

Renishaw's inspection tools optimise VMC precision for Haas

Haas Automation Inc. used to fine-tune every one of its VF vertical machining centres through a mechanical fore-and-aft loading test, with results entered into the CNC as a compensation value. Recently however, the company began to supplement this test with backlash compensation using Renishaw's QC10 Ballbar System. By measuring position errors throughout a complete circle, the Ballbar isolates effects often missed by the mechanical test, including the influence of friction, and problems in the motor/ballscrew connection.

Haas supplies a Ballbar circularity test plot with each new VMC shipped. Unique to the individual machine, the plot shows the trace of a 300 mm diameter circle in the X-Y plane, made at 25 or 50 ipm, depending on machine size. Through the precise match between an ideal circle and the Ballbar map of the machine's true movement, the customer sees graphic proof of the contouring accuracy of the machine. The test is frequently re-performed by Haas UK once the machine is installed at customers' premises. Andrew Ward, Haas UK Engineering Director commented: "The Ballbar check is a straightforward test. We are happy to show the customer that his machine is just as accurate after it has travelled the 6,000 miles from California". He added "We have also found the Renishaw Ballbar System invaluable as a diagnostic tool, if and when a problem does occur".

The other tool used throughout the development and manufacturing cycle of every Haas machine is Renishaw's ML10 Laser Calibration System. "Laser and Ballbar inspection begins with new machine prototypes," says Haas Inc.'s Service Manager, John Roth. "When an error is found in a prototype, the problem is traced back to the machine that produced it." He cites the company's new VF-6 vertical machining centre as an example.

Roth used the Ballbar to test the multi-axis movement of the VF-6 prototype in all three planes, X-Y, Y-Z and X-Z. This was followed by straightness and displacement measurements taken using the laser.



QC10 ballbar testing positioning performance on a HAAS VMC



The QC10 ballbar test is controlled with software on a PC, the data gathered will then be analysed with Ballbar diagnostic software off-line

“For a precision machine tool, it is necessary to assemble the parts and put them under true operating loads before we can be confident we have found every problem” he says. On the VF-6 prototype, laser straightness measurements revealed a 0.001” bow in the machine’s saddle. Roth returned to the milling centre responsible and through closer inspection with the Renishaw laser, he discovered the straightness error causing the bow. By compensating the CNC using the laser measurements the milling centre’s straightness was corrected, and the saddle bow was eliminated from the VF-6 production version.

John Roth added. “Before we use a machine in our shop to produce a component for a Haas machine, we first determine that the machine is accurate enough for the job, instead of waiting for post-process inspection to find a problem. When we are about to machine a part with a very tight tolerance, we use the Renishaw Ballbar and/or the Laser Calibration System to confirm that the machine tool is positioning accurately enough to hold that tolerance.”

“The other option,” Roth concluded, “is to risk wasting time and money, and risk scrapping a very expensive piece of material.”

www.renishaw.com/calibration



Following the ballbar test, adjustments can be made and the machine re-tested to provide a bench-mark for on-going historical analysis of the positioning performance, allowing predictive maintenance

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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.

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Renishaw worldwide

Australia

T +61 3 9521 0922
E australia@renishaw.com

Austria

T +43 2236 379790
E austria@renishaw.com

Brazil

T +55 11 4195 2866
E brazil@renishaw.com

Canada

T +1 905 828 0104
E canada@renishaw.com

The People's Republic of China

T +86 21 6180 6416
E china@renishaw.com

Czech Republic

T +420 548 216 553
E czech@renishaw.com

France

T +33 1 64 61 84 84
E france@renishaw.com

Germany

T +49 7127 9810
E germany@renishaw.com

Hong Kong

T +852 2753 0638
E hongkong@renishaw.com

Hungary

T +36 23 502 183
E hungary@renishaw.com

India

T +91 80 6623 6000
E india@renishaw.com

Indonesia

T +62 21 2550 2467
E indonesia@renishaw.com

Israel

T +972 4 953 6595
E israel@renishaw.com

Italy

T +39 011 966 10 52
E italy@renishaw.com

Japan

T +81 3 5366 5316
E japan@renishaw.com

Malaysia

T +60 3 5631 4420
E malaysia@renishaw.com

The Netherlands

T +31 76 543 11 00
E benelux@renishaw.com

Poland

T +48 22 577 11 80
E poland@renishaw.com

Russia

T +7 495 231 16 77
E russia@renishaw.com

Singapore

T +65 6897 5466
E singapore@renishaw.com

Slovenia

T +386 1 527 2100
E mail@rls.si

South Korea

T +82 2 2108 2830
E southkorea@renishaw.com

Spain

T +34 93 663 34 20
E spain@renishaw.com

Sweden

T +46 8 584 90 880
E sweden@renishaw.com

Switzerland

T +41 55 415 50 60
E switzerland@renishaw.com

Taiwan

T +886 4 2473 3177
E taiwan@renishaw.com

Thailand

T +66 2 746 9811
E thailand@renishaw.com

Turkey

T +90 216 380 92 40
E turkiye@renishaw.com

UK (Head Office)

T +44 1453 524524
E uk@renishaw.com

USA

T +1 847 286 9953
E usa@renishaw.com

For all other countries

T +44 1453 524524
E international@renishaw.com

