TechSolve
ADVANCED MACHINING R&D

HMI Design for Smart Manufacturing

Radu Pavel, Ph.D.
VP of Engineering
Chief Technology Officer

PHM Conference
St. Petersburg, Florida
October 2017

TechSolve, Inc.

Cincinnati-based, not-for-profit organization founded in 1982 by Cincinnati Chamber of Commerce, City of Cincinnati, and University of Cincinnati

- NIST-Manufacturing Extension Partnership (MEP) affiliated Center
- Hundreds of member organizations – manufacturers, research organizations, universities
- Core Competencies: Process/performance improvement and advanced manufacturing, machining & grinding technology
- 40+ Member Team: Engineers, MBA's, PhD's, chemists, and former business owners

Fully-Instrumented Machining Laboratory

TechSolve's M. Eugene Merchant Technology Development Center (formerly MetCut Research Machining Laboratory, founded 1948)
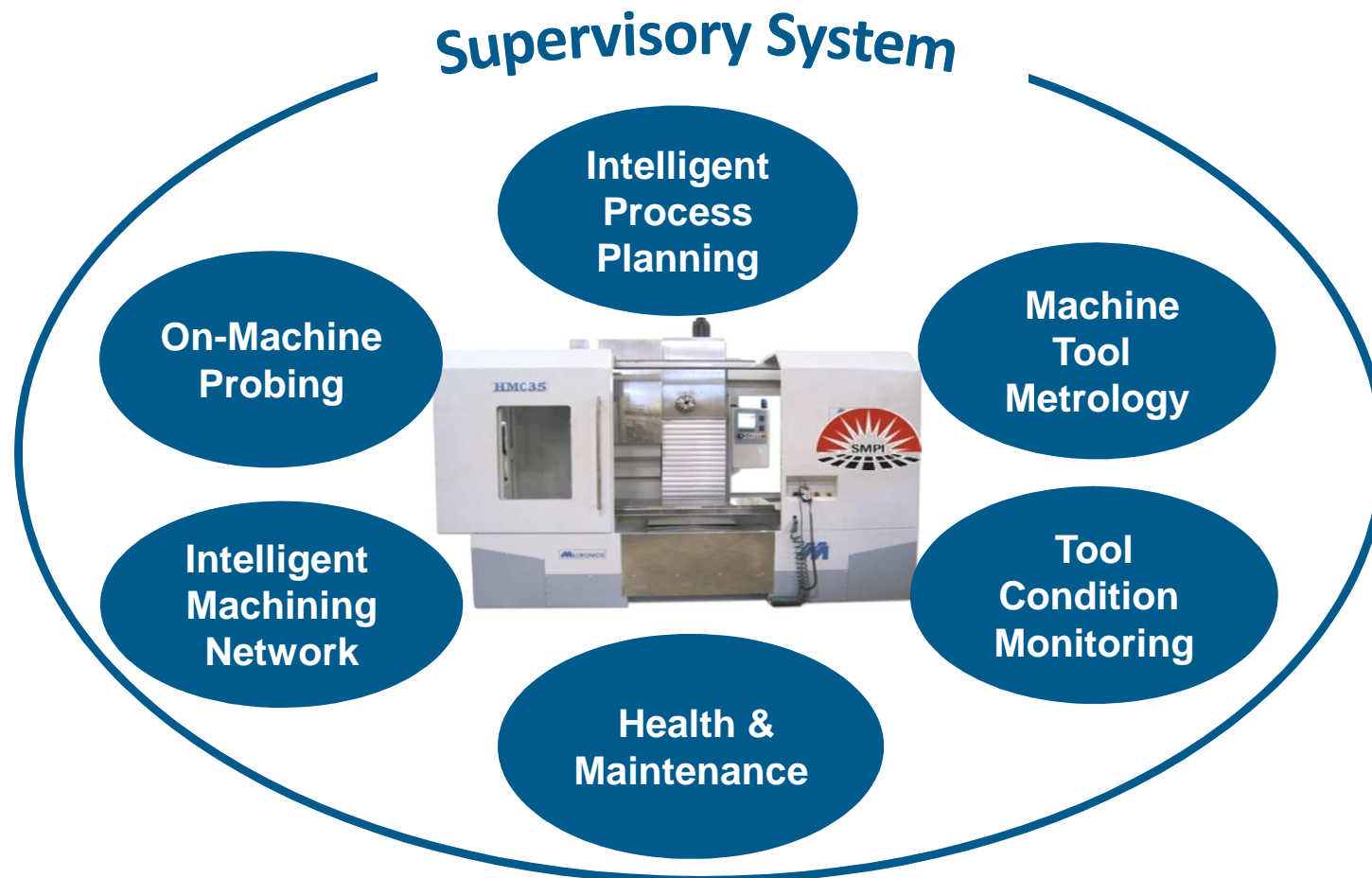
Major Equipment List

- Mazak Integrex i200S Mill Turn
- Makino V55 – 3 Axis VMC w/20K spindle
- DMG DMU-50 – 3+2 Axis VMC
- DMG DMU-70 eVo Linear – 5 Axis
- Hardinge Cobra 65 – 2 Axis turning center
- Milltronics HMC35 – 4 Axis HMC
- Chevalier Smart B1224II CNC Grinder
- Sheffield Cordax D-8 CMM
- Kistler Force Dynamometers
- Spindle and Feed-axis Test-beds
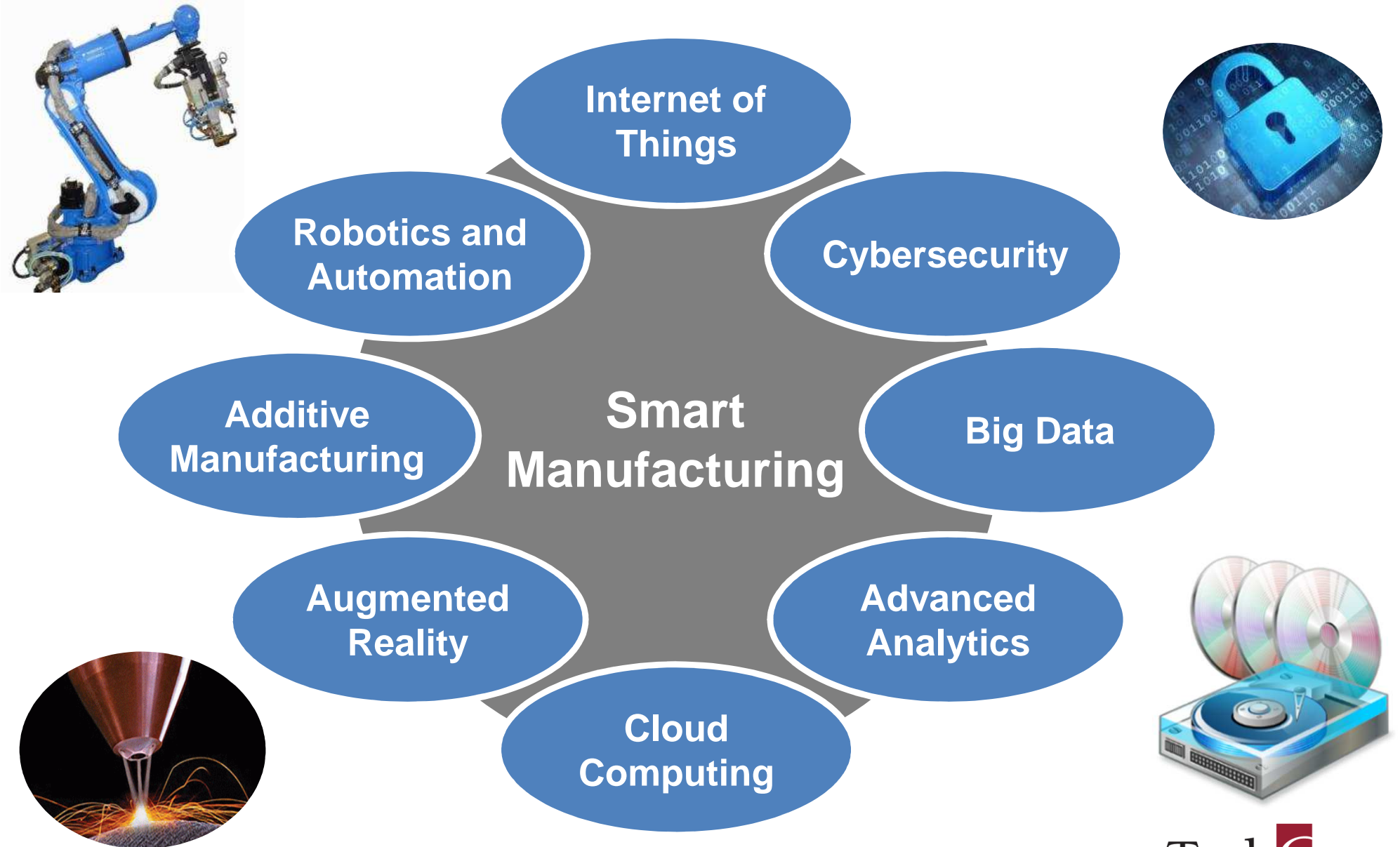- Keyence VHX Digital 3D Microscope
- Fluids Lab

TechSolve

Smart Machine Platform Initiative

Be the framework for the identification, development, and transition of technologies that recognize the goal of "First Part Correct" manufacturing.

Supervisory System

- Intelligent Process Planning
- On-Machine Probing
- Machine Tool Metrology
- Intelligent Machining Network
- Tool Condition Monitoring
- Health & Maintenance

Smart Manufacturing

Internet of Things

Cybersecurity

Robotics and Automation

Big Data

Additive Manufacturing

Smart Manufacturing

Augmented Reality

Advanced Analytics

Cloud Computing

TechSolve

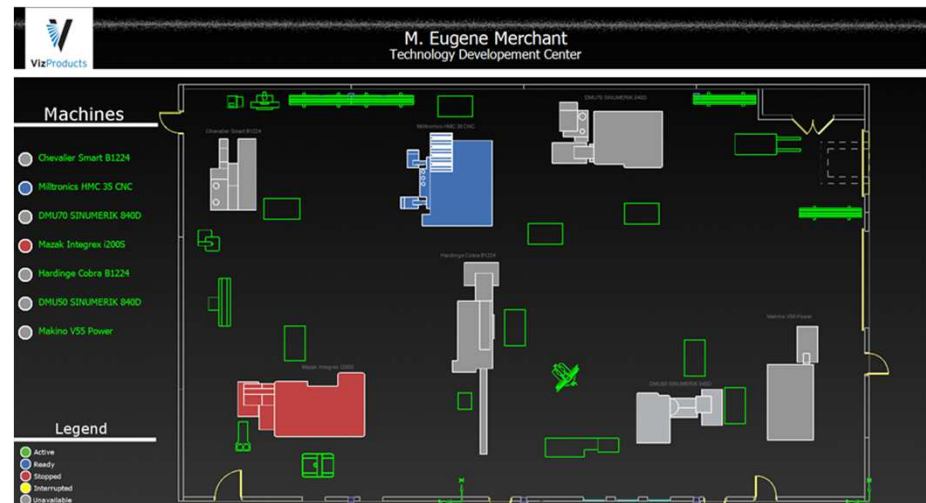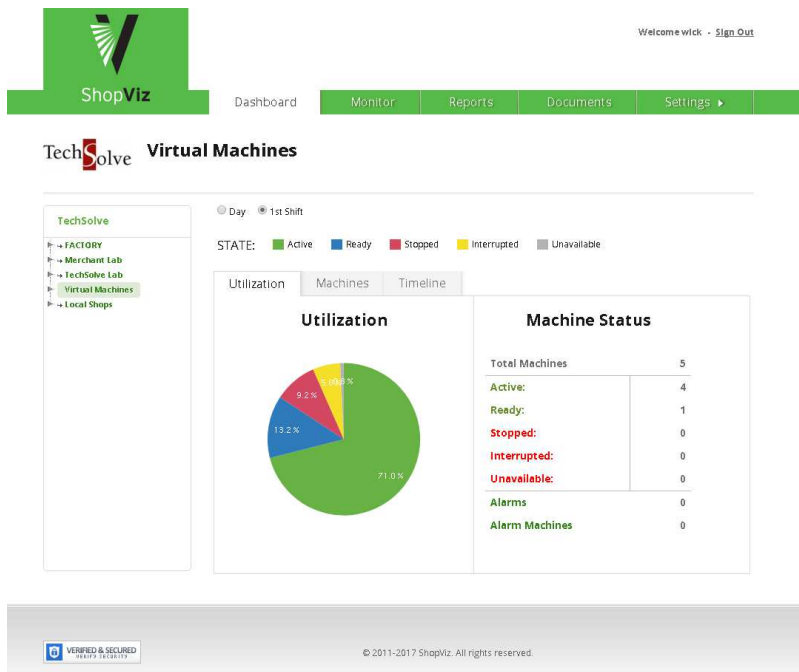# VIZProducts® – HMI Design and Development

MTConnect® - based equipment and process monitoring & reporting software

VIZ Adapter®: MTConnect® - based adapters

ShopViz®: Enterprise-wide monitoring & reporting software

MiniViz®: Local, simple monitoring & reporting software

© 2017 TechSolve Inc. All Rights Reserved.

HMI – What Industry Wants

- Safety

- Reliability

- (Cyber)security

- User friendliness

- Remote operation

- Minimal learning curve

- Digitization & Standardization

- Easy integration with other systems

- Unattended operation ("set it and forget it")

- Easy to understand (particularly error messages)

"Many HMIs are developed with little user input. Many [developers] do not have an HMI design guideline. This means every HMI they receive on every project will be different. This lack of standardization will naturally cause problems. Many HMIs are created by white collar, college educated engineers; yet the systems are used by blue collar, high school educated operators."
Paul Gruhn, P.E., Rockwell Automation

TechSolve

Contact

Radu Pavel, Ph.D.

VP of Engineering

Chief Technology Officer

TechSolve, Inc.

6705 Steger Drive,

Cincinnati, OH 45237

Phone: (513) 948 2062

pavel@techsolve.org

www.techsolve.org

CINCINNATI, OH