

The 2nd International Conference on Die & Mould Technology

2005 BEIJING CHINA

2005 北京 中国

第二届国际模具技术会议

<http://www.cdmia.com.cn>

Proceedings of 2005 Mori Seiki 2nd International Conference on Die & Mould Technology

China Die & Mould Industry Association



机械工业出版社
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China Die & Mould Industry Association

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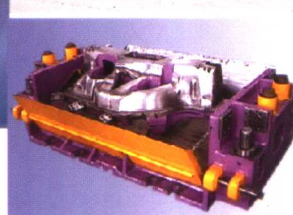
上海千缘汽车车身模具有限公司

Shanghai QianYuan Motor Body Die Co.,Ltd

公司简介

➤ 主要经营项目

- 汽车车身覆盖件冲压模具、检具、组焊夹具的设计制造
- 大中小型冲压件制造销售；冷冲模专用铸件制作
- 开发各种新车型(车身模具及冲压件)
- 成立日期：2000年5月
- 董事长：许子林
- 注册资金：10860万元
- 员工人数：238人
- 占地面积：39600平方米
- 厂房面积：9780平方米

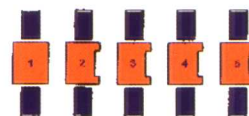


主要生产设备

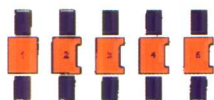
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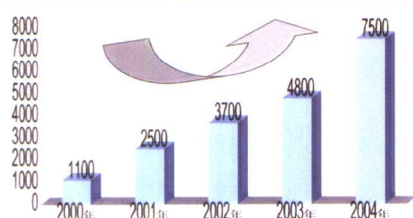


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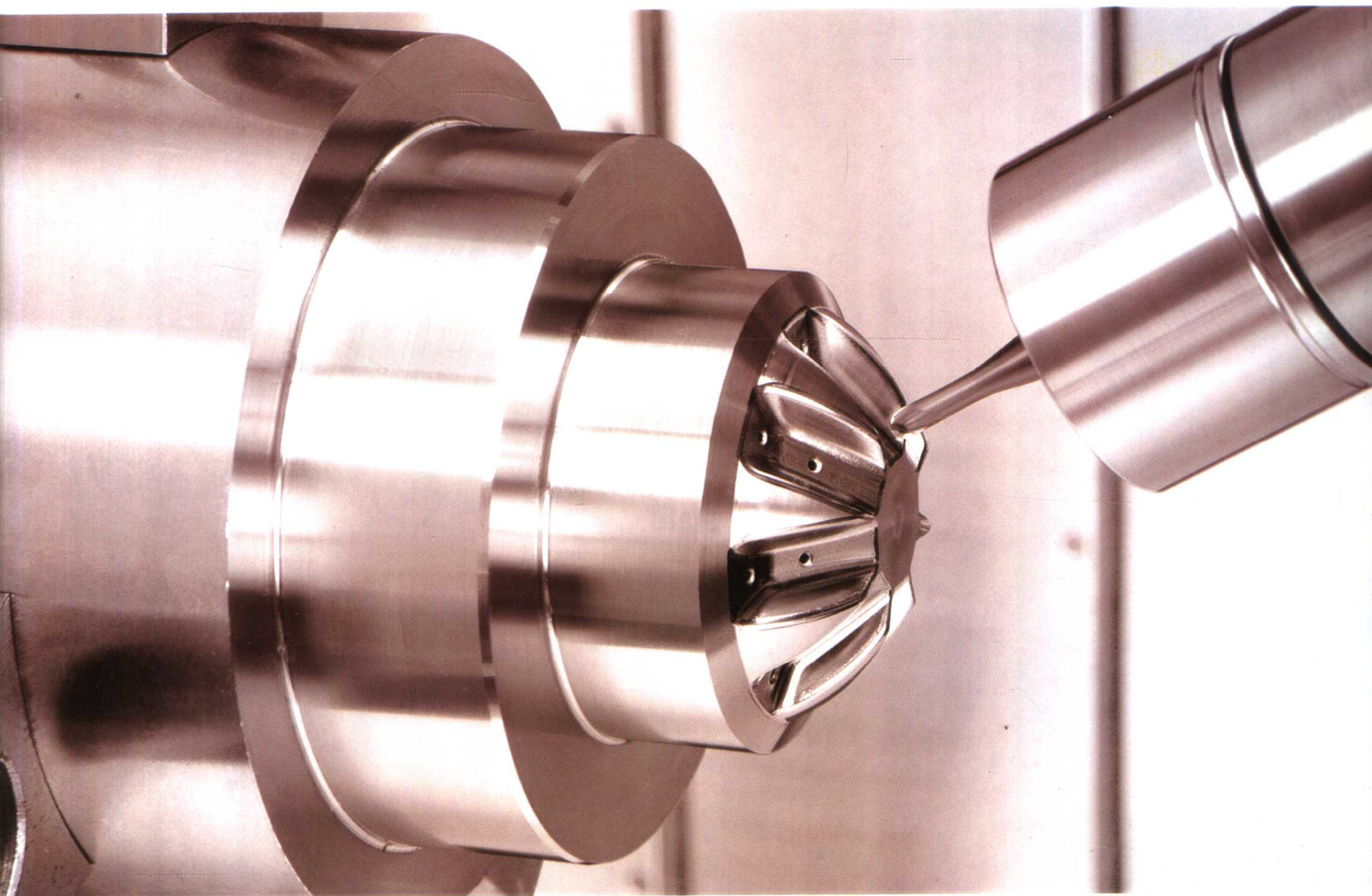
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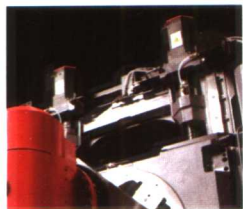
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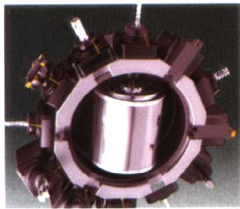


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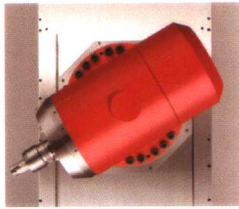
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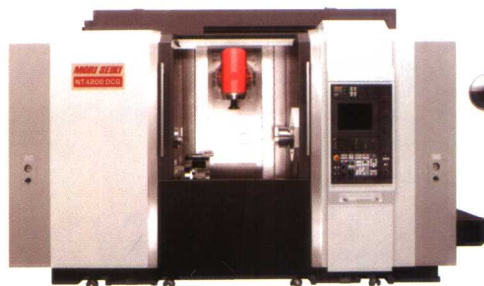


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*B 轴任意分度规格



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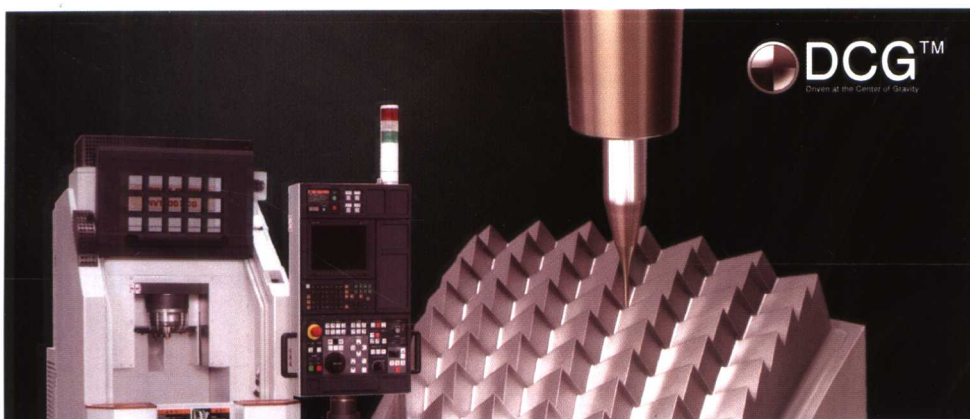
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传真: 86-769-371-5792

重心驱动:精密模具加工的革新技术



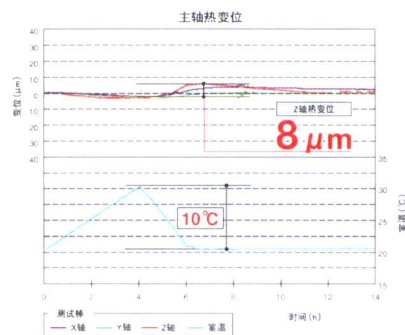
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高精度紧凑型立式加工中心

NV1500 DCG

■ Z轴热变位 (室温变化在10℃时的变位)



■ 真圆度

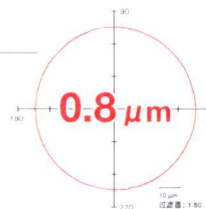
外径 : $\phi 50$ mm

坯料 : 铝

切入深度 : 0.05 mm

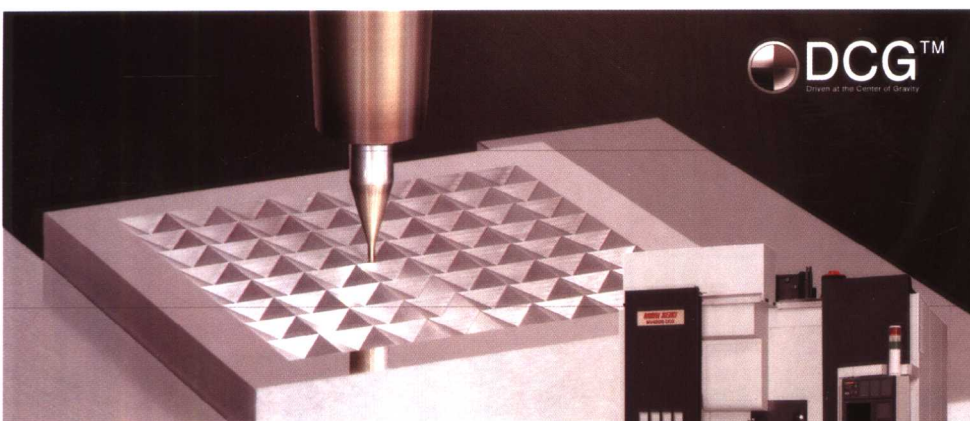
主轴转速 : 5,000 min⁻¹

进给速度 : 1,000 mm/min



- 在机床安装后不用地脚螺栓固定的状态下的实际值。
- 使用AI轮廓控制功能II (选配)时。

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高加速、低振动的重心驱动结构内装载了30,000 min⁻¹的高速主轴。
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高精度立式加工中心

30,000 min⁻¹规格

NV4000 DCG

■ 高速·高刚性

轴承内径为60 mm时, 可达到30,000 min⁻¹ (dnn值230万)。
2面拘束大大提高了刀具的弯曲韧性、切削能力和加工精度。

■ 低噪音

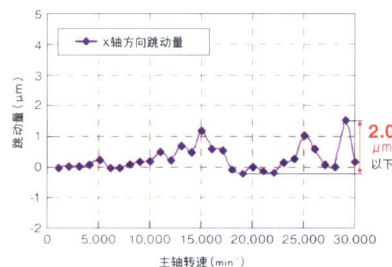
简单的主轴结构, 降低了旋转时带出的风声和振动噪音。
实现了69 dB (30,000 min⁻¹时/机械正面/A特性)。

■ 低振动

采用了平衡性良好的夹紧装置和多面平衡设计。
主轴元件精密匹配, 实现JIS-G1级以下等级。

■ 动态跳动精度

整个旋转速度区域内, 变动幅度可达到2.0 μm以内
(从标准线至顶端100 mm处测定)。



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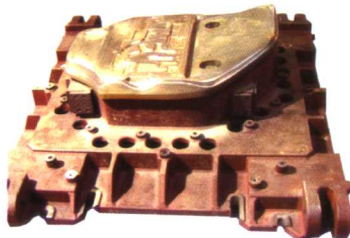
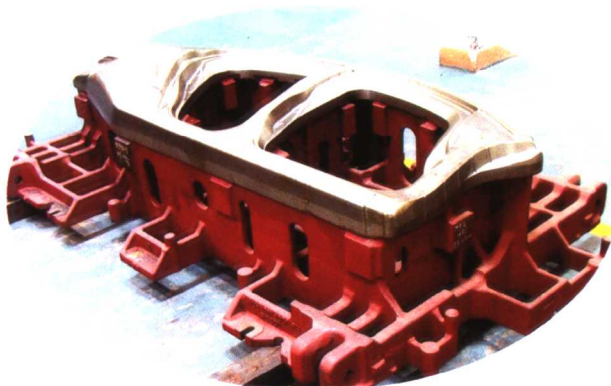
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四川省宜宾普什模具有限公司

普什模具有限公司是五粮液普什集团旗下的全资子公司，公司筹建于2000年，占地约10万平方米。主要从事注塑模具、金属冲压模具、压铸模具、检具、夹具的研发、设计及制造。

公司拥有日本MAZAK、SNK、OKUMAD等厂生产的加工中心；有德国的激光加工中心、TBT深孔钻床、平面磨床；有瑞士的米克朗高速加工中心、线切割机；有美国的水刀切割机、MOOR磨床、挤压研磨机、真空热处理炉、切削液再生机；有法国的ECM热处理炉等高精尖设备共200余台；250t-2300t调试压机15台；各种规格刀具、量具、辅具；英国、德国、意大利大型三坐标检测设备；有100余套HP高档CAD/CAM工作站，采用一流的CATIA、UG、PRO/E等模具设计、编程软件，DANAFORM、MOLDFLOW分析软件，全面使用CAD/CAE/到CAM/CAPP技术进行模具设计制造。



PW 四川省宜宾普什模具有限公司

普什模具有限公司引进国外前沿的管理理念与模式，推行全面质量管理，认真贯彻ISO9001，按照ISO9004及ISO14001的体系要求运作。2004年，公司成功地通过了奥迪、一汽等高新技术企业的供应商资格认证；2005年3月，公司正式通过了莱茵公司ISO9001：2000质量体系认证。目前，公司正在着手进行ISO14001和ISO16949的建立和取证有关工作。

公司还新建了刀具中心、铸造厂等配套生产厂，以实现产业链的延续和企业飞跃式的发展。

国家、省委领导多次到公司进行视察，对公司给予了较高的评价。



2005 MORI SEIKI
2nd INTERNATIONAL CONFERENCE
ON DIE & MOULD TECHNOLOGY

Oct 17-19, 2005

Beijing, China

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China Die & Mould Industry Association

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State Key Laboratory of Die & Mould Tech, HUST

National Plastic & Rubber Mould Engineering Research Center, ZZU

National Precision Forming Engineering Research Center, BRIMET

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Foreword

2005 Mori Seiki 2nd International Conference on Die & Mould Technology is held ceremoniously in Beijing on October 17 - 19, 2005.

This conference receives the extensive concern and attention of the domestic and international die & mould industry colleagues, and has got energetical support and response of famous mould manufacturing companies, scientific research institutions, and counterparts of famous key universities and colleges. The masses of scholars, scientific workers, entrepreneurs are very keen on submitting theses, and devote their latest, most practical and advanced technology to everybody. This has laid a solid foundation for the full success of the conference. During the preparation, the Organizing Committee received 136 domestic and international experts' thesis summaries, and 76 theses were put into the proceedings. The content has contained mould trade and numerous fields of relevant technology. The level of these theses, the number of the participants of the conference, and the range involved all exceed the First international conference on die & mould technology. These theses have fully reflected the fruits of the academic and technological field of the mould trade in recent years. The development of the mould technology has brought about product innovation and improvement in such trades as the machinery, electronics, automobile, household appliances, communication, etc.

The successful opening of the conference and smooth publication of the proceedings should be attributed to the support of China Die & Mould Industrial Association, National Die & Mold CAD Engineering Research Center, SJTU, State Key Laboratory of Die & Mould Tech, HUST, National Plastic & Rubber Mould Engineering Research Center, ZZU, National Precision Forming Engineering Research Center, BRIMET, Mori Seiki Co., Ltd., Push Die & Mold Co., Ltd., Shanghai Qianyuan Motor Body Die Co., Ltd., Tianjin Economic-Technological Development Area.

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I . CAD/CAM/CAE/CAPP, Expert Management System

Digital Manufacturing Technology and Its Application in Die & Mold Industry

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Abstract: In this paper, the digital manufacturing technology is classified, i.e., digitization of engineering technology and digitization of engineering management, and the digitization of engineering technology is discussed in detail. The significant tendency of CAD is Knowledge-based Engineering (KBE) technology, the tendency of CAM is high speed machining and optimization technology, the tendency of CAE is multidisciplinary numerical simulation, integration with optimization and KDD. Point out that the digital manufacturing technology is one of the key approaches to upgrade the core competence of Chinese die and mold industry. Finally, the application of digital die and mold manufacturing technology in Chinese National Die & Mold CAD Engineering Research Center at Shanghai Jiaotong University is introduced.

Key words: digital manufacturing, die and mold, KBE, optimization, numerical simulation

0 INTRODUCTION

With the continuously rapid development of world manufacturing industry, the demands for producing parts with "lower cost, best quality, quick time-to-market, customer focused as well as lifecycle service" have been increased tremendously. The design and manufacturing level of die and mold, which works as an important tool for plasticity forming, will cause direct impact on the product quality and working efficiency in different fields such as mechanical and electronic industry. So far, the plasticity forming as well as die & mold technology have been developed greatly and can be embodied as: (1) the fundamental theory of metal forming has been established generally; (2) the FEM-based numerical simulation technology has been developed steadily which provides a new approach to realize the essentials of forming processes; (3) with the continuously deep application of new computer technologies such as CAD and CAM, the tool quality has been improved while the production cycle has been shortened; (4) New forming methods have been developed frequently and applied successfully^[1].

Informatization is the tendency of world manufacturing industry, and digital manufacturing

technology has been an important approach to step up the core competence of product. The digital manufacturing of die and mold will be the core of die and mold technology in the 21st century. In a sense, the digital manufacturing technology can be classified as: (1) digitization of engineering technology, (2) digitization of engineering management.

1 DIGITIZATION OF ENGINEERING TECHNOLOGY

1.1 Design digitization technology — CAD

Design digitization technology aims at enhancing design quality, reducing design leading time, as well as providing a platform of visualization and real-time operation. It has been one of the important foundations of digitization of manufacturing industry. The future trends of CAD are listed as follows:

- Common platform - based and function - specific
- Integration with Knowledge-Based Engineering (KBE)
- Integration with new leading-edge technology (e.g. virtual reality, VR)

KBE is regarded as the core technology of design digitization. It is an intelligent design method

which was invented and developed facing to request of modern designing. KBE has been an important approach to accelerate engineering design on an intelligent basis, and especially, an important tendency of design digitization in die & mold. Ford Motor Company has regarded KBE technology as one of the key technologies of its information strategy in 21st century [2].

The benefits of KBE are:

- Knowledge share and reuse
- Decrease the risk of experienced personnel loss
- Improve the design efficiency and the time percentage for innovative activity
- Provide a way of knowledge accumulation by Case-based Reasoning (CBR) and Knowledge Discovery in Database (KDD)

The key technologies in KBE include knowledge modeling, knowledge representation and inference, knowledge acquisition, knowledge integration, etc. Currently, the main research emphases of KBE in design digitization of die & mold are:

- Knowledge acquisition and representation in die & mold
- Knowledge inference in die & mold
Rule-based Reasoning, RBR
Case-based Reasoning, CBR
Model-based Reasoning, MBR
- Knowledge management in die & mold
- Knowledge Discovery in Database, KDD

The integration of CAD and VR technologies is another key point of design digitization. The modeling establishment and experiment simulation by using VR can make the modeling process and simulation results imaged and visualized. The modeling system enabled with 3D, real-time operation and attributes extraction greatly enhanced the development of CAD technology, and increased power of VR as well.

1.2 Manufacturing digitalization technology — CAM

The trends of CAM are listed as follows:

- NC code generation for high-speed

machining

- Integration of knowledge, experience and optimization algorithm
- Integration with CAPP
- Optimization of NC code generation time and run-time
- Adaptive NC machining

Moreover, other technologies such as reverse engineering, rapid prototyping / rapid tooling are also important directions in manufacturing digitalization and have been applied widely.

1.3 Analyzing digitalization technology — CAE

The trends of CAE are listed as follows:

- Multidisciplinary numerical simulation
- Integration with design optimization
- Integration with knowledge discovery

CAE technology can be regarded as “diagnosis” while CAE-based optimization is the “prescription” according to the “diagnosis”. Nowadays, the integration of optimization and numerical simulation is the key trend in this field. The target of analysis is to optimize parameters, but the traditional optimization technique needs a lot of iterations and human control at the cost of immense calculations. It is not allowed to carry through so many iterations in most of design processes, so the CAE technology needs breakthrough in optimization method to search the most optimum parameter in design matrix and realize “true optimal design”.

The KBE method and technology is also an effective way to upgrade numerical simulation capability. By establishing multi-represented knowledge base with rule, case, sample and various intelligent methods such as RBR, CBR, MBR, Artificial Neural Network (ANN), KDD, the intelligent system comprehensively supporting CAE application can be set up. In this way, forming method can be analyzed and evaluated automatically based on numerical simulation and optimized scheme can be put forward. It has been one of the leading-edge research topics in metal forming.

2 DIGITIZATION OF ENGINEERING MANAGEMENT