

NEW Manufacturing Alliance
INDUSTRY 4.0 TASK FORCE – WEBEX MEETING MINUTES
Thursday, February 25, 2021 – 1:30 to 3:00 PM

ATTENDEES: Aaron Koats-YASH Technologies, Adonica Randall-Abaxent, Ahmed Nasif-UWO, Allie Leidy-JLG Industries, Amy Kox-NWTC, Ann Franz-NEWMA, Aslinn Merriman-Sargento, Barb Lamue-New North, Brenden Olds-LTC, Brendon Wallace-Trillium Staffing, Brian Schauf-Schreiber Foods, Brook Sumner-FVTC, Chris Lipski – Vantage Financial, Chris White-CMD, Christopher Morgan-MTU, Dan Fuhrman-MTU, Dan Heiser-SNC, Debbie Thompson-NWTC, Eric DeKorne-Greater Green Bay Chamber, Gerry Aase-SNC, Greg Kleinheinz-UWO, Greg VandenLangenberg-Amcor, Jake Manchester-MTU, Jason Trombley-NWTC, Jerry Murphy-NEWERA, Jill Thiede-NWTC, John Irwin-MTU, Joe Girard-Wipfli, John Katers-UWGB, Josh Delforge-Marquis Yachts, Mark Kralovec-PCMC, Matt Bishop-FVTC, Mike Schlagenhauser-Acuity, Pawel Olszewski-UWO, Robin Reese-LTC, Scott Wagner-MTU, Sheila Schetter-LTC Steve Meyer-FVTC, Steve Straub-FVTC, Tony Olson-Excelion Partners, Uli Unterriker-Optima Machinery Corp.

WELCOME & INTRODUCTIONS – BRIAN SCHAUF

UPDATES: DATA ANALYTICS & DIGITAL SKILLS TRAINING

DATA ANALYTICS TRAINING

The 2nd cohort is finishing the training. 64 people, representing 40 different companies. The weekly classes had great participation, averaging 50 people. The next cohort will begin April 12. Ann will be sending registration information.

DIGITAL SKILLS TRAINING

Ann will be sending information regarding the next phase of LinkedIn training offerings – Working with Computers & Devices and Digital Citizenship (Cybersecurity).

UPDATE: PAINT COHORT PROJECT

This topic is tabled until April's meeting.

HIGHER EDUCATION'S INDUSTRY 4.0 DEGREES NOW & FUTURE – HOW TO WORK WITH THEIR STUDENTS ON INDUSTRY 4.0 LED PROJECTS

FOX VALLEY TECHNICAL COLLEGE

Steve Meyer, K-12 Involvement, meyerst@fvtc.edu

Steve Straub, Program/Industry Training, straub@fvtc.edu

Brooke Sumner, IT – Data Specialist, sumner@fvtc.edu

A full-time faculty member has been added to assist with their new Industry 4.0 programs. The College has made a significant investment in their new labs. Tours will be conducted upon their completion.

FVTC INDUSTRY 4.0 DEGREE PROGRAMS

IT – Data Specialist

- Due to Launch in Fall 2021
- Associate Degree - 60 Credits
- Program will implement eight new courses based in data programming.

Automation Degree Pathway

Industrial Maintenance Foundations (C) – *Credits can be applied to the TD below.*

Industrial Maintenance Mechanic – (TD) – *Credits can be applied to either of the AAS programs below.*

Automated Manufacturing Systems (AAS) - *Can transfer credits to UW partners.*

Electro-Mechanical (AAS) - *Can transfer credits to UW partners.*

Industry 4.0 Apprenticeship

Industrial Electrician

Electrical & Instrumentation

Industry Cohort Training

Industrial Maintenance Fundamentals (C): 20 Companies, 161 Students

Advanced Automation & Maintenance (C): 14 Companies, 24 Students

Both programs have been very successful.

Mechanical Design & Manufacturing Engineering Technology

- The use of 3D printing and prototyping technologies (FDM & DLP)
- Used for proof of concept, production tooling, small quantity machine runs (die design)
- Use multiple types of machines

K-12 Outreach Initiatives

- Dual credit opportunities
- Teacher Professional development
- Summer camps (virtual & in-person)
- Business/Industry Partnerships

Via FVTC's K-12 outreach initiatives, the College promotes a passion to pursue Industry 4.0 degrees. Their Industry 4.0 camps are offered Statewide and across the country. Future FVTC Industry 4.0 initiatives include a focus on agriculture.

Partnership Opportunities

- Hire FVTC Students
- Lunch-n-Learns/Clubs
- Summer Camp Support
- K-12 Sponsorship
- Initial Invitation to Tour

LAKESHORE TECHNICAL COLLEGE

Sheila Schetter, Sheila.Schetter@gotoltc.edu

LTC will be offering a new four course certificate next year, introducing students to Industry 4.0. The four courses are part of their new Manufacturing Engineering Technology program and utilizes their full robotics lab. The certificate incorporates online learning, with hands-on assessments.

Electro-Mechanical Maintenance (2 Year AD)

- Embedded 1 Year TD
- 2nd Year: Robotics, PLCs, Motors & Controls, Devices & Transducers, Electrical

Electro-Mechanical Automation (2 Year AD)

- Robotics Advanced - ir 2D vision
- Motors & Controls – Wiring & programming frequency drives
- Devices, Transducers, & Analog Controls
 - Closed Loop Controls – temperature, pressure, flow, etc. (intro & advanced)
- Industrial Troubleshooting – Solving faults & In-depth problem solving

LTC's Electro-Mechanical credentials include FANUC Educational Center & SACA Certifications – Micro-Credentials.

Electro-Mechanical Embedded Certificate

Industrial Technician – Automation (13 credits)

- PLC's
- Robotics
- Touchscreens
- Networking

Manufacturing IT

Year 1 – Meta Major in IT

- Networking
- PC Support

- Server Administration
- Information Security

Year 2 – Industrial Internet of Things – 4.0 course/certification and Electro-Mechanical Coursework

- Electricity
- PLC's

- Touchscreens
- Industrial Networking

Mechanical Design & Engineering Technology (2 Year AD)

- Drafting Embedded TD – AutoCAD, Solidworks, CREO
- 3D Printing
- Reverse Engineering
- Prototyping
- Manufacturing Processes
- Robotic Maintenance
- HSM for Solidworks

LTC will be offering a cybersecurity certificate beginning in fall 2022. Apprenticeship opportunities are available for: industrial electrician, maintenance mechanic, maintenance technician, and mechatronics.

Workforce Solutions

Courses can be taught onsite.

- Customized Training
- Assessment Services: Mechanical, Electrical, PLC, and more...
 - Grants: Fast Forward and WAT
- Seminars

LTC has articulation agreements with UW Oshkosh and UW Green Bay for the following programs.

- Mechanical Engineering Technology
- Electrical Engineering Technology

Dual Credit – High School

- Intro to Robotics
- Industrial Wiring
- Intro to Mechatronics
- Intro to Industrial Control Systems
- Intro to Industrial Internet of things

Employers are welcome to promote their jobs on the LTC campus.

MICHIGAN TECHNOLOGICAL UNIVERSITY

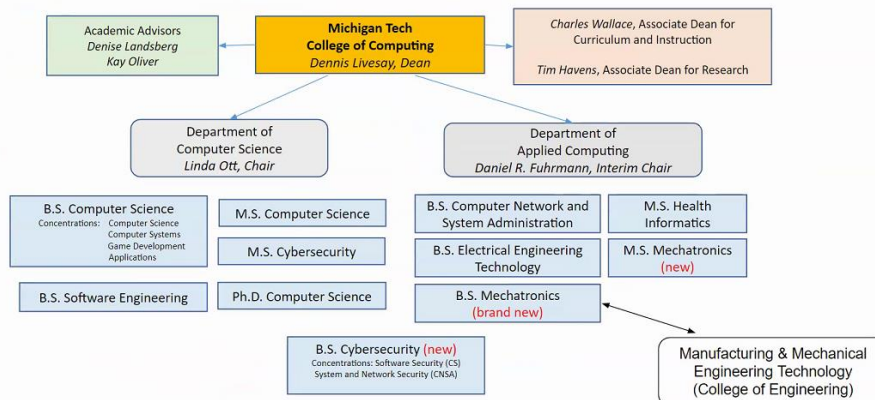
Dan Fuhrmann, Interim Chair, Dept. of Applied Computing - fuhrmann@mtu.edu

John Irwin, Chair, Manufacturing & Mechanical Engineering Technology – jirwin@mtu.edu

Christopher Morgan, Assistant Director of Educational Partnerships, Enterprise Program – cjmorgan@mtu.edu

Scott Wagner, Associate Professor, Manufacturing & Mechanical Engineering Technology – swagner@mtu.edu

College of Computing Organizational Structure



The College of Computing was launched in 2019.

Digital Transformation of the Workforce

GOAL: To prepare the next generation and upskill the current workforce in Michigan and Wisconsin to meet the challenges and opportunities of Industry 4.0.

- Engagement with Industry
- Engagement with Community Colleges
- Modernization of the Curriculum

Manufacturing & Mechanical Engineering Technology (MMET) Department – Degree Programs:

- BS in Mechanical Engineering Technology
 - Manufacturing Focus
 - Power Systems Focus
 - Computer Aided Engineering Focus
- Minor in Manufacturing Systems
- BS in Mechatronics (Interdisciplinary)
- MS in Mechatronics (Interdisciplinary)
- High School CTE Mechatronics
- Grad Cert in Manufacturing Engineering
- Future: MS in Manufacturing Engineering

Enrolled undergraduates: 170, Faculty: 9

Mechanical Engineering Technology – Curriculum Overview

Core curriculum focused on design and manufacturing.

- Material, statics, strength of materials, dynamics, fluid mechanics, thermo, heat transfer
- Basic electronics, electrical machinery, instrumentation
- Machine tool fundamentals & applications
- Practical applications in parametric modeling
- Manufacturing processes
- Machine design (2 courses)
- Product design & development
- Applied quality techniques
- Thermal-fluids lab
- Senior design or enterprise

MMET Undergraduate Courses – Industry 4.0

- Industrial Systems Simulation
- Advanced Hydraulics: Electro-hydraulic Components & Systems
- Product Design & Development
- Lean Manufacturing & Production Planning
- Computer Aided Manufacturing
- Facilities Layout and Safety Design
- Advanced Manufacturing

MMET Graduate Courses

- Dynamics and Kinematics of Robotics Platforms
- Controls of Dynamic Systems
- Key Factors of Holistic Safety
- Industry 4.0 Concepts
- Organizational Leadership
- Tolerance Analysis with GD&T
- Design for Additive Manufacturing

All classes have components of Industry 4.0 in them. A certificate program is being started.

Senior Capstone Design & Enterprise – Challenges teams of engineering students to develop a design solution to a real-world, industry problem. MTU is focused on a hands-on experience and takes pride in any real-world industry sponsored projects.

- **Course Focus** – design process, professional development, project management (2 credits)

- **Project Work** – two semesters, team-based, external sponsors as clients and mentors (4 credits)
- **Scope** – open-ended solutions, entry-level engineering
- **Team Composition** – single / multidisciplinary within engineering, 4-5 students
- **Enabling Infrastructure** – extensive on-campus facilities for design, analysis, fabrication, validation
- **Learning Outcomes** – ‘design-build-test’...plus communication, teamwork, economics

NORTHEAST WISCONSIN TECHNICAL COLLEGE

Jill Thiede (Presenter), Associate Dean of Engineering Technologies – jill.thiede@nwtc.edu

Jason Trombley, Trades and Engineering Technologies Faculty – jason.trombley@nwtc.edu

Sue Zittlow, Associate Dean of College of Business – sue.zittlow@nwtc.edu

The Big 3 at NWTC – Enabling Technologies

- Additive Manufacturing
- Augmented Reality & Virtual Reality
- IoT (Data Analytics, etc.)
- Cloud Computing, Cybersecurity, System Integration, Big Data

NWTC Current Programs with Industry 4.0 Technology Skills			
Engineering Technologies	Information Technologies	New Program for 2021	New Certificates for 2021
<ul style="list-style-type: none"> • Electro-Mechanical • Electrical Engineering Tech • Mechanical Design • Prototype & Design • Automation Engineering • Manufacturing Engineering Technology 	<ul style="list-style-type: none"> • Computer Support Specialist • Web Development • Software Developer • Business Analyst • Security Technologist • Database Development • IT Programming • Web Programming • Cybersecurity • Microsoft Security • Web Design • Visualization Systems Administration 	<ul style="list-style-type: none"> • Data Analytics 	<ul style="list-style-type: none"> • Additive Manufacturing • Data Analytics & Visualization
<p><i>Industry 4.0 skills are embedded across many existing programs and credentials. There are opportunities for new certificates to ‘fill the gaps’ and ‘upskill’ existing employees.</i></p>			



Above is one example, starting with high school students, showing the career pathway.

NWTC has a new [I4.0 Landing Page](#).

Grants

- HP Educase Campus of the Future
- NSF Seminar Grant Request
- NEW ERA Computer Support - NWTC is working on a computer support degree with NEW ERA
- WAT Grants - CTED partners with companies on recent WAT Grants for gaining I4.0 skills.

Industry Pilot Programs

- OEM Manufacturing Business Analyst
- IOT Data Collection & Visualization for NWTC HVAC System
- NEWMA Data Analyst Program to follow-up LinkedIn Learning

NWTC is focused on building a pipeline with K-12 partners. Support and internships are needed for their students.

ST. NORBERT COLLEGE

Gerry Aase, Associate Professor, Business Administration, gerry.aase@snc.edu

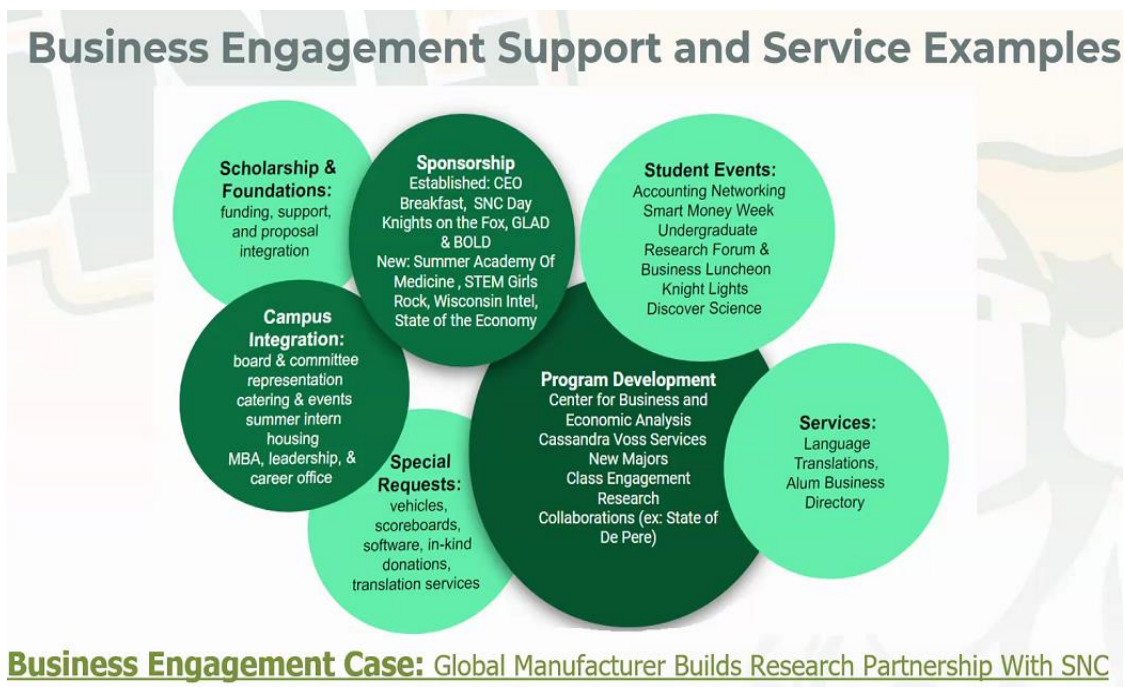
Dan Heiser, Dean, Schneider School of Business & Economics, dan.heiser@snc.edu

Business Engagement

Amy Chandik Kunding, Director of Business Engagement (including company projects), Amy.Kunding@snc.edu

A full range of opportunities is offered within SNC that maximizes the ability for business to attain their goals.

SNC Business Engagement Development		
<ul style="list-style-type: none"> • Alumni Relations • Donor Development • Tuition & Program Support • Valued Community Event Provider • Campus Resources 	<p>Business ROI</p> <ul style="list-style-type: none"> • Talent Pipeline • Research & Analysis • Faculty Expertise • Investment/Giving Alignment 	<p>Student & Class Experiences</p> <ul style="list-style-type: none"> • Theory in Application • Skill Differentiation • Increased hire-ability • Internships • Connection to Business/Community



Actuarial Mathematics Concentration

The Math Discipline at SNC recently had an Actuarial Mathematics concentration approved by SNC faculty. Students will take advanced coursework in math, business, and economics and develop skills in probability, statistics, financial modeling, measure and managing risks.

Students should begin graduating with this concentration in May 2025 and will be interested in summer projects and internship opportunities starting soon. Inquiries or requests for more information can be directed to Dr. Seth Meyer at seth.meyer@snc.edu.

Schneider School of Business & Economics

Data Analytics Major – Improving business performance with data-driven decisions

- New for Fall 2020 is a collaboration between SSBE, Math and Computer Science
- Contact Marc Schaffer, marc.schaffer@snc.edu

Center for Business & Economic Analysis – Serves the region through community partner research, community-based research, and presentations. Contact Marc Schaffer for more information.

Business Administration Major – Supply Chain Concentration

SCM concentration will be new for fall 2021. Contact Gerry Aase, gerry.aase@snc.edu

Business Analysis Tools and Business Statistics – Contact Todd Sarnstrom II, todd.sarnstrom@snc.edu

Seeking

- Guest speakers, all levels of BUAD and DATA courses.
- Short cases with data sets for many courses such as BUAD 142 and 228.
- Class projects with data focus.
- Company visits, internships, and capstone projects.
- Advisors and general list of business contacts for SCM concentration.

SNC is a need for real-world projects for their students.

<https://drive.google.com/file/d/1eMv6uNgzyHcSRDfntEekdF5PkY-lxFJp/view?usp=sharing>

UW-GREEN BAY

John F. Katers (Presenter), Dean, College of Science, Engineering & Technology – 920-465-2278 katersj@uwgb.edu

Patricia Terry, Chair of Resch School of Engineering

Jagadeep Thota, Chair of Engineering

Mike Zorn, Associate Dean & Chair of Computer Science

Woo Jeon, Chair of Mathematics & Statics

UW-Green Bay has four campuses serving northeastern Wisconsin - Green Bay, Marinette, Manitowoc, and Sheboygan. The Richard J. Resch School of Engineering is in its third year.

Structure of CSET	
Human Biology <ul style="list-style-type: none">• Human Biology• Master of Athletic Training• MS – Nutrition & Integrated Health (Fall 2021)	Natural & Applied Sciences <ul style="list-style-type: none">• Biology<ul style="list-style-type: none">◦ Aquaculture, Microbiology Emphases• Chemistry (ACS Certification)• Environmental Science<ul style="list-style-type: none">◦ Sustainability Minor• Geoscience• Physics (Minor Only)• Water Science
Resch School of Engineering <ul style="list-style-type: none">• Mechanical Engineering• Electrical Engineering (Fall 2021)	

<ul style="list-style-type: none"> • Engineering Technology <ul style="list-style-type: none"> ○ Electrical ○ Mechanical ○ Environmental • Computer Science <ul style="list-style-type: none"> ○ Information Assurance & Security ○ Software Engineering • Mathematics & Statistics <p>MS in Cybersecurity (online)</p>	<ul style="list-style-type: none"> • MS in Environmental Science & Policy • MS in Applied Biotechnology (online) • MS in Sustainable Management (online) <p>Centers & Institutes Environmental Management & Business Institute (EMBI) Cofrin Center for Biodiversity</p>
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UW-GREEN BAY: RESCH ENROLLMENT HISTORY

ENROLLMENT - DECLARED MAJORS	LAS		CST		CSET		
	2014	2015	2016	2017	2018	2019	2020*
Mechanical Engineering Technology	1	12	55	72	73	53	36
Mechanical Engineering					12	97	145
Electrical Engineering Technology	1	11	36	41	48	50	61
Electrical Engineering (Fall 2021)							
Environmental Engineering Technology	2	9	30	22	22	28	26
Computer Science	107	90	152	175	202	201	217
Mathematics and Statistics	34	44	53	51	42	43	53
TOTALS:	145	166	326	361	399	472	538

UWGB has experienced growth each year. It had its first Mechanical Engineering Technology graduates last December.

Resch School of Engineering

Faculty – New Tenure-track ME in Sheboygan (Fall 2021)

Facilities

- STEM Innovation Center (Fall 2019)
- Instruction Services renovation for Electrical Engineering (Spring 2022)
- UWGB – Sheboygan Campus: Future Investments for ME & EE
- UWGB – Marinette Campus: Partnering with NWTC on Electrical Engineering Technology

Opportunities for Engagement – Students

- Engineering Club
- Internships
- Co-ops (in process)
- Senior Design Projects
- Employment
- Mentoring (in particular, computer science students)

Opportunities for Engagement – Faculty

- R&D
- Consulting
- Program Support
 - Awareness
 - Advisory Boards
 - Scholarships
 - Facilities & Equipment

Examples of Faculty Expertise

- Experimental & computational analysis of structures under severe loading
- Shock mitigation, with an emphasis on bolted joints
- Wave filtration & vibration control
- Waste heat recovery
- Bio-Robotics & controls
- Mechanical sensors and energy harvesting
- Optimization of renewable & distributed energy generation

UW-OSHKOSH

Department of Engineering Technology

Greg Kleinheinz, Chair, Department of Engineering Technology – 920-424-1100, kleinhei@uwosh.edu

Ahmed Nasif, Associate Professor, Electrical Engineering Technology - 920 424-4159, nasif@uwosh.edu

Pawel Olszewski, Associate Professor, Mechanical Engineering Technology – 920-424-1736, olszewskip@uwosh.edu

UWO – Industry 4.0 Relevant Programs	
<p>College of Business Certificates</p> <ul style="list-style-type: none"> • Business Analytics Certificate • Business Analysis Certificate • Data Analytics Certificate (MBA) • Enterprise Resources Planning (ERP) Certificate • Information Systems Certificates • Information Systems Minor • Analytics Minor • Operations Research • Cybersecurity • Digital Marketing 	<p>Computer Science</p> <ul style="list-style-type: none"> • Computer Science • Software Technology • Computer Programming Certificate • Web & Mobile Development • Data Science <p>Engineering Technology</p> <ul style="list-style-type: none"> • Mechanical Engineering Technology • Electrical Engineering Technology <p>Project Management Certificate (non-credit)</p>

UWO Academic Programs		
<p>Bachelor’s Degree Options</p> <ul style="list-style-type: none"> • Electrical Engineering Technology • Environmental Engineering Technology • Mechanical Engineering Technology 	<p>Accelerated BS Degree Completion</p> <ul style="list-style-type: none"> • Electrical Engineering Technology • Mechanical Engineering Technology 	<p>Certificates</p> <ul style="list-style-type: none"> • Automation • Electronics • Electronic Communication • Renewable Energy

Industry Resources – Center for Engineering and Applied Research (CEAR)

The mission of the Center for Engineering and Applied Research (CEAR) is to provide engineering and allied services to regional industry using the expertise of our faculty and staff. The CEAR will utilize faculty, staff, and student resources to solve the questions of the day. CEAR provides corporate training, testing services and workforce education resources.

Examples of work being done by CEAR faculty and staff include:

- 3D printing & prototyping
- Pilot testing for process management and QA/QC purposes
- Computational modeling & simulation
- Development of renewable energy projects
- Consultation on environmental remediation of a contaminated site
- Design course group projects
- Energy audits
- Continuing education for professionals
- Industry-specific training
- Onsite testing services

Opportunities for Industry Participation

- Advisory Boards
- Summer Intern & Job Announcements
- Lunch Meet-n-Greet
- Engineering Club
- Mechatronics Course
- Engineering design Problems Course
- Basic Manufacturing Processes Course
- Independent Study Course
- Design Problem & Student Research
- Faculty-led Team Projects
- Internships

Internet of Things

- Internet of Things (IoT) lab is new.
- Course EGRT257 Intro to Internet of Things (Summer '20, '21)
- **Emphasis**
 - Remote sensing & monitoring
 - RF imaging, localization & Wireless AI
 - Sensor fusion & algorithm development
- **Equipment**
 - Mobile robot with sensors
 - mmWave Imaging
 - Software-defined radios, USRPs
 - Spectrum analyzer
 - Microcontrollers
- **Industry Relevance**
 - Student projects
 - Industry-supported research & consulting

UWO is in the process of creating a new lab that will give students hands-on experience using different technologies.

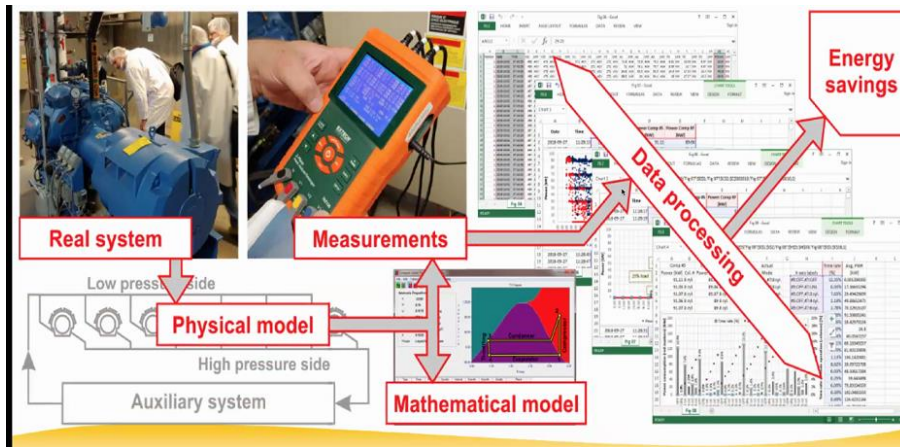
Workshops for Industry:

Workshop topics and tentative structure (may differ for particular topics)

Time	Block	Workshop topic			
		Compressed air	Chiller/cooling	Pumps	Furnace
8.00 – 8.20	Introduction	CEAR presentation			
8.30 – 9.30	Supporting theory*)	Ideal gas equation	Thermodynamics of refrigeration system	Characteristics in liquid pumping	Supporting theory section:
9.30 – 11.30	Experimental session I (TERIL) **)	Volume, pressure, temperature and measurements in gas flows	Rankine refrigeration cycle	Pump flow and system resistant characteristics.	Thermodynamics of combustion, heat transfer modes in industrial furnace, energy balance
11.30 – 12.15	Data processing session I **)				
12.15 – 13.00	Lunch				
13.00 – 15.00	Experimental session II (TERIL)	Influence of pressure on power consumption in compressed air systems. Energy effects of air leaks. Load/Un-load vs. Variable Speed Drive (VSD) compressors	Influence of load temperature on power consumption. Load/Un-load vs. Variable Speed Drive (VSD) chillers	Methods of flow control in hydraulic systems and their energy effects (control valves vs. Variable speed drive). Parallel and serial operation in multi-pump systems	Experimental section: Measurements of parameters in industrial furnace.
15.00 – 16.00	Data processing session II. Report				
16.00 – 17.00	Discussion	Action plan for company energy systems			

*) Modified schedule for Furnace System Workshop with morning **Supporting Theory Section and afternoon Experimental Section.
 **) For Compressed air, Chiller/Cooling, and Pumps workshops

Below is an example of the work they can do from their 'Teaching and Energy Research Industrial Lab (TERIL)'.



Members are encouraged to contact UWO reps for more information.

NEXT MEETING DATE/TIME/AGENDA

Members are encouraged to contact Ann or Brian Schauf if they have a case study or pilot project they would like to share at the next meeting. The next Industry 4.0 Task Force Webex meeting is on **Thursday, April 22, 2021, 1:30 p.m.**

Agenda:

- ✓ Welcome & Project Updates
- ✓ Case Study Presentation(s)
- ✓ Survey Prep
- ✓ Upcoming Alliance Events
- ✓ Next Meeting Date/Time/Agenda