

Welcome to the 1st edition of Electronic Measuring Device's E-News letter. Our intent and purpose is to educate and inform the metrology community on technological developments at EMD and our industry. Our users group was formed by real users, and usually have two meetings per year. Since traveling budgets are tight, we hope this forum will fill the communications gap. It is not our intent to create a marketing vehicle but hope to give all subscribers a reference point by which to assess their own capabilities and needs.

We all work in remote locations and don't know everything. Sometimes we need reality checks just to see if our metrology is in the same decimal place as the rest of industry and our colleagues. Feel free to submit comments and pass us around to your fellow colleagues. In a serious business we intend to have a little dry humor fun with this newsletter.

Unlike most of our industry which repackages a probe from here, a rock from there and software from an overconfident geek, EMD has total engineering control over the entire system. As a result we have a different spin on metrology and have developed a unique set of capabilities. We welcome new applications and innovative uses for the Sceptre™ System and CMM systems. Most if not all were originally created at the request of a customer who was faced with what seemed impossible or difficult tasks.

EMD is smaller than other big name (high marketing margin competitors) but we are more flexible, with superior technology and the humility to listen to customers. If what you need is not in their catalogue then more often than not it will fall on deaf ears. We are American owned and our products are made in America. Our sales are direct and are free of the confusion of middlemen. We compete at the high end of precision and capability at 1/2 of the price, less the glossy brochures and trips to exotic places. Management still answers the phones and real people respond to your concerns and problems.

Nobody starting an industry or manufacturing company wanted metrology. But once down this path of building things metrology makes everything work. Bill Gates wrote **"Information is power"** and for us in manufacturing, metrology is the key enabling information. In this first Issue we want to explore the future EMD sees for itself in the broad manufacturing world.

In future editions - Some CMM topics will be:

- Heresy - The ANTI-CMM, CMM
- Coordinate Tribology Studies
- Design Issues and Philosophy of the Monolith
- Gear Inspection the ISO-DIN way
- Multi Sensor Capabilities
- Gage R&R
- Surface Finish Measurement
- Dynamic Dimensional Testing
- Magnetic Field Testing
- Roundness Measurements

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What bothers me about the timing of CMM information?

From Klaus, Chief Operating Officer

For our first issue of EMD E-News, I thought I would stir up the pot a little. For several years now I have been troubled that in many manufacturing environments, our industry has missed the point. CMM's are sold because they are the only "game in town" capable of gaining the information needed from workpieces. You need this info, you purchase a vanilla flavored CMM. Live with the time lag of a gage lab, close an eye to clamping and fixturing uncertainties, and remove Quality and human resources into another department.

Real time process feedback has been the stated goal of virtually every customer in my 20+ years of experience but the requirement keeps getting whittled back down to a classic CMM.

EMD is now focussing on metrology in a total manufacturability sense. The stand-alone CMM in a Lab might still be a component but the focus will be on the reliable gathering of information and the dissemination and processing of that information in a time effective manner, where it still can make a difference. Hybridizing Machine tools and CMM technology is EMD's future.

What we foresee is broad mix of future products. Specialized closed loop machine controls where the machine tool becomes a high performance scanning CMM. Software that combines CMM results, masters and machine tool corrections along with special gauging modules that are in close proximity to the workpiece while it are being manufactured. We monitor and control net material removal in real time and end up with a perfect workpiece.

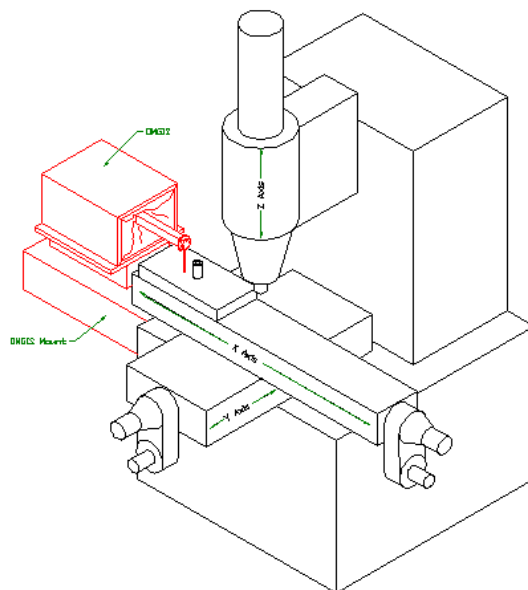


Fig. 1 Concept Line drawing of a CUBIT Coordinate Gauging Module on a typical vertical machine tool. Cubit is rigidly attached to machine base. Without removing the workpiece from its fixture and mounting on the machine tool, the stages of the machine tool bring the workpiece to home position for inspection. During the inspection cycle the machine tool is powered down and inactive. Inspection accuracy is derived completely independent of the machine tool and its own slides, controller and software.

Fig.2 Picture of a CUBIT (coordinate gauging module) in built onto the base of a vertical milling machine. The cubit resting in a kinematic base may be removed during heavy machining operations or whenever necessary for access or service. Sealed against contamination is critical consideration in this environment.

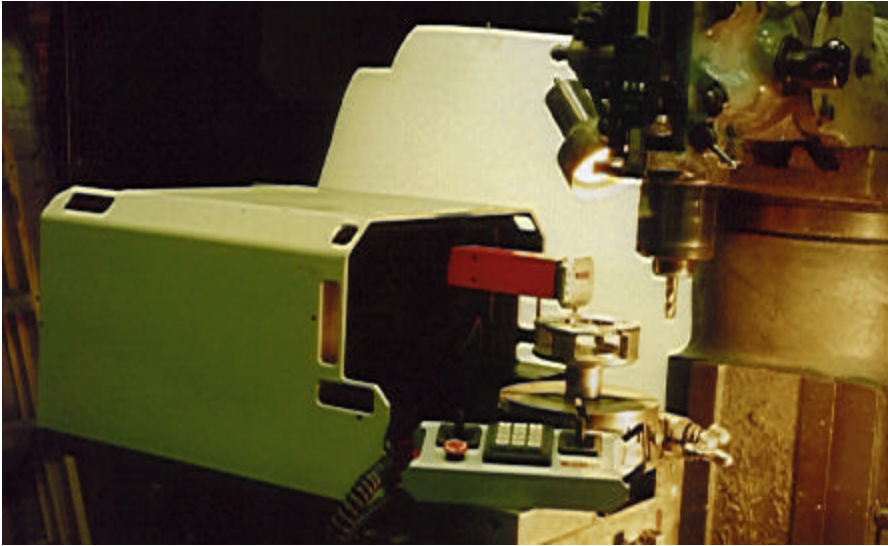
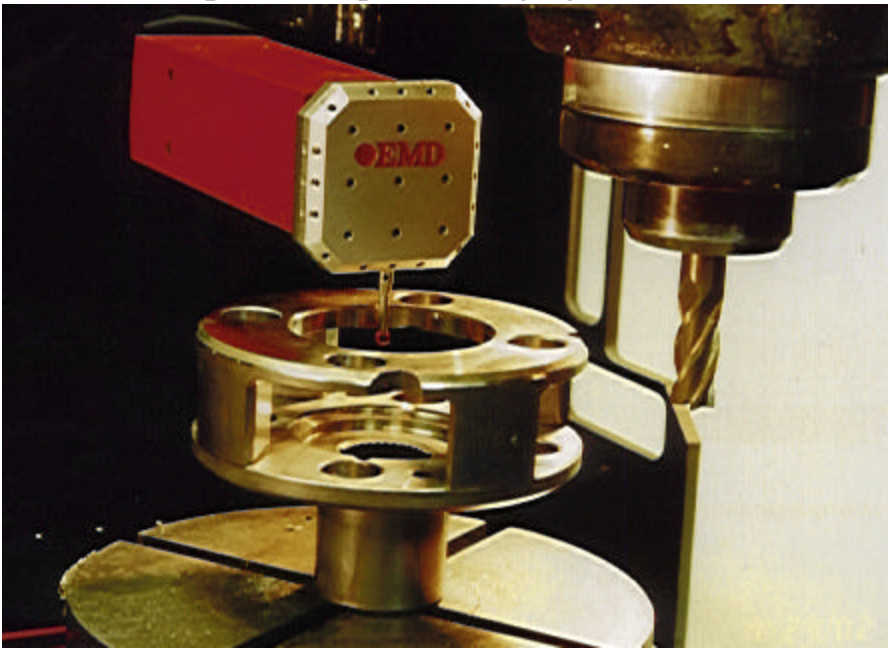


Fig.3 Close up of Workpiece, Gauging Module Head, and Milling Head



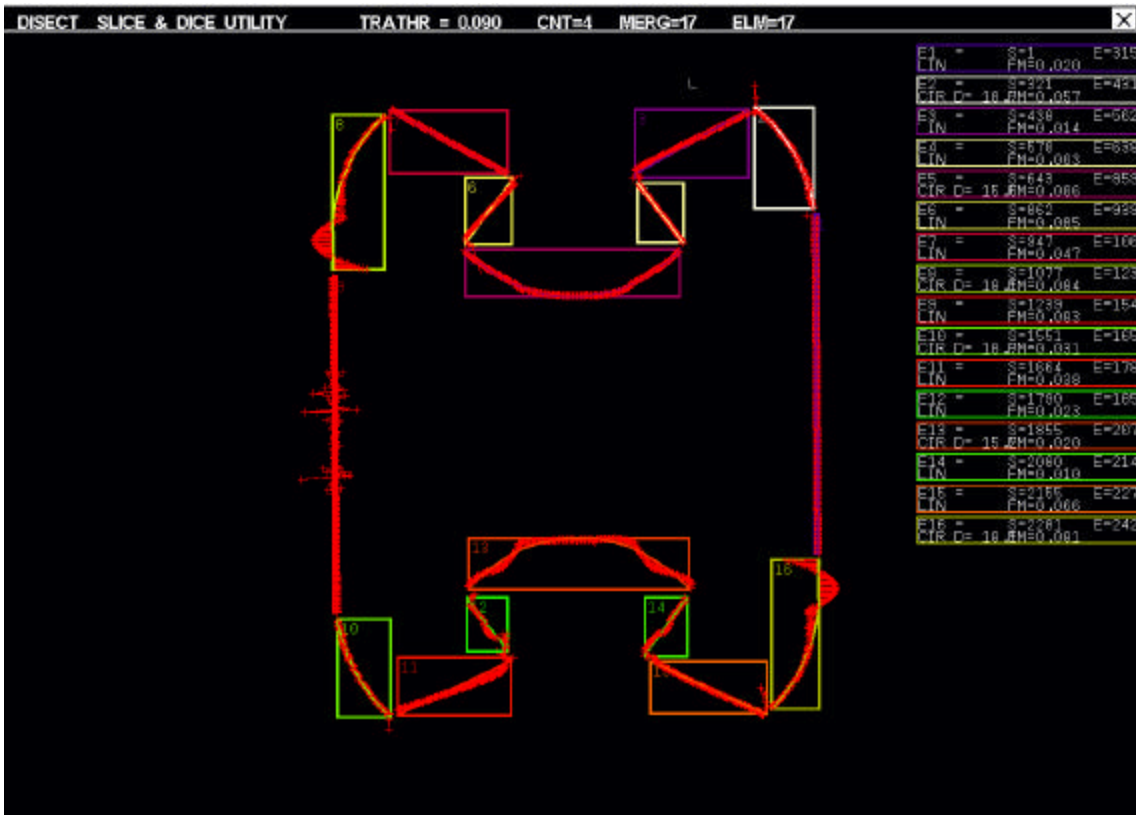
Machine tools and their controls have been optimized over the centuries so that they bring power and remove material from a workpiece. The attempts of on machine tool probing have been limited in accuracy and software scope.

The future of EMD will bring the full power of micro inch accuracy's and truly flexible and powerful software to bear directly on the manufacturing process. Please bring us your metrology problems and see what EMD can come up with.

Questions & Answers From Sceptre Users

I need to measure and reverse engineer a continuous curve made up of bunch of feature circles and lines. I know how to cut it up with the point editor but I end up guessing at the transition points from one feature to the next.
Tim from Nebraska

You need to get familiar with the **DISECT** command. Set the **TRATHR= .001** transition threshold to max form that you will allow each feature to have. For example a feature like a circle should be a circle within some tolerance. The routine will then slice and dice the data and actually generate the program code with the transition points in it.



Typical section of code generated by **DISECT\LRN** command.

```
REM
REM LEARNED SECTION OF PROGRAM FROM DISECT COMMAND
REM-----
REM
REM Element of Disect= 1
SCALE ALL, MX167.450 TO167.647, MY108.490 TO126.339 <- This is where the transition points are
PTDEEX
E1=LINE
ALL
REM
REM Element of Disect= 2
SCALE ALL, MX164.292 TO167.412, MY126.657 TO132.002 <- This is where the transition points are
PTDEEX
E2=CIRCLE
ALL
.
...
```

Note to users familiar with this command, It recently been enhanced so that the user can pre-select the number and types of features rather than guess at the threshold. If anybody is interested we can have a tutorial in a newsletter. Anybody interested?