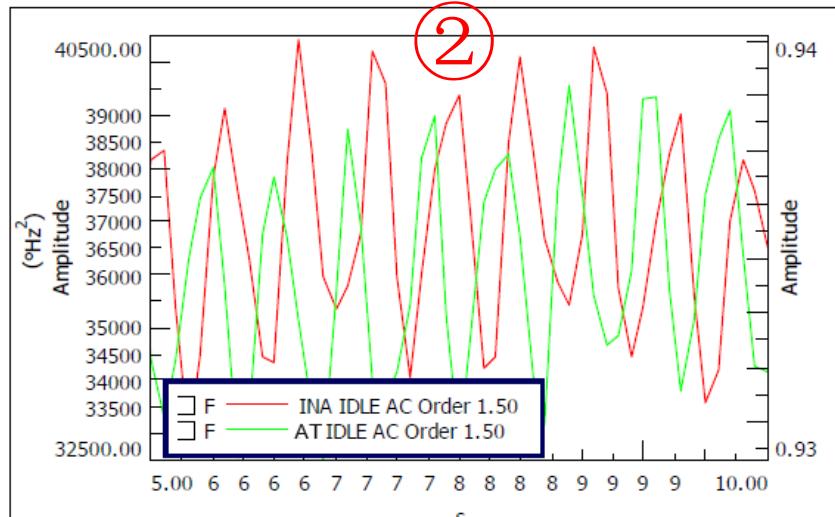
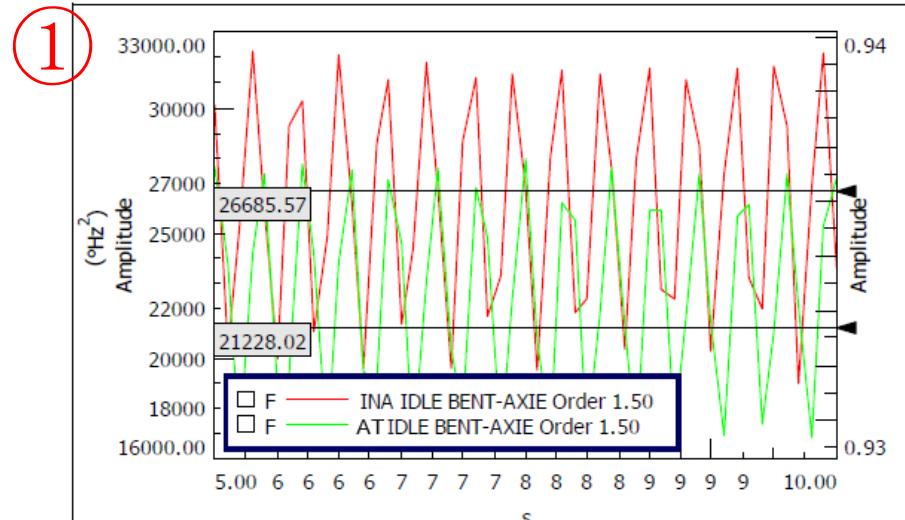
C/S angular vibration

2、空调压缩机角振动

A/C angular vibration

3、发电机振动

Alternator vibration



试验验证

Experimental verification

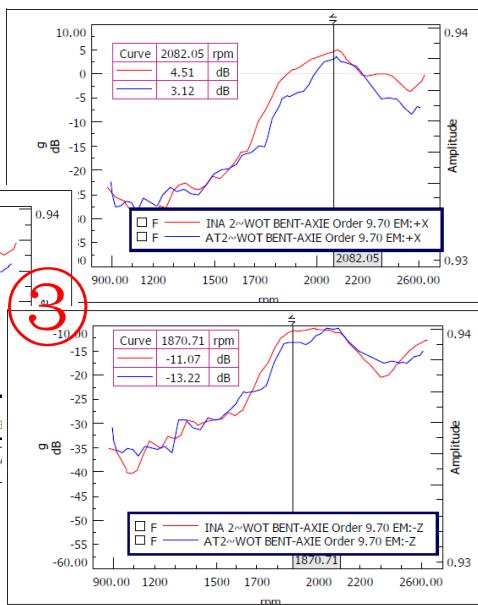
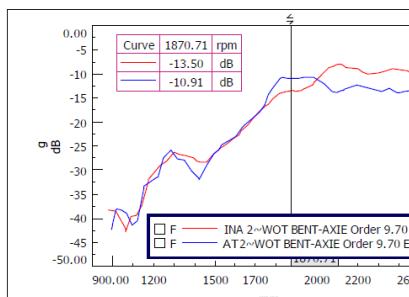
Hefei LuKin Auto Parts Co., Ltd.

2挡全负荷工况 2nd WOT condition

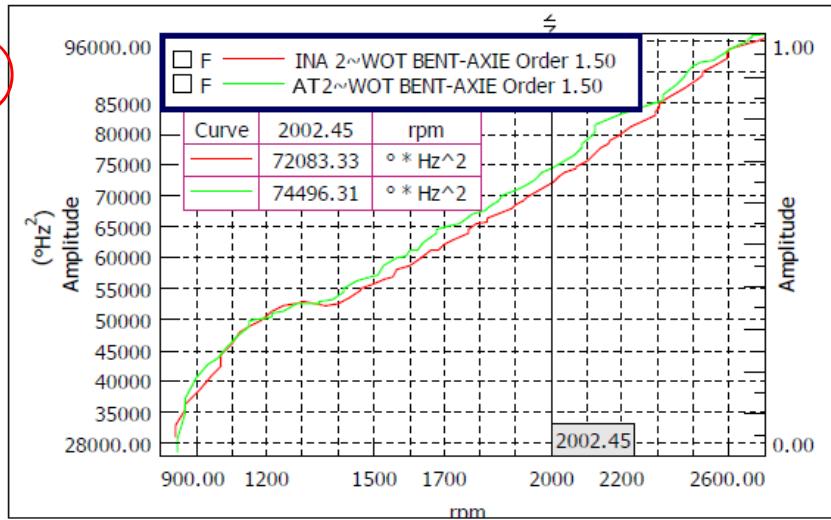
1、曲轴角振动
C/S angular vibration

2、空调压缩机角振动
A/C angular vibration

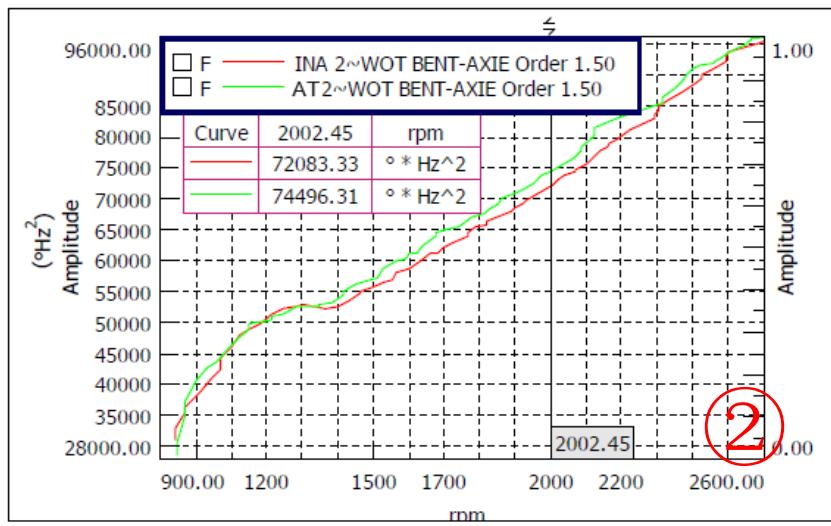
3、发电机振动
Alternator vibration



①



②



③

试验验证

Experimental verification

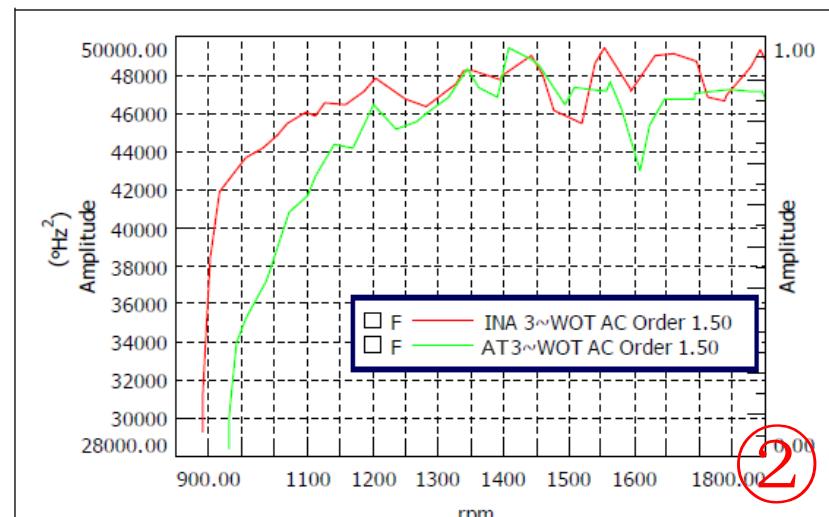
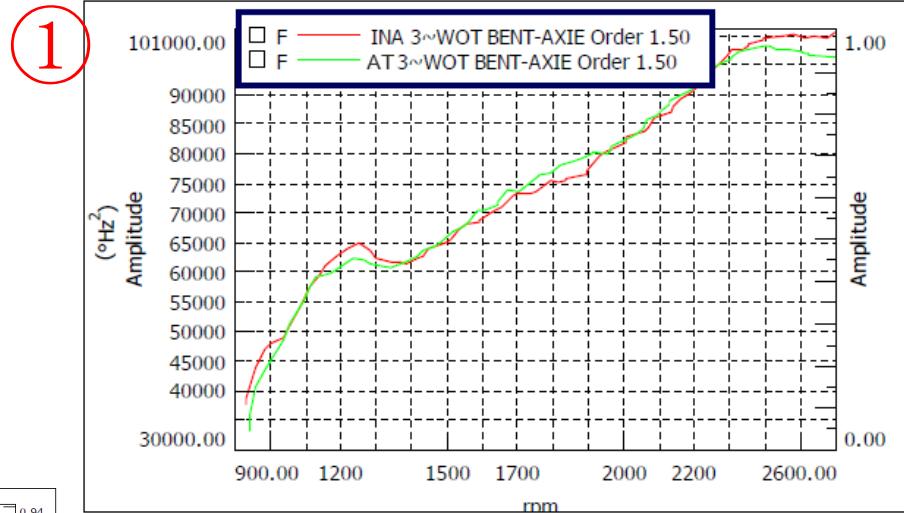
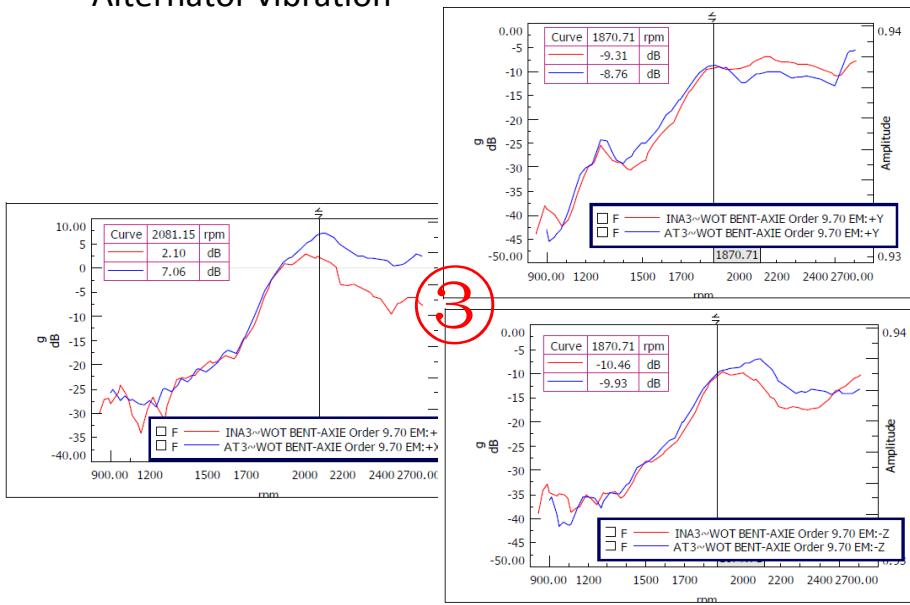
Hefei LuKin Auto Parts Co., Ltd.

3挡全负荷工况 3rd WOT condition

1、曲轴角振动
C/S angular vibration

2、空调压缩机角振动
A/C angular vibration

3、发电机振动
Alternator vibration



试验验证

Experimental verification

Hefei LuKin Auto Parts Co., Ltd.

- LUKIN OAP与INA功能相同、性能相似
Same function and performance between INA and CG OAP
- 直接替换而无需调整轮系参数
Change to LUKIN OAP without any change of FEAD system

- 2009.5
江铃VM R425发动机国产化项目皮带轮开发
Development on localization project of JMC VM R425 diesel
- 2009.10
奇瑞D4S13发动机项目增压器皮带轮开发
Development on project of Chery D4S13 engine
- 2011
奇瑞1.0D发动机发电机皮带轮开发
Development on project of Chery 1.0D engine B alternator supplier
- 2013
奇瑞1.6T发动机项目皮带轮开发
Development on project of Chery 1.6Tengine
- 2014
海马某型号发动机项目皮带轮开发
Development on project of Haima



我们的优势

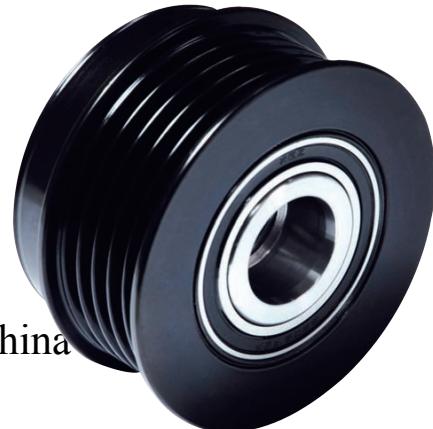
Adventage of us

Hefei LuKin Auto Parts Co., Ltd.

- ▶ 快速的样品及成品交货期
Fast delivery for samples and orders
- ▶ 快速响应及专业服务
Quick response and professional service
- ▶ 高品质的产品及更长的质保期
High quality pulleys and long warranty
- ▶ 更有竞争力的价格
Cheaper price

汽车发电机单向皮带轮 Overrunning Alternator Pulley(OAP)

THANKS !



HeFei Lukin Auto Parts Co.,Ltd
Building4# Damo Square Luzhou Ave 58 Baohe District Hefei China
Tel/Fax:+86-551-63815515
Mob:+86-18758477626 (What's App No)
QQ&Wechat :871795899
Web:www.lukinoap.com