DMDII'S DIGITAL MANUFACTURING FLOOR

The centerpiece of the new headquarters is a 24,000 square-foot manufacturing floor that showcases the machines and technology at the heart of DMDII's mission to create a digital thread of technology across the manufacturing process, providing American manufacturers opportunities to harness data to make products better, faster and more cost-competitive.

The floor has seven cells, each designed to develop and demonstrate different types of manufacturing technologies and processes all in a digitally integrated environment. Each cell is planned to be converted to a new technology, process or equipment mix as often as once a year to accommodate advancements in technology, meet the needs of the Institute membership and support the Institute's project calls.

The facility's infrastructure has been designed to a lean and agile design concept that will easily allow the transformation of a cell when needed. The type of manufacturing and components to be produced will vary and depend on the project call demonstrations and research.

*The Facility is also available for Research, Development and Testing not related to specific projects.

*All DMDII Manufacturing Lab activity is subject to DMDII evaluation and approvals.

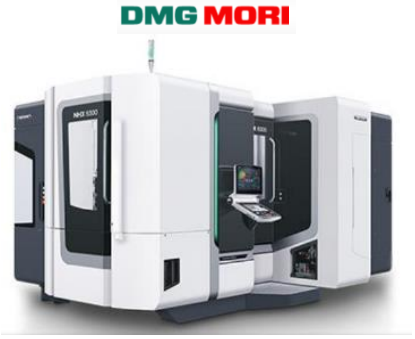
The DMDII Manufacturing Lab currently features nearly $5 Million in loaned equipment, including:

DMDII'S DIGITAL MANUFACTURING FLOOR

Cell 1) Multi-Axis Complex Machining: These two complex machining centers represent the highest level of machining technology. Multi-axis machines like the NHX 6300 and NZ2000 allow the user to machine, or cut away, material from multiple directions in a single setup. With no need to reposition the material being cut, these complex machines streamline the manufacturing process. For example, these centers can cut all the dimples around a golf ball in a single machine. Provided by DMG MORI

Software partners: Forcam/Sytem Insights/DMG Mori Messenger

Highlights NHX 6300



- DDM (Direct Drive Motor) on the B-axis (option)
- Rapid traverse rate (X/Y/Z): 60 m/min
- Direct scale feedback as standard
- High-rigidity bed with three-point support
- High-rigidity spindle with a large-diameter bearing
- Ring type magazine (60 tools) offers high-speed indexing
- The reduction in standby power

More detailed information click link:

http://en.dmgmori.com/products/milling-machines/horizontal-machining-centres/nhx/nhx6300

Highlights NZX 2000

- BMT (Built-in Motor Turret) is used
- Y-axis function for all 3 axes (3 turret spec)
- ORC (Octagonal Ram Construction) is used for Turret 2 in Y-axis direction
- Y-axis travel is 110mm for all turrets (Y-axis spec)
- Turtleneck structure prevents chips from accumulating on lower turret
- Rapid traverse rate （X/Y/Z）：30/20/50 m/min

Software partners: Forcam/Sytem Insights/DMG Mori Messenger

More detailed information click link:

http://en.dmgmori.com/products/lathes/production-lathes/nzx/nzx2000t3y3

Cell 2) Standard CNC Machining: These four standard machining technology machines: two, 2-axis horizontal lathes (the ST-10 and ST-30) and two, 3-axis vertical machining centers (VF-2SS and VF-5/50) can be found in any size machine shop across the U.S. Provided by Haas

Software Partners: Forcam/Sytem Insights/DMG Mori Messenger/VeriCut/Esprit/Siemens NX

ST-10

CNC Lathe; 14" x 14" (356 x 356 mm) max capacity, 1.75" (44 mm) bar, 16.25" (413 mm) swing, 15 hp (11.2 kW) vector drive, 6000 rpm, A2-5 spindle, 6.5" (165 mm) chuck, 12-station bolt-on turret, 15" color LCD monitor, memory lock key switch, USB port and rigid tapping. Standard tool holder kit included with BOT or Hybrid turret.

More detailed information click link:

http://haascnc.com/mt_spec1.asp?id=ST-10&webID=2AXIS_STD_LATHE#gsc.tab=0

ST-30

CNC Lathe; 21" x 26" (533 x 660 mm) max capacity, 3.0" (76 mm) bar, 31.75" (806 mm) swing, 30 hp (22.4 kW) vector drive, 3400 rpm, A2-6 spindle,10" (254 mm) chuck, 12-station bolt-on turret, 15" color LCD monitor, memory lock key switch, USB port and rigid tapping. Standard toolholder kit included with BOT or Hybrid turret. The Haas Bar Feeder is not compatible with the optional gear-drive spindle.

More detailed information click link:

http://haascnc.com/mt_spec1.asp?id=ST-30&webID=2AXIS_STD_LATHE#gsc.tab=0

VF-2SS

Haas Automation Inc

Vertical Machining Center; 30" x 16" x 20" (762 x 406 x 508 mm), 40 taper, 30 hp (22.4 kW) vector drive, 8100 rpm, inline direct-drive, 20-station carousel tool changer, 1000 ipm (25.4 m/min) rapids, 1 MB program memory, 15" color LCD monitor, USB port, memory lock key switch, rigid tapping and 55-gallon (208 liter) flood coolant system.

More detailed information click link:

http://haascnc.com/mt_spec1.asp?id=VF-2&webID=40_TAPER_STD_VMC&id1=VF-2SS#comparespec&gsc.tab=0

VF-5/50

Vertical Machining Center; 50" x 26" x 25" (1270 x 660 x 635 mm), 50-taper geared-head, 30 hp (22.4 kW) vector drive, 7500 rpm,30+1 side-mount tool changer, 710 ipm (18 m/min) rapids, color remote jog handle, programmable coolant nozzle, automatic chip auger, 1 MB program memory, 15" color LCD monitor, USB port, memory lock key switch, rigid tapping and 95-gallon (360 liter) flood coolant system.

More detailed information click link:

http://haascnc.com/mt_spec1.asp?id=VF-5/50&webID=50_TAPER_STD_VMC#gsc.tab=0

The complex machine centers in Cell #1 and the standard machine centers in Cell #2 can both be integrated into the digital thread. Cells #1 and #2 demonstrate how any level of machine tool at any size company in the U.S. can be digitally connected to continuously improve performance.

Cell 3) Emerging Technologies: This cell includes a Haas UMC-750 5-Axis vertical machining center. Goal is to expand cell to include 3D printing, robotics and optical scanning. This cell demonstrates how new technologies, like 3D printing, can be integrated into existing manufacturing processes. For example, the 3D printing machine can print an object, like a computer mouse, which can then be optically scanned and compared with a model to ensure that it has been correctly manufactured. Digital integration with the 5-axis machine can then allow for the mouse to be custom-machined to fit the specific contours of any individual hand. Provided by Haas

Software Partners: Forcam/Sytem Insights/DMG Mori Messenger/VeriCut/Mastercam/Esprit/Siemens NX/Big Kaiser

Haas Automation Inc

UMC-750

5-Axis Vertical Machining Center; 30" x 20" x 20" (762 x 508 x 508 mm), with 630 x 500 mm integrated 2-axis trunnion rotary table, 40 taper, 30 hp (22.4 kW) vector drive, 8100 rpm, inline direct-drive, 40+1 side mount tool changer, 1200 ipm (30.5 m/min) rapids, spindle orientation, macros, coordinate rotation & scaling, Wireless Intuitive Probing System, second home button, color remote jog handle, power-failure detection module, 750 MB+ expanded memory, 15" color LCD monitor, USB port, memory lock key switch, rigid tapping and 75-gallon (284 liter) flood coolant system.

More detailed information click link:

http://haascnc.com/mt_spec1.asp?id=UMC-750&webID=5AXIS_VMC#gsc.tab=0

Cell 4) Metrology Lab: This cell has an environmentally controlled room that includes a Zeiss Prismo Navigator, one of the most technologically advanced coordinate measuring machines in the world and an Alicona InfiniteFocus G4 optical surface measurement system. Equipment in the Metrology Lab is used to take precisely accurate measurements to ensure that parts are consistently and correctly manufactured. For example, a part created on the manufacturing floor can be measured against the original 3D model in the Metrology Lab. Process can then be fine-tuned and re-measured to make the part right every time. Advanced measuring machines like the ones found in the Metrology Lab can feed data back to the machine tools, creating a continuous feedback loop to keep each element of the manufacturing process in control. Provided by Zeiss and Alicona

ZEISS PRISMO Navigator

Ideal for All Measuring Tasks

PRISMO navigator from ZEISS is synonymous around the world for high-speed scanning and maximum accuracy near production. With length measurement error of just 0.5+L/500 millimeters, ZEISS PRISMO ultra is ideal when maximum demands on precision have to be met.

More detailed information click link:

http://www.zeiss.com/industrial-metrology/en_de/products/systems/bridge-type-cmms/prismo-navigator.html

Alicona InfiniteFocus G4

Optical 3D micro coordinate measurement technology in research and production

Alicona is an international provider of optical 3D measurement systems in high resolution. Alicona measurement devices are successfully used as tool measurement devices for cutting edge measurement, as roughness measurement devices and as form measurement devices. Focus-Variation, the core technique of the InfiniteFocus line, combines the traditional surface metrology and the micro coordinate measurement technology. Users can measure form plus roughness with only one system.

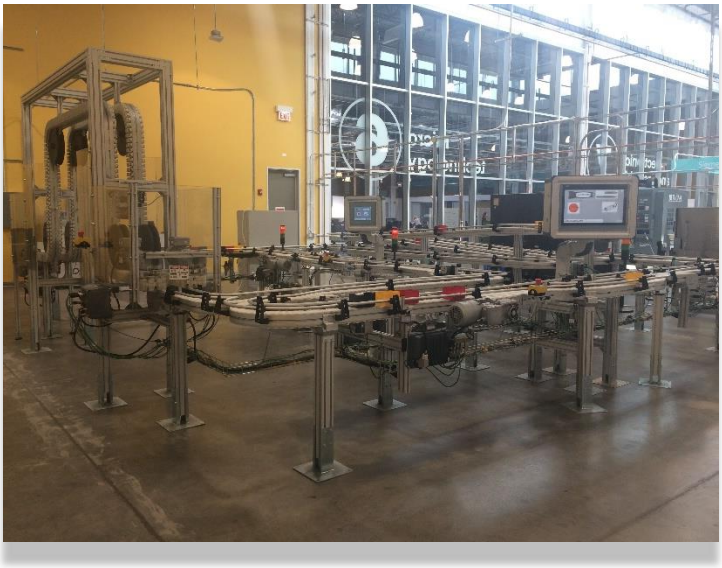
More detailed information click link:

http://www.alicona.com/home/products/infinitefocus.html

Cell 5) Material Management

Conveyor

The conveyor system illustrates Siemens hardware control (level 0,1,2) capabilities and currently runs the carriers in a loop. Siemens simulation and automation SMEs are currently building a Virtual Commissioning environment which will integrate to both the conveyor hardware and the core demonstrations into one cohesive demo.



Sensor Data Collection Technology

Bluvision is leading innovation in the IoT space as market leaders in sensor beacons. They are pioneers of achieving cloud connectivity without the need for smartphone applications and the first to offer a cloud solution that allows remote, worldwide beacon deployment, fleet, workflow and event management. Bluvision's simple architecture provides enterprises scalable solutions for Asset Tracking for location, health and performance.

Blue vision technology is on and around the conveyor collecting data and mapping:

- Motor temperature
- Motor vibration
- Product movement
- RFID badges

Cell 6) Micro/Mini Machining made intelligent: This cell will be developed around the latest technology in machining extremely small work pieces while demonstrating the digital integration throughout the Manufacturing Lab. Currently the following equipment is available in Cell 6.

BT-360D

12,000 RPM High Speed Spindle, High Speed L-M Guideways Linear Core Construction with dual pallet table

- Travel: X -axis 20.47″, Y-axis 14.17″, Z-axis 13.7 “
- Spindle Speed: 12,000 RPM
- Spindle Power: (Max./Cont.): 7.5 / 5 HP
- Floor Space (LxWxH): 72.44″ x 133.35″ x 101.8″

More detailed information click link:

http://www.bulovatech.com/product/bt-360d/

VMC-4220B

12,000 RPM High Speed Spindle, Box Way Construction On All Three Axes.

- Box Way Construction On All Three Axes.
- Travel: X -axis 42.0″, Y-axis 20.9″, Z-axis 30.7″
- Spindle Speed: 12,000 RPM
- Spindle Power (Max./Cont.): 20/15 HP
- Floor Space (LxWxH): 125″ x 96″ x 120″

More detailed information click link:

http://www.bulovatech.com/product/bt-360d/

L-2100

Linear motion on X and Z axis

- Travel: X-axis 8.3″, Z-axis 13.8″
- Spindle Speed: 4,500 RPM
- Spindle Power (Max./Cont.): 20 HP
- Floor Space (LxWxH): 96.5″ x 65″ x 73″

More detailed information click link:

http://www.bulovatech.com/product/3612/

Additional hardware and software by Omative will monitor, optimize and automate machine cutting conditions.

BT-380

- 12,000 RPM High Speed Spindle, High Speed L-M Guideways Linear Core Construction
- Travel: X-axis 20.47″, Y-axis 14.96″, Z-axis 13.8″
- Spindle Speed: 12,000 RPM
- Spindle Power (Max./Cont.): 7.5/5 HP
- Floor Space (LxWxH): 67.7″ x 82.4″ x 94″

http://www.bulovatech.com/product/bt-380/

OM-2A

Haas Automation Inc

Office Mill; 12" x 10" x 12" (305 x 254 x 305 mm) (xyz), ISO 20 taper, 5 HP (3.7 kW) vector drive, 30,000 rpm, 20-station automatic tool changer, coolant pump, high-speed machining, 750 MB program memory, memory lock key switch, 15" color LCD monitor and USB port. 208-250VAC 50-60Hz, single-phase power only, with NEMA L6-20P plug.

More detailed information click link:

http://haascnc.com/mt_spec1.asp?id=OM-2A&webID=OFFICE_MILL_VMC#gsc.tab=0

Cell 7) Virtual Digital Thread & Augmented Reality:

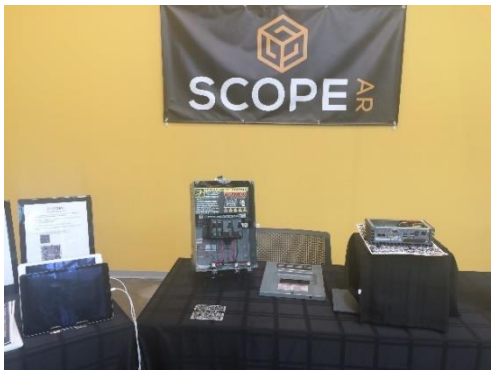
Siemens Digital Enterprise

The ten stations represent different disciplines and phases of development for a manufacturer, with one side being product creation and the other side being facility/process design.
The goal is to show how in the Digital Enterprise all of these activities are linked by the Digital Thread.
To illustrate this, there are high-level presentations at each station that walk through that station's activity.
To-be state will be to use a combination of presentations and live production software to present and demonstrate a virtual Digital Thread.

Light Guide Systems

The study, performed in August 2014 by OPS Solutions at Chrysler's World Class Manufacturing Academy (WCMA), compared the effectiveness of paper-based Standard Work Instructions (SWIs) and the OPS Solutions' Light Guide System of visual workflow and auto-confirmation. The benchmarking was performed on both an assembly process and a logistics process. Both the paper-based SWI and Light Guide had a chance to be first and thus normalized for any learning curve effects. The results are clear: when processes were enabled by Light Guide Systems, there were significant improvements in quality, cycle time and throughput.

Scope AR



Our content creation platform allows the rapid development of augmented reality work instructions, allowing you to use converted 3D models, add engaging animations, text, images, videos, checklists, etc. in a branched workflow, to give intuitive, visual instructions. Once 'smart' instructions are deployed into the field, the digital instructions automatically start collecting valuable data such as time per step, user and usage information, geo location, etc to give insight to an organization and empower users to continuously improve their processes.

Tool Crib & Tool Room:

Speroni MAGIS

Tool Presetting & Measuring System

Speroni MAGIS Tool Presetting & measuring system is a new line of tool presetting and measuring systems & controls which revolutionizes the way one uses software in the tool measuring world. In today's world, software companies add screens, windows and menus in order to give the user more features. Speroni's MAGIS control for tool presetting and measuring combines all of the needed features and functions in a user friendly, clean and trouble free single screen user interface.

More detailed information click link:

http://us.bigkaiser.com/products/tool-presetters/speroni-magis.html

TM-2P

Tool Room Mill with Tool Changer; 40" x 16" x 16" (1016 x 406 x 406 mm), 40 taper, 7.5 hp (5.6 kW) vector drive, 6000 rpm, full enclosure, 10-station automatic tool changer, Intuitive Programming System, 1 MB program memory, memory lock key switch, 15" color LCD monitor and USB port and 20-gallon (76 liter) flood coolant system.

More detailed information click link:

http://haascnc.com/mt_spec1.asp?id=TM-2P&webID=TOOLROOM_MILL_VMC#gsc.tab=0