

#### **University of Huddersfield Repository**

Perkins, Chris J, Longstaff, Andrew P., Fletcher, Simon, Willoughby, P and Verma, Rocky

Limitations of Data Handling within the Machine Tool Service environment

#### **Original Citation**

Perkins, Chris J, Longstaff, Andrew P., Fletcher, Simon, Willoughby, P and Verma, Rocky (2010) Limitations of Data Handling within the Machine Tool Service environment. In: Future Technologies in Computing and Engineering: Proceedings of Computing and Engineering Annual Researchers' Conference 2010: CEARC'10. University of Huddersfield, Huddersfield, p. 192. ISBN 9781862180932

This version is available at http://eprints.hud.ac.uk/id/eprint/9347/

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

http://eprints.hud.ac.uk/

# Limitations of Data Handling within the Machine Tool Service environment

**Christopher Perkins** Supervisor: Andrew Longstaff Engineering Control and Machine Performance Group Computing and Engineering S Fletcher, P Willoughby, R Verma.

### Sources

There are multiple information sources to be considered when measuring or calibrating a machine tool. More modern data acquisition by telemetry devices are becoming increasingly common, however older mechanical devices are still heavily used. This means that both electronic data capture and acquisition by operator input must be considered.



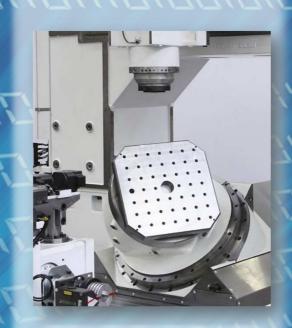
Combining electronic captured data and manually created paper copies is time consuming and is prone to errors.



Modern, high precision measurement devices usually have the ability to export measurement data directly to electronic data files. This leads to faster data capture with fewer errors.

> Ideally, as much information as possible should be captured, or at least recorded, electronically. This will help reduce uncertainty, minimise human errors, and save time

Simpler, but quicker measurements can be made using mechanical Dial Test Indicators. These results must be manually transferred to either a paper or electronic storage format.



Modern Machine Tools require extremely high accuracy measurements to ensure they are working at their full ability.

These measurements, however, require large amounts of data to be recorded, transferred, analysed and presented.

The way in which the data is presented can also be a difficult problem. The correct amount of detail must be displayed for the chosen audience.



Managers may require a brief overview of a machine's condition with a quick Yes/No function.



## Transfer

The way in which data is transferred from point of measurement, to the analysis systems can prove to be a major bottleneck in the system. Conversion from multiple formats (manual and electronic) often cannot be easily automated.



Varying incompatible data types have to be converted and transferred. This takes ime and effort.

Various file formats can be used to transfer data from one site to another, each with its pros and cons.

Actual file-transfer methods tend to favour email, as it is an accepted and easy to use technology, but this can lead to data loss. Improved systems could include handshaking abilities to ansure the integrity and receipt of transmitted data.

Human error and individual

"OK" interpretation can lead to misunderstandings, stemming from one person's opinion regarding results and readings. Minimising these "fuzzy" areas will lead to more reliable and repeatable results.

A more suited approach would to be to transfer the data into an XML data structure before transmission. This would reduce Spreadsheets the amount of data transferred and is flexible enough to incorporate any future data needs.

'Massive'

"Big" 0.0047

"Alright"

Notepads

Text Documents

"Very Bad"

data is incorrectly formatted or incomplete.

Multiple measurement formats can make comparison of readings difficult. Each measurement must be in the same format as the tolerance that is



 $10 \,\mu\text{m/M} = 2.062 \,\text{arcseconds}$ Tolerance = 0.005mm/300mm

Ideally, all measurements of similar types should be converted to the same format before storage and transfer. This will avoid complication and make analysis and comparison much faster and more reliable. All other requested formats can then be generated from this single data source with repeatable results.

Inspiring tomorrow's professionals



## Presentation

Technical Engineers will have to rectify problems within the machine itself. This means they will need details of each nonconformance (to the manufacturer's specification) that the affects the machine.

		CERTIFICATE O	F CALIBRATION
	Customer	Hai	Drame Minimume Sensor, Number
Ownerster		Parent of	notion in the Z plane (X in Z)
		requiress of the A axis i	notice in the 2 plane (A in 2)
Test Det			
Same of En			
Name or cri			
		dicator clock and straighted	
the clock re frigure that position. Ntach indic measure that diagram). Set zero at axis only so Record the full length of ESO/ES Ska TEST CON No. of Tany Feed Rate	ads zero at both the spindle and atar clock to spin it anis straight one end of the t that the stylus maximum devia ("travel." mdard Raf No. DETEONS — Ma	all relatey ases are locked in mote head and set dysks to more in the 2 plane (See Draigheader and toxiense the associate the other and associated on SIG 230: Pert 1 Content Set UP PARAMET 1 Kinde head 7 Kinde head 7 Kinde head 7 Kinde head 7 Kinde head 8 Kinde hea	
		C 0*	
Test Range	Start 300	End -200	
ENVIRON	TENTAL COND	TIONS	
	-	nguired	
	HEAT NO	edenee.	TEST EQUIPMENT LOCATION
Comments			
RESULTS (			
	n Deviation		
TOLERANCE			
ISO Guideline Hanufacturers Guideline			Not Specified
Manufacturers Guideline MTT Guideline			Not Specified 6.520mm/2000mm

Charts and plots of measurement data provide a quick way to compare results, but require correctly formatted, relatable data of similar magnitudes.

The eventual goal is to store all relevant measurement data in an easily accessible electronic format. This will greatly reduce the time required to produce differing outputs from the same data as the source remains the same. This will also further reduce the possibility of human error.

# Analysis

Data processing and analysis can prove to be an extremely time-consuming task if incoming measurement

The magnitude of certain measured errors can have more of an effect on the machine tool's output than others. The correct identification and ranking of these errors depends on the accuracy of the initial machine description.

A method to allow quick and easy identification of the machine configuration and therefore the required measurements (with reference to international standards) will save time and reduce errors.

