SUBMITTED BY
JOHN HORST & WILLIAM RIPPEY,
NIST

TRIP REPORT

A DEMONSTRATION OF METROLOGY
INTEROPERABILITY AT THE
INTERNATIONAL MANUFACTURING AND
TECHNOLOGY SHOW (IMTS) 2004,
CHICAGO, SEPTEMBER 8 - 15, 2004

TRIP REPORT

A DEMONSTRATION OF METROLOGY INTEROPERABILITY

DEMONSTRATION SUMMARY

With the support of the Automotive Industry Action Group (AIAG) Metrology Project Team (MEPT) and substantial help from dimensional metrology system manufacturers, members of the NIST metrology interoperability project team (Bill Rippey, Tom Kramer, Ann Virts, and John Horst) successfully executed a public demonstration of dimensional metrology system interface standards at the International Manufacturing Technology Show (IMTS) 2004, September 8 - 15, 2004. The title of the booth was "AIAG Metrology Project Team (MEPT): Enabling metrology interoperability standards that can save you time and money." The 10 m x 3 m booth was located at the Emerging Technology Center portion of the IMTS Show.

Reflecting the consistent tone of commendation for NIST's efforts at the show, Robert Waite of DaimlerChrysler, the MEPT chair, said to a group of over 34 AIAG MEPT meeting attendees on Sept. 14, 2004, that **"we all agree that NIST provides critical value-added to this interoperability effort."**

Over the eight days of the show, we entertained hundreds of visitors, and spoke in detail with more than one hundred professionals that had a wide variety of interest in our work. For example, many small and medium sized manufacturers that use dimensional metrology products acknowledged that they suffer from the interoperability problem and typically asked how our standards efforts might benefit them.

DESCRIPTION OF THE DEMONSTRATION

At our booth, we performed a live execution of a simple but non-trivial inspection program connecting components from widely varying vendors, including many of the household names in dimensional metrology worldwide, such as LK, Zeiss, Hexagon Metrology (Sheffield), Wenzel, Tecnomatix, Hexagon Metrology (Wilcox), Metrologic, Metromec, Dimensional Control Systems, and Dassault (Delmia). Two important draft interface standards, I++ DME and DML, for two key interfaces, Dimensional Metrology Equipment (DME) and Reporting and Analysis (R&A), were highlighted in the demonstration.

We performed a live demonstration of the utility of I++ DME and DML, by showcasing the live execution of the same inspection routine performed using software and coordinate measuring machines (CMMs) from a wide variety of manufacturers. On the DME interface, we accomplished and verified the correct execution of 18 separate connections between 6 inspection software products and 3 CMMs, without using any proprietary

information on the interface, except machine-to-part coordinate system transform information. The application of the demo for most visitors was in showing that they could use their "favorite" software package to program and control any of the three CMMs. Further, their favorite could, at this time, include any of the six software packages running in the booth. As more vendors support the I++ DME standard, the list of CMMs and compatible software packages will increase. On the Reporting and Analysis (R&A) interface, we also accomplished and verified 2 separate connections between 2 inspection software products and 1 Statistical Process Control product. These interconnections were made possible through use of the Dimensional Markup Language (DML) specification.

Vendor Support for the Demo

Vendor support included: three vendors shipped CMMs to the show, set them up, maintained their operation, and disassembled and shipped them back (one came from Germany); two vendors had a person at the booth for the entire duration of setup and show operation (11 days). Three vendors supported staff onsite for 3-5 days during the setup and beginning of the show; one of these was a senior manager. International support travelers came from England, France, Germany, and Switzerland.

AIAG MEPT MEETING

On Tuesday September 14th, an AIAG MEPT meeting was held. The agenda included a report on the status of several efforts, namely, DMIS conformance classes, CAD and GD&T integration, QML and DML harmonization, and I++ DME specification development. A major accomplishment of the meeting was that the President of Q-DAS, Tom Stewart, the architect of QML, agreed that he had no problem integrating QML and DML and in fact encouraged the process. As a result, a further meeting was planned (for October 7, 2004 at the AIAG headquarters in Southfield, MI) to discuss the integration of QML and DML into one standard. Martin Hardwick of STEPtools, Inc. discussed progress on CAD and GD&T integration. As a result, John Horst, Martin, and Larry Maggiano of Mitutoyo agreed to set up a conference call meeting soon to organize a demonstration of CAD and GD&T with mostly existing standards with a small amount of futuristic interface standards.

I++ DME / DMIS HARMONIZATION MEETING

Following the MEPT meeting, a further meeting was held to seek to resolve incompatibilities between the emerging I++ DME specification and the DMIS standard. John Horst of NIST led the discussion at this meeting. It was agreed that the appropriate I++ DME representative should present I++ DME in more detail to the DNSC committee for clarification. It seemed that no one in attendance had serious objections to the I++ DME philosophy.

PICTURES

Verifying the last few connections at the booth prior the show

NC Kishore (Delmia)

Michel Penlae (Wilcox)

Interacting with show attendees

Nathalie Blanco (Metrologic)

Bill Rippey (NIST)

Chiratana Pot (Tecnomatix)

The six inspection software applications

The Sheffield CMM

The Wenzel CMM

The Zeiss CMM

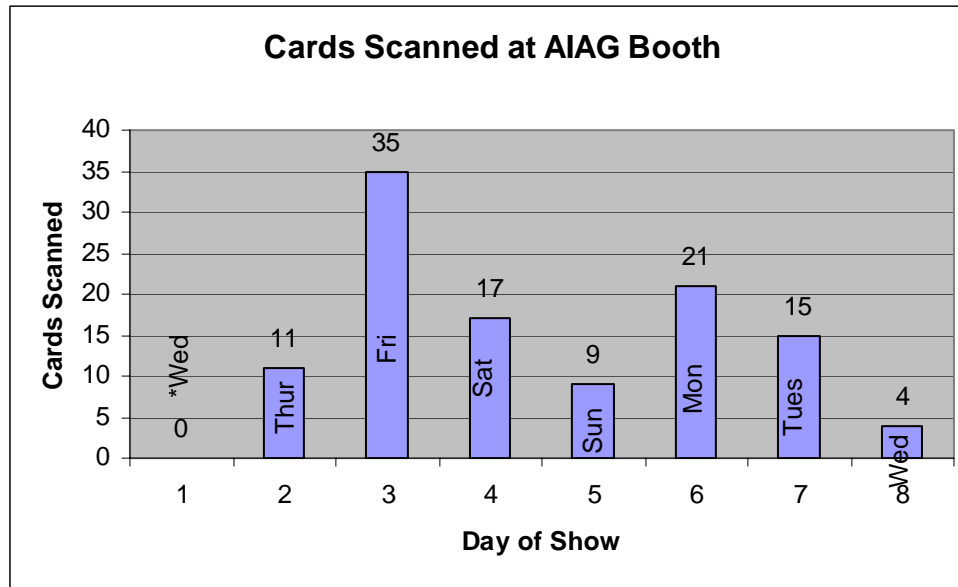Software developers, Nathalie Blanco (Metrologic) and Jose Torres (Zeiss)

The booth display

Developer Michel Penlae of Wilcox Associates next to the Sheffield CMM

The back side of the Wenzel and Zeiss CMMs

Talking with the press

Cards Scanned at AIAG Booth

Day of Show	1 (*Wed)	2 (Thur)	3 (Fri)	4 (Sat)	5 (Sun)	6 (Mon)	7 (Tues)	8 (Wed)
Cards Scanned	0	11	35	17	9	21	15	4

* No card reader on the first day

STATISTICS ON INTERACTIONS AT THE BOOTH