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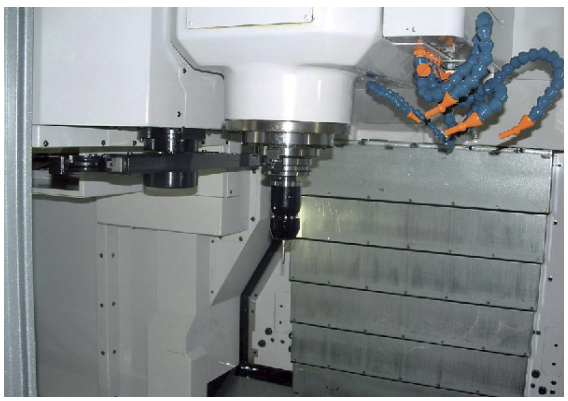
Metrology equipment reduces set-up times and improves machining accuracy

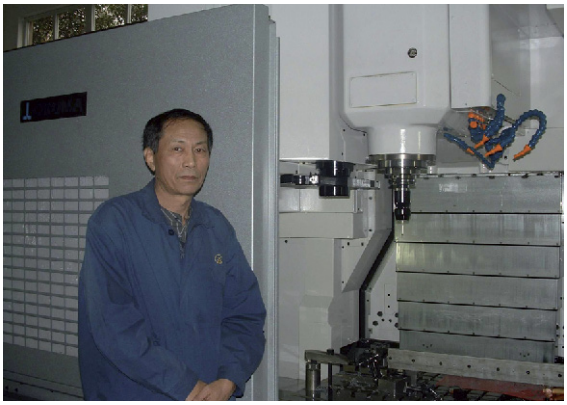
Shanghai Yawa Printing Machinery Co. Ltd is the first Sino-foreign joint venture in the Chinese printing machinery industry, specialising in the manufacture of printing, packing and post-press equipment, such as automatic gilding equipment and die cutting machines.

A subsidiary of Shanghai Electric Co. Ltd, the company has been awarded 'Top 100 company' status for the Chinese mechanical industry, and since its formation in 1988 has grown into a major international player in the print industry, employing over 500 staff. Shanghai Yawa exports to more than 30 countries, with recognised brands such as the Lionstamp TYM series of automatic gilding die cutting machines and the ZH series of automatic folding and gluing equipment.

These achievements have been possible due to continuous development and investment in innovative technology and effective modern management. Shanghai Yawa was the first company in the Chinese printing industry to obtain ISO9001 quality system accreditation, to meet the high level requirements of the export markets. It has an ongoing commitment to process control and quality management systems, with extensive use of information management networks and CAD/CAM/CAE systems. The manufacturing facility is also equipped with the latest in CNC machine tools, CNC machining centres and co-ordinate measuring machines (CMMs), with many of these machines fitted with probe systems from Renishaw, a world leader in metrology equipment.



Renishaw's MP7 inspection probe in operation on a VMC



Li Banggu, Chief of CNC Machining Department, Shanghai Yawa Printing Machinery Co. Ltd

According to Mr. Li Banggu, the engineer responsible for the company's production, the existing equipment includes seven large, medium and small CNC machining centres for milling and boring operations. An expert in his field, Mr Banggu has been involved in manufacturing for many years and is familiar with every aspect of the machining process. In his opinion, the ability to guarantee positioning accuracy and part cleaning are key procedures during machining.

The printing die cutting machine produced by the company requires a high level of part accuracy. In the company's early years part set-up was carried out manually, with inspection results calculated by comparing readouts and subtracting radii. This method for set-up is fairly primitive, and manual measurement was often affected by uncertainties such as skills, measurement points, calibration and pressure applied during measurement. Therefore inaccurate measurement occurred frequently, resulting in higher potential for errors, and affected the positioning accuracy of the part.

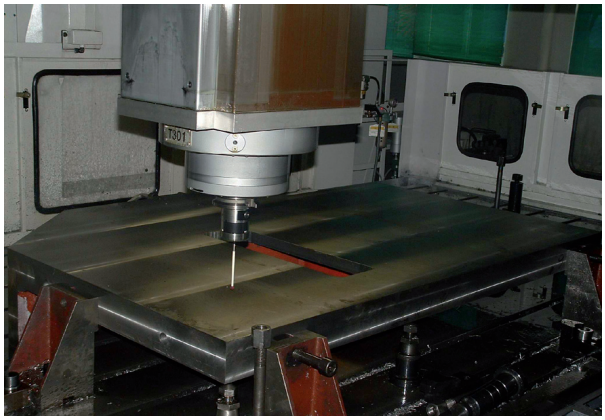
To overcome this problem, Shanghai Yawa has fitted Renishaw inspection touch probes to its CNC machine tools since 1992. The first touch probe fitted was a Renishaw MP3 unit, and Mr Banggu quickly found that this probe helped to solve difficult problems arising during machining, that had been causing problems for many years. The MP3 touch probe was used to perform general inspection of machined parts, achieved process control through process inspection, reduced manual set-up and inspection time, reduced scrap, and reduced dynamic and inertia errors.

Since the first installation, more Renishaw probes such as the MP7, MP10 and RMP60 radio transmission touch probes, and tool setting systems, have been installed onto CNC machining centres. Mr Banggu explained that accuracy and cleanness were pursued during printing die cutting machine part machining, especially in large five-face machining. Machining accuracy was most important, and a part had to be reworked even if the error was less than 1%. Before Renishaw touch probes, automatic tool setting, tool breakage detection and on-machine part inspection had been considered difficult, but these issues had been readily solved.

As the volume and weight of the parts machined by Shanghai Yawa is comparatively large, setting on the machine tool is very inconvenient, with complex requirements for fixturing. However, Mr Banggu reports that using a touch probe system to set up co-ordinates is simple and quick, saving significant preparatory time. This usually amounts to 90% of set-up time, therefore increasing effective machining time by 30%.Generally, the large parts manufactured by Shanghai Yawa are expensive, and even an error of less than 1% can cause scrap and high costs. Therefore, employing quality control techniques during machining is essential. Said Mr Banggu, “It is not necessary to move the parts onto a CMM for inspection using a probe system, instead we can perform on-machine inspection directly and determine the next machining process”.

Finished multi-hole components for Yawa printing machines inspected using Renishaw’s touch probes

He further commented, “Renishaw probes combine machine tool calibration, in-process inspection and process control to assure the accuracy once and for all, which is critical to achieve high-quality products”. Since using touch probes on machine tools, Mr Banggu has realised the importance of complementary machine tool technologies to control the machining process. Consequently, Shanghai Yawa has introduced both Renishaw’s ML10 laser measurement system for machine calibration, and co-ordinate measuring machines (CMMs) fitted with Renishaw measurement sensors.



Renishaw’s RMP60 inspection probe with radio signal transmission, used to check machined components for Yawa printing machines

Mr Banggu said that usually only machine tool builders used laser measurement systems, but he feels that compared to the high cost of their machining centres (over USD 1 million for one machine), using a laser measurement system for calibration makes good sense. With the ML10 laser measurement system, Shanghai Yawa checks and analyses the positioning accuracy of each axis of the machine tool, helping to maintain the machining accuracy and performance of the machine tool, leading to improved part quality, and effectively upgrading the performance capability of the machine.

In conclusion, Mr Banggu and his on-site staff praised Renishaw for its easy-to-use products, specialist expertise and comprehensive technical support. He said, “Probes, laser systems and CMMs not only improve part accuracy and reduce error ratios, but boost our confidence in machining quality and reduce the costs of waste. This makes Yawa die cutting machines and other products more competitive.”

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Operating Engineer of pentahedron machining for Yawa printing machines

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Renishaw is an established world leader in engineering technologies, with a strong history of innovation in product development and manufacturing. Since its formation in 1973, the company has supplied leading-edge products that increase process productivity, improve product quality and deliver cost-effective automation solutions.

A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

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- **Laser and ballbar systems for performance measurement and calibration of machines.**
- **Medical devices for neurosurgical applications.**
- **Probe systems and software for job set-up, tool setting and inspection on CNC machine tools.**
- **Raman spectroscopy systems for non-destructive material analysis.**
- **Sensor systems and software for measurement on CMMs (co-ordinate measuring machines).**
- **Styli for CMM and machine tool probe applications.**

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