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KENT STATE UNIVERSITY

CERTIFICATION OF CURRICULUM PROPOSAL

Preparation Date **26-Aug-17** Curriculum Bulletin _____
Effective Date **Fall 2018** Approved by EPC _____

Department **Applied Engineering**
College **AR - Aeronautics and Engineering**
Degree **BS - Bachelor of Science**
Program Name **Mechatronics Engineering Technology** Program Banner Code _____
Concentration(s) _____ Concentration(s) Banner Code(s) _____
Proposal **Establish program**

Description of proposal:

The college of Aeronautics and Engineering is seeking approval to establish a Bachelor of Science Degree in Mechatronics Engineering Technology. This new program is based on the existing Mechatronics Engineering Technology concentration under the Bachelor of Science in Applied Engineering program. The purpose of this change is to create a program that is relevant and responsive to industry needs. The mechatronics engineering technology curriculum has developed to the point where it no longer shares 50% of its major courses with the other Applied Engineering concentrations and is out of compliance in regards to concentration content within a major.

Does proposed revision change program's total credit hours? ☐ Yes ☒ No

Current total credit hours: **120** Proposed total credit hours _____

Describe impact on other programs, policies or procedures (e.g., duplication issues; enrollment and staffing considerations; need; audience; prerequisites; teacher education licensure):

There will be no impact, because the program already exists as a concentration.

Units consulted (other departments, programs or campuses affected by this proposal):

Kent State University Tuscarawas campus.

REQUIRED ENDORSEMENTS

Jackie Buller 10/24/17
Department Chair / School Director

Campus Dean (for Regional Campuses proposals) / /

Robert G. Sines Jr. 10/26/2017
College Dean (or designee)

Dean of Graduate Studies (for graduate proposals) / /

Senior Vice President for Academic Affairs and Provost (or designee) / /



FORM

New Programs

Substantive Change Application

Institution: Kent State University City, State: Kent, Ohio

Name of person completing this application: Therese E. Tillett

Title: Executive Director, Curriculum Services Phone: 330-672-8558 Email: ttillet1@kent.edu

Date Submitted:

The questions are designed to elicit brief, succinct, detailed information, rather than a narrative or references to extensive supporting documents. Do not attach other documents unless they are specifically requested in the questions and are germane to the request. The total submission should be no more than 10–12 pages on a single classification of change. (The page limit excludes attachments. However, the overall length, including attachments, should not exceed 200 pages.)

If the person completing this application is not the CEO, CAO or the ALO of the institution, it is understood that the person completing and submitting this application has consulted with and informed those individuals.

Please note: HLC plans to update the change forms annually, on or about September 1 of each year. However, if a change application form was accessed more than 90 days prior to filing, it is recommended that the institution visit <http://www.hlcommission.org/change> to ensure that there have been no changes to the application form in the intervening time.

Submit the completed application as a single PDF file on the following webpage:
http://www.hlcommission.org/document_upload/.

Part 1: General Questions

1. **Requested Change(s).** Concisely describe the change for which the institution is seeking approval.

Kent State University proposes to offer a Bachelor of Science degree in Mechatronics Engineering Technology to be offered through the university's College of Aeronautics and Engineering. This program is existing as a concentration within the college's Applied Engineering major. The goal is to elevate the concentration to a separate major and align the curriculum more fully with accreditation standards. Kent State will seek accreditation for the degree program from the Engineering Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Mechatronics is an emerging field, revolving around the design, construction and operation of automated systems, robots and intelligent products. Mechatronic devices can be found in agriculture, hospitals, buildings, homes, automobiles, manufacturing plants, toy and entertainment industry and in aids for the elderly and disabled.

Mechanical engineering technologists manage and support the design, operation and analysis of mechanical devices connected with automated systems, robots and computer-integrated manufacturing.

2. Is this application being submitted in conjunction with another application?

☐ Yes

☒ No

3. Classification of Change Request.

Note: not every institutional change requires prior review and approval. Review the [“Overview of HLC Policies and Procedures for Institutional Changes Requiring HLC Notification or Approval”](#) to make certain that current HLC policy requires the institution to seek approval.

New academic program(s):

☐ Certificate

☒ Bachelor's

☐ Diploma

☐ Master's/specialist

☐ Associate's

☐ Doctorate

☐ Check if program is at a new degree level

An institution submitting more than one change request should complete multiple applications, one for each type of change. The types of change requests include:

- Change in mission
- Change in student body
- Competency-based education (credit-based; direct assessment; hybrid) programs
- Consortial arrangement
- Contractual arrangement
- Substantially changing the clock or credit hours required for a program
- Change in academic calendar (e.g., quarters to semester) or change in credit allocation
- Teach-out plan if closing location provides total degree programs
- Distance or correspondence education
- New programs
- Certificate programs
- Branch campuses and additional locations

4. Special conditions. Indicate whether any of the conditions identified below fit the institution (Yes or No). If Yes, explain the situation in the space provided.

a) Is the institution, in its relations with other regional, specialized, or national accrediting agencies, currently under or recommended for a negative status or action (e.g., withdrawal, probation, sanction, warning, show-cause, etc.)?

No.

b) Is the institution now undergoing or facing substantial monitoring, special review, or financial restrictions from the U.S. Department of Education or other federal or state government agencies?

No.

- c) Has the institution's senior leadership or board membership experienced substantial resignations or removals in the past year?

No.

- d) Is the institution experiencing financial difficulty through such conditions as a currently declared state of exigency, a deficit of 10% or more, a default or failure to make payroll during the past year, or consecutive deficits in the two most recent years?

No.

- e) Is the institution experiencing other pressures that might affect its ability to carry out the proposal (e.g., a collective bargaining dispute or a significant lawsuit)?

No.

5. **Approvals.** Mark whether each type of approval is required prior to implementing the proposed change. If "Yes," attach documentation of the approval to the request. If "No," attach evidence that approval is not needed.

Internal (faculty, board) approvals	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
System approvals	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not Applicable
State approval	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Foreign country(ies) approvals	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not Applicable

For Distance or Correspondence Education only:

Process in place to ascertain and secure state approval(s) as required ☐ Yes ☐ No

6. **Specialized Accreditation.** Complete this section only if specialized accreditation is required for licensure or practice in program(s) covered by this change application.

- ☐ The institution has already obtained the appropriate specialized accreditation. Attach a copy of the letter from the agency granting accreditation.
- ☐ The institution has begun the process of seeking or plans to seek specialized accreditation. Specify the name of the agency and the timeline for completing the process in the space below. (If approval is a multi-stage process, the institution should contact the HLC staff liaison to discuss the timeline before submitting this change application form.)
- ☐ The institution does not plan to seek specialized accreditation. Provide a rationale for not seeking this accreditation in the space below.

7. **Changes Requiring Visits.** This section is not for HLC-mandated visits such as additional location confirmation visits or campus evaluation visits.

Note: Complete this section only if the institution is already aware that the proposed change will need to be reviewed through a visit. The institution may submit Part 1 of the change request application to

begin the process of scheduling a Change Visit or adding the proposed change to an already scheduled visit. The full application must be submitted at a later date. (If the institution is unsure whether a visit is required, leave this section blank and submit the full change application. HLC will advise the institution based on the information provided.)

a) Select the type of visit the institution is requesting:

☐ Request to schedule a Change Visit.

Change Visits typically are scheduled approximately four months from the date an institution submits its change request. The full change application and other required materials will be due to HLC and the peer review team eight weeks before the visit date. See <http://www.hlcommission.org/change-visit> for more information.

☐ Request to add a proposed change to an already scheduled visit. **Note:** Such requests must be submitted at least six months before the visit date.

Specify type of visit and date scheduled:

The institution's full change application should be submitted along with other materials required for the visit.

b) Provide URLs to the institution's Faculty/Staff Handbook and Catalog below. If the URLs are not available, please provide PDF versions of these documents when submitting other required materials prior to the visit.

Faculty/Staff Handbook URL:

Catalog URL:

Part 2: Topic-Specific Questions

An institution should submit a separate application for each requested program (unless the programs represent closely related disciplines). If more than one program is being requested in this application, please be sure to sufficiently address each program when answering the following questions, particularly in Sections A, D, E and F. Each proposed new program should be identified by using the *Classification of Instructional Programs* terminology (CIP codes). CIP codes are established by the U.S. Department of Education's National Center for Education Statistics as a taxonomic scheme that supports the accurate tracking and reporting of fields of study and program completions activity. More information is available at <http://nces.ed.gov/ipeds/cipcode/>.

Attach the "Substantive Change Application, Part 1: General Questions" as page one of your application. That completed form and your answers to the questions below will constitute your request for approval of a substantive change. This form will be the basis for review of this application.

Section A. Characteristics of the Change Requested

1. Identify the basic characteristics of the proposed educational program as indicated below:

- a) The full name of the proposed program, the specific degree (if applicable) or the instructional level (if not a degree program), and the six-digit CIP code XX.XXXX of the program (CIP codes, program name, and additional description [optional])

The name of the program will be the Mechatronics Engineering Technology major within the Bachelor of Science degree. The CIP most aligned with the program's outcomes is the following:

15.0406 Automation Engineer Technology/Technician. A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing, installing, calibrating, modifying and maintaining automated systems. Includes instruction in computer systems; electronics and instrumentation; programmable logic controllers (PLCs); electric, hydraulic and pneumatic control systems; actuator and sensor systems; process control; robotics; applications to specific industrial tasks; and report preparation.

- b) Total credit hours (indicate whether semester or quarter) for completion of the program

The Mechatronics Engineering Technology major is 120 semester credit hours, comprising 73 credit hours of major coursework and 43 credit hours of mathematics, physics, economics and general education coursework.

- c) Normal or typical length of time for students to complete the program

Full-time new students will be able to complete the program in four years (eight semesters).

- d) Proposed initial date for implementation of the program

Fall 2018 Semester.

- e) Primary target audience for the program (e.g., full-time, part-time, traditional college age, working adults, transfer students, military personnel, or particular ethnic group)

The target audience is full-time and part-time traditional students and students transferring from another institution.

- f) Projected life of the program (single cohort or ongoing)

The program will have ongoing admission.

- g) Whether the program will be part of contractual or consortial arrangement

Not applicable.

2. Identify if the institution is requesting new stipulations for the proposed program and provide a rationale for this request.

Not applicable.

3. If the institution is planning any involvement by external organizations (other than accredited higher education institutions) in key operations as identified below, provide the information requested below and complete the [Contractual Screening Form](#) for each planned involvement. (Note that such involvement by a parent company or by one of its subsidiaries external to the institution in any of

these operations should be reported.) If the screening form indicates contractual approval is required, complete the full contractual application and submit it in conjunction with the program application. If the screening form indicates no further action is required, attach the confirmation email from HLC.

Type of Involvement	Name(s) of External Organization(s)	Percent of Involvement
A. Recruitment and admission of students	Not applicable	Not applicable
B. Course placement and advising of students	Not applicable	Not applicable
C. Design and oversight of curriculum	Not applicable	Not applicable
D. Direct instruction and oversight	Not applicable	Not applicable
E. Other support for delivery of instruction	Not applicable	Not applicable

Section B. Institution's History With Programs

4. Does the institution currently offer a program at the same instructional level and with the same 4-digit CIP code (XX.XX) as the proposed program? If so, identify the program currently offered and whether it is a degree program. Will the proposed program replace the program currently offered?

Presently, Kent State does not offer a bachelor's degree major in the same four-digit CIP series (15.04 Electromechanical Instrumentation and Maintenance Technologies/Technicians).

5. Does the institution currently offer two or more programs at the same instructional level with the same 2-digit CIP code (XX.) as the proposed program? If so, identify the two such programs with the highest numbers of graduates during the past year, along with their numbers of graduates.

Kent State offers two bachelor's degree majors with the same two-digit series (15 Engineering Technologies and Engineering-Related Fields.).

- Aeronautical Systems Engineering Technology major: first cohort of 22 students entered in fall semester 2017
- Engineering Technology major: 37 graduates in fiscal year 2017

Section C. Institutional Planning for Program Change

6. What impact might the proposed program have on challenges identified as part of or subsequent to the last HLC review and how has the institution addressed the challenges?

There are no identified challenges.

7. Briefly describe the planning process for determining the need for this new program, including the role of faculty in the planning and approval process.

The College of Aeronautics and Engineering has offered this program since 2013 as one of four concentrations in the Applied Engineering major, Bachelor of Science degree. In its four years, the program has grown fourfold in enrollment, with 47 students in fall 2017.

The Applied Engineering major is accredited by the Association of Technology, Management and Applied Engineering (ATMAE). The college will seek to have the proposed Mechatronics Engineering Technology accredited, instead, by ABET. With different curriculum, learning outcomes and accreditation standards, the Applied Engineering and Mechatronics Engineering Technology programs have gone down separate paths and now need to be made separate degree programs

[Future Actions] In addition to be approved by the applied engineering faculty, the proposal was approved by the faculty-led Aeronautics and Engineering Curriculum Committee, the Educational Policies Council, a subcommittee of the Faculty Senate; and the Faculty Senate.

8. What are the physical facilities and equipment needed to support the program? Indicate the impact that the proposed change will have on the physical resources and laboratories that currently accommodate existing programs and services, or identify new laboratory and preceptor needs.

As the program is existing, facilities on the Kent Campus will be adequate for the elevation of the concentration to major. In 2015, a new, 55,000-square-foot aeronautics and technology building opened on the Kent Campus. The building houses classrooms and laboratories to support the College of Aeronautics and Engineering programs, including an advanced mechatronics laboratory, a magnethermic casting laboratory and an air traffic control simulation laboratory.

9. What is the evidence that a market for the new program(s) exists? How has estimated program demand been factored into realistic enrollment projections? How has this evidence been used in planning and budgeting processes to develop a quality program that can be sustained?

Mechatronics is an emerging field that first found its place in automation vendors, major consumer packaged goods manufacturers and packaging machine builders. However, more and more companies are employing the mechatronics approach to design, especially with the growth of computing power, which makes applying mechatronics easier than ever before.

The Ohio Governor's Office of Workforce Transformation presented a report entitled "Building Ohio's Future Workforce." An excerpt taken from the report is as follows:

"In a 2016 McKinsey & Company study of more than 800 occupations, the continued growth of automation will drive substantial workforce changes over the next decade. Automation will likely result in very few occupations being eliminated entirely; however, it also likely will affect a portion of almost all jobs, in varying degrees. The McKinsey study attests that technologies available today could automate 45 percent of the activities that people are paid to perform and that about 60 percent of all occupations could see 30 percent or more of their component activities automated."¹

A recent Gallup study found that "approximately 2.7 million jobs (22 percent of existing workforce) will be retiring from the manufacturing workforce between now and 2025. The U.S. manufacturing industry will add nearly 3.4 million jobs in the next decade to meet both future domestic and international demand. Moreover, as manufacturing firms expand their operations over this 10-year period, they will need an additional 700,000 workers to meet the demand."²

According to the Ohio Manufacturers' Association, the Ohio manufacturing sector was fourth in the nation and has 5.6 percent of manufacturing jobs in the United States.³ Using 2.7 million jobs as the base, this means Ohio must replace approximately 151,000 workers. While not all these jobs will be in mechatronics, even one percent would correspond to a demand for 1,500 new employees with mechatronics credentials.

¹ Ohio Governor's Office of Workforce Transformation (2016). Building Ohio's Future Workforce. Retrieved from workforce.ohio.gov/Portals/0/Building%20Ohio%27s%20Future%20Workforce%20Report.pdf.

² Manufacturing Institute (2015). *The Skills Gap in the U.S. Manufacturing 2015 and Beyond*. Retrieved from www.themanufacturinginstitute.org/~media/827DBC76533942679A15EF7067A704CD.ashx.

³ The Ohio Manufacturers' Association (2015). *2015 Ohio Manufacturing Counts*. Retrieved from www.ohiomfg.com/wp-content/uploads/ManufacturingCounts2015.pdf.

10. If the program request is approved, what future growth do you anticipate (e.g., in the next six months, three years) and how do you plan to manage this growth?

Using past enrollment growth in the concentration as a basis (see table below), future enrollment is projected at the same rate. With the concentration becoming a separate degree program, Kent State expects that the program will become more visible to prospective students. In addition, the university is developing a Mechatronics Engineering major. Students interested in mechatronics but who do not meet the admission criteria for the engineering program will be able to declare, instead, this engineering technology major.

Table: Student Enrollment in the Mechatronics Concentration, Applied Engineering Major

Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017
3	12	26	36	47

The college has the resources to manage the program currently, but as the program continues to grow as expected, it will be necessary to hire additional faculty. It is anticipated that the enrollment in the next six months will be approximately 50 students and will stabilize at 70 students in three years.

11. How does this program fit into the current and expected financial picture of the institution? In particular, will the program be financially self-sufficient within three years? If not, when do you expect the program to be financially self-sufficient and how do you expect the program to operate until then?

Kent State University operates under a Responsibility Center Management-based (RCM) financial model, where business-type strategies are used to manage and evaluate new and existing programs. Under this model, costs and revenues are taken into consideration when making decisions about the viability of programs. The proposed Mechatronics Engineering Technology major will be no exception, and will undergo the same scrutiny as other.

The proposed degree program is built primarily around existing courses that are required in other engineering and engineering technology programs. Only three new courses will be created for the program at implementation. Therefore, the program can rely on existing faculty, facilities, library resources, equipment and technology (with minor upgrades).

Fiscal projections show the program breaking even in year two of implementation, and then show a net gain after that. Since the program will be launched using existing facilities, equipment and faculty, investments that must be made in year one will be modest and absorbed using college revenue from other programs.

12. What controls are in place to ensure that the information presented to all constituencies in advertising, brochures, and other communications will be accurate?

The Office of the Provost ensures that only faculty- and university-approved program information is included in the university's Catalog, degree audit, Explore Programs and Degrees website and student information system (for admission and graduation). Kent State's Division of University Communications and Marketing coordinates branding and consistency of all of the university's promotional materials.

Section D. Curriculum and Instructional Design

13. Please list all the courses that comprise the program and identify if the program will include any new courses. Include course descriptions and number of credit hours for each.

MAJOR REQUIREMENTS**TECH 13580 Engineering Graphics I** 3 Credit Hours

Technique of engineering drawing, lettering, instrument use, freehand drawing, orthogonal projection, sections, single and double auxiliaries, dimensioning, screw threads, charts and graphs.

TECH 20002 Materials and Processes 3 Credit Hours

Study and practice addressing the nature of basic manufacturing materials and the processes by which they are converted into manufactured products. Includes laboratory experience.

TECH 21021 Survey of Electricity and Electronics 4 Credit Hours

Survey of DC and AC circuits, semiconductors, and electronic devices, including diodes and transistors.

TECH 23581 Computer-Aided Engineering Graphics 3 Credit Hours

Study of working drawings, descriptive geometry, geometrical tolerancing, structural/weldments, cams, gears, piping and considerable time with the Hewlett Packard 900 CAD system.

TECH 26010 Introduction to Computer Engineering Technology 3 Credit Hours

Describes Computer Engineering Technology concepts and principles. Topics include computer hardware, computer hardware operations, digital systems design, networking hardware, technology of networking, computer aided design and embedded systems.

TECH 26200 Programming for Engineering I 3 Credit Hours **NEW**

Introduction to engineering problem solving and use of programming language to solve those problems is the base of this course. Students in an engineering major are expected to develop basic mathematical modeling and engineering problem solving skills using mathematical and conventional computational tools. Developing modeling and logical thinking are the core objective of this course.

TECH 31000 Cultural Dynamics of Technology 3 Credit Hours

Study of technology and the forces it exerts upon society.

TECH 31010 Engineering and Professional Ethics 3 Credit Hours

Applications of codes of ethics in the engineering and technology professions reflective of social and moral responsibilities to the public, and accountability in engineering practice.

TECH 33031 Programmable Logic Controllers 3 Credit Hours

An introduction to programmable logic controllers (PLCS) covering hardware, ladder logic programming, networking and communications. Programming timers, counters and sequencers and an introduction to human machine interfaces (HMIS).

TECH 33032 Programmable Logic Controllers II 3 Credit Hours

Advanced principles and applications of programmable logic controllers with a focus on using sequential function charts to control complex industrial processes. Includes real time control issues, PLC networking, programming languages other than ladder logic, standards, motion control, supervisory control and data acquisition, process control, alarm management, power failure strategies and safety.

TECH 33033 Hydraulics/Pneumatics 3 Credit Hours

Fluid properties, hydraulic design, viscosity, hydraulic components, pumps, systems and circuits, maintenance and safety, pneumatics, air systems control and design.

TECH 33040 Motors and Controllers 3 Credit Hours

AC and DC motors, motor control, and machine operations in mechatronic systems. Includes introduction to basic control system terms and devices, input and output transducers, signal conditioning, open loop and closed loop control, stability and performance.

TECH 33092 Cooperative Education - Professional Development 1-3 Credit Hours

(Repeatable for a maximum of 6 credit hours) Supervised work-study experience in approved business or industrial environment relative to the student's major. The 3 credit hour co-op experience must be for a period of at least 12 consecutive weeks at 40 hours per week, or 30 hours per week for 15 weeks, totaling not less than 450 hours. Most co-ops occur during the summer. Students can earn up to an additional 3 credit hours (one to three per co-op – 150 work hours per credit hour) over the course of their college career as long as each co-op has a different focus.

TECH 33111 Strength of Materials 3 Credit Hours

An analytical study of the relation between the external forces applied to elastic materials and the resulting deformations and stresses.

TECH 33222 Digital Design for Computer Engineering 3 Credit Hours

Introduction to digital design. The operation and use of digital devices and components as used in microprocessors and digital computers. Topics include binary arithmetic operations, Boolean algebra, logic gates, combinational and sequential logic, buffers, registers, memory devices, counters, latches, timers, comparators, encoders, decoders, multiplexers and demultiplexers.

TECH 33333 Industrial Robotics 3 Credit Hours **NEW**

Covers basic safety precautions for working with robots. Laboratory time will be spent programming FANUC robotics handling tool operation and programming certificate completion.

TECH 33700 Qualities Techniques 3 Credit Hours

Introduction to quality management and the tools and techniques including the basic tools identified by ASQ (American Society for Quality) as well as an introduction to Lean and Six Sigma. Information presented helps prepare the student to qualify for the Quality Process Analyst Certification.

TECH 34002 Advanced Computer-Aided Design 3 Credit Hours

Continuation of CADT 22000 with an emphasis on the use of a Parametric-based CAD software (PRO-ENGINEER) for the design and modeling of industrial products.

TECH 36200 Programming for Engineering II 3 Credit Hours **NEW**

Emphasizes engineering problems and applications of programming language and mathematical tools to analyze and solve them. Students with engineering major (including mechatronics, mechanical engineering technology and computer engineering technology) are expected to learn problem solving techniques, modeling, simulation and presentation of engineering application oriented problems using conventional computation and mathematical tools. Advanced modeling, simulations and analysis are the core objectives of this course.

TECH 43030 Mechatronics 3 Credit Hours

Application of automation concepts in motion control, electrical circuits, fundamental mechanics, control systems and programming including modeling, interfacing and signal conditioning.

TECH 43031 Mechatronics II 3 Credit Hours

Advanced modeling, system response, closed loop control and system software for mechatronic systems.

TECH 43060 Management of Technology Innovation 3 Credit Hours

Subjects covered in this course are case studies of innovative companies, elements of an innovation process, review of major problem solving methods, technical opportunity analysis, technical planning, technological forecasting, concept development and elements of patents. A project is included that utilizes TRIZ software and innovation model elements.

TECH 43080 Industrial and Environmental Safety 3 Credit Hours

Examines the occupational safety and health act and fundamentals of industrial safety programs.

TECH 43580 Computer-Aided Machine Design 3 Credit Hours

Description and Prerequisite Data Currently in Banner: Application of the principles of mechanics and strength of materials, with computer assistance to the design and selection of machine components under both static and dynamic loads.

ADDITIONAL REQUIREMENTS**COMM 15000 Introduction to Human Communication** 3 Credit Hours

An inquiry into the nature and function of human communication in interpersonal, group and public contexts.

ECON 22060 Principles of Microeconomics 3 Credit Hours

Course covers principles and policies affecting prices, including factor incomes, under alternative market structures. Students develop tools to examine social problems, including poverty, crime, pollution and international relations.

MATH 12002 Analytic Geometry and Calculus I 5 Credit Hours

Concepts of limit, continuity and derivative, and the indefinite and definite integral for functions of one real variable. Maximization, related rates, fundamental theorem of calculus.

PHY 13001 General College Physics I 4 Credit Hours

Principles of mechanics, heat and sound.

PHY 13002 General College Physics II 4 Credit Hours

Principles of electricity and magnetism, optics and modern physics.

PHY 13021 General College Physics Laboratory I 1 Credit Hour

Introductory lab to accompany PHY 13001 or PHY 13011.

PHY 13022 General College Physics Laboratory II 1 Credit Hour

Introductory lab to accompany PHY 13002 or PHY 13012.

UC 10097 Destination Kent State: First Year Experience 1 Credit Hour

(Equivalent to UC 10002 or UC 20007) Course assists students in making a successful academic transition to the university through experiential or intellectually engaging discipline-based content. Required of all first year students. Not required of transfer students with 25 or more credit hours.

14. What are the requirements students must fulfill to complete the program successfully (including specific courses, course options, and any other requirements)?

Major Requirements

TECH 13580	Engineering Graphics I	3
TECH 20002	Materials and Processes	3
TECH 21021	Survey of Electricity and Electronics	4
TECH 23581	Computer-Aided Engineering Graphics	3
TECH 26010	Introduction to Computer Engineering Technology	3
TECH 26200	Programming for Engineers I (NEW)	3
TECH 31000	Cultural Dynamics of Technology	3
TECH 31010	Engineering and Professional Ethics	3
TECH 33031	Programmable Logic Controllers	3
TECH 33032	Programmable Logic Controller II	3
TECH 33033	Hydraulics/Pneumatics	3
TECH 33040	Motors and Controllers	3
TECH 33092	Cooperative Education-Professional Development	3
TECH 33111	Strength of Materials	3
TECH 33222	Digital Design for Computer Engineering	3
TECH 33333	Industrial Robotics (NEW)	3
TECH 33700	Qualities Techniques	3
TECH 34002	Advanced Computer-Aided Design	3
TECH 36200	Programming for Engineers II (NEW)	3
TECH 43030	Mechatronics	3
TECH 43031	Mechatronics II	3
TECH 43060	Management of Technology Innovation	3
TECH 43080	Industrial and Environmental Safety	3
TECH 43580	Computer-Aided Machine Design	3

Additional Requirements

COMM 15000	Introduction to Human Communication	3
ECON 22060	Principles of Microeconomics	3
MATH 12002	Analytic Geometry and Calculus I	5
PHY 13001	General College Physics I	4
PHY 13021	General College Physics Laboratory I	1
PHY 13002	General College Physics II	4
PHY 13022	General College Physics Laboratory II	1
UC 10097	Destination Kent State First Year Experience	1

Kent Core Composition	6
Kent Core Humanities and Fine Arts (minimum one course from each)	9
Kent Core Social Sciences (cannot be ECON course)	3
Kent Core Additional	3
General Electives (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours)	4

Minimum Credit Hours: 120

15. For programs using prior learning credit, compressed time frames, online delivery, accelerated formats or other approaches to learning, explain how the institution will ensure that student work and the levels of knowledge and competencies comparable to those required in traditional formats have been achieved.

Kent State University has partnered with several secondary school districts and career and technical centers to accept for college credit completion of tech prep education programs in engineering and engineering technology. All tech prep programs in Ohio are required to align with the technical content standards and curriculum as developed by both high school and college faculty and business and industry representatives. Thus, the competencies are the same for all programs in a particular career field state-wide. All students are tested using the same state-wide end-of-course exams, which were developed in collaboration by high school and college faculty.

Section E. Institutional Staffing, Faculty, and Student Support

16. How many and what types of faculty (full-time or part-time) will be employed in the program? Why is the number and type of faculty sufficient to support the program? How many, if any, new faculty will be hired for the program?

Existing six full- and nine part-time faculty in the College of Aeronautics and Engineering teach the major courses in the program. Faculty-to-student ratio is presently one full-time faculty for every eight full-time equivalent students (headcount calculations). When the ratio exceeds 30 FTE students, the college will budget the necessary resources to hire additional faculty.

17. What will the impact of the new initiative be on faculty workload?

There will be no impact on the faculty workload.

18. Provide a brief attachment that inventories each faculty member employed to teach in the program, including names of existing personnel, a description of each faculty member's academic qualifications, their prior instructional responsibility and other experiences relevant to the courses they will teach in the program in question, each faculty member's course load in the new program, and the course work each teaches in other programs currently offered. (Note: Do not attach full CVs for each faculty member; rather, the requested information should be summarized in one paragraph for each faculty member.)

See Appendix A.

19. For graduate programs, document scholarship and research capability of each faculty member; for doctoral programs, document faculty experience in directing student research.

Not applicable.

20. What library and information resources—general as well as specific to the program(s)—and staffing and services are in place to support the initiative? If the proposed new program is at the graduate level, document discipline-specific refereed journals and primary source materials.

Kent State's science librarian, determined whether the collection of print and electronic resources were adequate enough to support the program proposed. The science librarian works closely with the library representative from the college to determine the need for additional resources as needed, and fulfills direct requests from faculty in need of additional resources. There is an annual budget allocated by the library and administered by the science librarian to support the resource needs of the college. In addition, the science librarian teaches information literacy classes that focus on the usage of these materials.

Book collections: The existing book collection at the Kent State University Library will strongly support the proposed areas of study and research. Existing services the library offers will allow for continued development of this collection. Faculty members have the ability to participate in the selection of new books and journals for the collection. The University Library allocates an annual budget for monograph and journal purchases for the College of Aeronautics and Engineering. The science librarian coordinates requests for these purchases. In addition, for materials not available in the collection, faculty and students may request books through the Interlibrary Loan system.

Journals and subscriptions: Another area of collection support is the University Library's collection of academic periodicals. This collection of journals supports most of the needs of faculty and students research. The collection management librarian and science librarian regularly review interlibrary loan reports from collage to identify new collection needs.

Database collection: The University Library provides access to several databases. The database collection is evaluated each year to ascertain its usefulness to faculty and students, when to acquire new databases, and replace those not of use.

- **ACM Digital Library:** Provides bibliographic information, abstracts, index terms, reviews and the full-text for ACM conference proceedings. ACM journals, magazines and newsletters are also available at this site, as well as through the OhioLINK Electronic Journal Center.
- **AccessScience:** An online encyclopedia that provides full-text access to articles, research updates and dictionary terms in all areas of science and technology. Also contains biographies, weekly updates on hot topics and discoveries, a student center with resource guides and links to related sites. Updated daily.
- **Computers and Applied Sciences Complete:** Incorporates Computer Science Index, Computer Source, Information Science and Technology Abstracts, Internet and Personal Computing Abstracts and includes academic journals, professional publications and other reference sources. Subject areas include the many engineering disciplines, computer theory and new technologies.
- **Derwent Innovations Index:** Available through the ISI Web of Knowledge interface. Merges the Derwent World Patents Index with the Derwent Patents Citation Index. Provides access to more than 14,800,000 patents with links to cited and citing patents, cited articles and full-text patent data sources. Gives users an overview of inventions in three categories: chemical, electrical and electronic and engineering.
- **IEEE/IET Electronic Library (IEL):** More than three million full text IEEE journals, conferences and standards, IET journals and conferences, VDE conference papers and all IEEE standards except for the drafts. All content back to 1988 with selected content back to 1872.
- **Inspec:** Provides access to the world's scientific and technical literature in physics, electrical engineering, electronics, communications, control engineering, computers and computing and

information technology; also has significant coverage in areas such as materials science, aeronautics, oceanography, nuclear engineering, geophysics, biomedical engineering and biophysics. Searches Physics Abstracts and more.

- Science Online: Science Online from Facts on File (not the journal Science published by AAAS) presents information on a broad range of scientific disciplines through extensive definitions, essays, diagrams, biographies and experiments.
- Textile Technology Complete: Textile Technology Complete is a scholarly and professional database covering scientific and technological aspects of textile production and processing. Containing over 400 periodical titles, it also draws on current technical reports, books and trade literature. Also includes resources about apparel, home furnishings and polymer industries.

Section F. Evaluation

21. Describe the process for monitoring, evaluating and improving the overall effectiveness and quality of the program, and articulate program-level learning outcomes and objectives.

College faculty will assess and evaluate the program following the existing practices. Various metrics such as course grades, major GPA, time to completion and job placement following graduation will be used to assess the program's student learning outcomes listed below. The data on these metrics are summarized in a program assessment report each year and submitted to Kent State's Office of Accreditation, Assessment and Learning.

The program outcomes are as follows:

- Select and apply a knowledge of mathematics, science, engineering and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.
- Design systems, components or processes for broadly defined engineering technology problems.
- Select and apply the knowledge, techniques, skills and modern tools of the discipline to broadly defined engineering technology activities.

Upon matriculation of the program's first cohort, Kent State University will seek accreditation from the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). Faculty will back their learning outcomes and assessment techniques for the courses in this program based on ABET criteria.

See Appendix B for more information on student learning outcomes in the program.

22. Describe the process for assessing and improving student learning, including student persistence and completion, in the new program.

While the traditional means to assess learning are employed with this program, such as quizzes, exams, papers and problem sets, the nature of this program lends itself to a natural assessment process because about half of the courses have a lecture and a lab component to them. This provides students with the opportunity to learn the material during the lecture and then apply what they have learned during the lab. This format allows students to be exposed to the same material more than once, which not only increases their likelihood of learning it but the resulting lab report or project is a good learning assessment tool.

Labs provide an active way to learn which helps students stay engaged. This along with designing the course material so that students will understand how the material is relevant to them, how it applies to their everyday life and how it improves their chances of getting the job they may someday want, increases persistence.

Another way student learning is assessed is through internships. This program does require that every student participate in an internship. The student is required to journal about their experience weekly and write a paper at the end of the semester. This encourages the student to articulate what they have learned which is a good assessment tool. The employer is also asked to evaluate the student and provide feedback about the student's knowledge and performance. Having a "real-world" experience provides the student with the opportunity to understand why they take the courses that they do, implement what they have learned and determine what they may like to do in the future, which increases persistence.

**ADDENDUM TO HIGHER LEARNING COMMISSION
SUBSTANTIVE CHANGE APPLICATION
TO ESTABLISH A NEW UNDERGRADUATE DEGREE PROGRAM**

Proposed Major: Mechatronics Engineering Technology
Proposed Degree: Bachelor of Science
Administrating College: College of Aeronautics and Engineering
Administrating Department: Not applicable

Provide the title of the lead administrator for the proposed program and a brief description of the individual's duties and responsibilities.

Kent State's College of Aeronautics and Engineering, functions as one organizational unit with two separate and distinct program areas: aeronautics and engineering. Each program area is led by a program director.

The proposed Mechatronics Engineering Technology degree program will reside in the engineering program area under the leadership of interim director Jackie Ruller, M.S. Position duties include developing the course schedule, managing the day-to-day requests/issues, pursuing partnerships with industry personnel, writing proposals and serving on committees.

Indicate whether any institutions of higher education offer the proposed program within a 30-mile radius of the campus(es) at which the proposed program will be offered. If so, list the institutions that offer the proposed program and provide a rationale for offering an additional program at this campus.

There are no similar baccalaureate programs offered by public universities in Northeast Ohio. The closest is Bowling Green State University, which offers a Bachelor of Science in Technology degree in Mechatronics Engineering Technology.

Purdue University Calumet is the only university in the country with an ABET-accredited bachelor's degree in mechatronics engineering technology.

Several public colleges in the state offer associate degree programs in robotics, mechatronics or automation engineering technology, including Stark State College, University of Rio Grande, North Central State College, James A Rhodes State College, Terra State Community College and Lorain County Community College.

CATALOG COPY**DESCRIPTION**

The Bachelor of Science degree in Mechatronics Engineering integrates mechanical, electrical, computer and controls engineering to understand automated machinery, specifically, how to design it and how to make it work. Mechatronics engineering revolves around the design, construction and operation of automated systems, robots and intelligent products, which result from the integration of software and hardware.

Using automated systems is becoming more popular for operating equipment/machinery on manufacturing lines, boilers and aircraft to reduce labor costs, increase precision and accuracy and provide quality and safety for workers.

Mechanical engineering technologists manage and support the design, operation and analysis of mechanical devices connected with automated systems, robots and computer-integrated manufacturing. They can work in any company that develops, designs or manufactures and markets these devices. Opportunities exist in manufacturing, sales as well as research.

Fully Offered At:

- Kent Campus

ACCREDITATION

Not applicable

ADMISSION REQUIREMENTS

Standard admission criteria.

PROGRAM LEARNING OUTCOMES:

Graduates of this program will be able to:

1. Select and apply a knowledge of mathematics, science, engineering and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.
2. Design systems, components or processes for broadly defined engineering technology problems.
3. Select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly defined engineering technology activities.

CATALOG COPY

PROGRAM REQUIREMENTS

Major Requirements (courses count in major GPA)

TECH 13580	Engineering Graphics I	3
TECH 20002	Materials and Processes	3
TECH 21021	Survey of Electricity and Electronics	4
TECH 23581	Computer-Aided Engineering Graphics	3
TECH 26010	Introduction to Computer Engineering Technology	3
TECH 26200	Programming for Engineers I (NEW)	3
TECH 31000	Cultural Dynamics of Technology (DIVD) (WIC) ¹	3
TECH 31010	Engineering and Professional Ethics	3
TECH 33031	Programmable Logic Controllers	3
TECH 33032	Programmable Logic Controller II	3
TECH 33033	Hydraulics/Pneumatics	3
TECH 33040	Motors and Controllers	3
TECH 33092	Cooperative Education-Professional Development (ELR) (WIC) ¹	3
TECH 33111	Strength of Materials	3
TECH 33222	Digital Design for Computer Engineering	3
TECH 33333	Industrial Robotics (NEW)	3
TECH 33700	Qualities Techniques	3
TECH 34002	Advanced Computer-Aided Design	3
TECH 36200	Programming for Engineers II (NEW)	3
TECH 43030	Mechatronics	3
TECH 43031	Mechatronics II	3
TECH 43060	Management of Technology Innovation	3
TECH 43080	Industrial and Environmental Safety	3
TECH 43580	Computer-Aided Machine Design	3

Additional Requirements (courses do not count in major GPA)

COMM 15000	Introduction to Human Communication (KADL)	3
ECON 22060	Principles of Microeconomics (KSS)	3
MATH 12002	Analytic Geometry and Calculus I (KMCR)	5
PHY 13001	General College Physics I (KBS)	4
PHY 13021	General College Physics Laboratory I (KBS) (KLAB)	1
PHY 13002	General College Physics II (KBS)	4
PHY 13022	General College Physics Laboratory II (KBS) (KLAB)	1
UC 10097	Destination Kent State First Year Experience	1
Kent Core Composition		6
Kent Core Humanities and Fine Arts (minimum one course from each)		9
Kent Core Social Sciences (cannot be ECON course)		3
Kent Core Additional		3
General Electives (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours)		4

Minimum Credit Hours: 120

1. A minimum C grade must be earned to fulfill writing-intensive requirement.

Graduation Requirements:

- Minimum Major GPA: 2.250
- Minimum Overall GPA: 2.000

CATALOG COPY**ROADMAP****Semester One**

COMM 15000	Introduction to Human Communication (KADL)	3
TECH 13580	Engineering Graphics I	3
TECH 26010	Introduction to Computer Engineering Technology	3
UC 10097	Destination Kent State: First Year Experience	1
Kent Core Requirement		3
Kent Core Requirement		3
Credit Hours:		16

Semester Two

MATH 12002	Analytic Geometry and Calculus I (KMCR)	5
PHY 13001	General College Physics I (KBS)	4
PHY 13021	General College Physics Laboratory I (KBS) (KLAB)	1
TECH 23581	Computer-Aided Engineering Graphics	3
Kent Core Requirement		3
Credit Hours:		16

Semester Three

ECON 22060	Principles of Microeconomics (KSS)	3
PHY 13002	General College Physics II (KBS)	4
PHY 13022	General College Physics Laboratory II (KBS) (KLAB)	1
TECH 20002	Materials and Processes	3
Kent Core Requirement		3
Credit Hours:		14

Semester Four

TECH 21021	Survey of Electricity and Electronics	4
TECH 26200	Programming for Engineers I	3
TECH 33033	Hydraulics/Pneumatics	3
Kent Core Requirement		3
Kent Core Requirement		3
Credit Hours:		16

Semester Five

TECH 33031	Programmable Logic Controllers	3
TECH 33092	Cooperative Education - Professional Development (ELR) (WIC)	3
TECH 33111	Strength of Materials	3
TECH 36200	Programming for Engineers II	3
Kent Core Requirement		3
Credit Hours:		15

Semester Six

TECH 31010	Engineering and Professional Ethics	3
TECH 33032	Programmable Logic Controllers II	3
TECH 33040	Motors and Controllers	3
TECH 33333	Industrial Robotics I	3
TECH 34002	Advanced Computer-Aided Design II	3
Credit Hours:		15

Semester Seven

TECH 31000	Cultural Dynamics of Technology (DIVD) (WIC)	3
TECH 33222	Digital Design for Computer Engineering	3
TECH 43030	Mechatronics	3
TECH 43060	Management of Technology Innovation	3
TECH 43580	Computer-Aided Machine Design	3
Credit Hours:		15

Semester Eight

TECH 33700	Quality Techniques	3
TECH 43031	Mechatronics II	3
TECH 43080	Industrial and Environmental Safety	3
General Elective		4
Credit Hours:		13

Minimum Credit Hours: 120



December 22, 2016

Robert G. Sines, Jr.
Interim Dean
College of Applied Engineering, Sustainability and Technology

Mr. Sines:

Nook Industries would like to express its support of Kent State's proposed Mechatronics Engineering Technology program. Nook Industries would have definite needs for students with experience in mechatronics, including controls expertise, working with motors, drives, and an ability to program PLC's.

As a Company with 45+ years of experience providing linear motion and power transmission solutions for a variety of industries, we certainly see the need and have a desire to do more of systems engineering integrating mechanical engineering, electrical engineering, computer control and information technology.

An increase in the interest of our customers in "smart" solutions drives the search for specialists who have obtained expertise and interdisciplinary knowledge of various technologies and be able to lead the entire design process with the blend of these technologies.

Use of Stepper and Servo motors, familiarity with PLCs and Controls in addition to traditional strong manufacturing technology disciplines make graduates in the Mechatronics Engineering Technology program very appealing candidates for Nook Industries future growth.

Respectfully,

Greg Burkhart

Greg Burkhart
Director, Human Resources

Robert G. Sines, Jr.
Interim Dean
College of Aeronautics and Engineering
1400 Lefton Esplanade
Kent, Ohio 44240

Dear Mr. Sines:

My name is Kevin Ballard. I am 2010 graduate of your college and now serve as the Production Engineering Manager at Rambus' Lighting Division in Brecksville, OH. At Rambus, I lead a team that is charged with development of new manufacturing processes and technologies that enable our company to produce our industry leading product designs.

I would like to express my support of Kent State's proposed Mechatronics Engineering, Mechatronics Engineering Technology, Computer Engineering Technology and Mechanical Engineering Technology programs. Over the next five years, we will need to hire graduates with experience in articulated robotics, machine vision, machine safety, factory data analytics, and lean manufacturing.

It is difficult to find young talent that has any controls engineering expertise, or an understanding of how manufacturing systems, and the data they generate can be utilized to improve the operation of the business as a whole. It is also difficult to find people of any age that truly understand how the design of the equipment, robotics, and plant floor directly affect performance and uptime of the operation.

In addition to the in-class curriculum, we would be very interested in co-op or internship programs that expose your students to real world projects and opportunities. Again, this type of experience would provide your students with an important advantage when compared to other recent graduates.

With almost all Co-Ops, or traditional Mechanical Engineers that I have worked with thus-far, we have found very little comprehension of the concepts outlined above. The education background I received at Kent State has given me a unique advantage because I was able to build on the concepts from the moment I left school. We feel the lack of talent and knowledge in this field every day, whether it be through our own organization, or our suppliers of production equipment. With that being said, I believe that the prospects will continue to improve, for graduates of your programs.

Sincerely,

Kevin Ballard
Production Engineering Manager
Rambus Lighting Division
6611 W. Snowville Rd.
Brecksville, OH 44319
Kballard@rambus.com

Robert G. Sines, Jr.
Interim Dean
College of Aeronautics and Engineering
1400 Lefton Esplanade
Kent, Ohio 44240

Dear Mr. Sines:

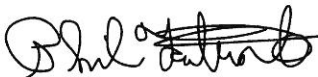
AMETEK HKP would like to express its support of Kent State's proposed Mechatronics Engineering, Mechatronics Engineering Technology, Computer Engineering Technology and Mechanical Engineering Technology programs. Over the next 5 years, we will need to hire graduates with experience in CAD, controls expertise, applying and testing stepper and servo motors and controls, and systems design.

It is difficult to find young talent that has theoretical and hands on electro-mechanical expertise. Thus, these programs resulting in graduates with a high level of knowledge as well as graduates with significant experience in the application, design, and use of today's machine control system architectures would give them a significant competitive advantage entering the workforce. All programs would provide graduates that would be a valuable resource of future employees for AMETEK.

In addition to the in-class curriculum, we would be very interested in co-op or internship programs that expose your students to real world projects and opportunities. Again, this type of experience would provide your students with an important advantage when compared to other recent graduates.

Key industries such as consumer goods, life sciences, food and beverage, tire and automotive manufacturing are facing workforce shortages and the engineering and technical skills to design and maintain automated, mechanical and electrical systems is critical to their success.

Regards,



Phil Faluotico

330-357-6252

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Phil Faluotico
Director of Engineering

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Phone: (330) 677-3741
Fax: (330) 677-3306
Cell: (330) 357-6252

PITTMAN

Haydon kerk



North Central State College

October 18, 2017

Chancellor John Carey
Department of Higher Education
25 South Front Street
Columbus, Ohio 43215

Dear Chancellor Carey:

I am writing this letter on behalf of North Central State College to express support for the engineering programs in the College of Aeronautics and Engineering (CAE) at Kent State University. A goal of ours is to provide our students with different pathways and good opportunities when they leave North Central State College. Consequently, we have been working with staff and faculty at Kent State to create pathways for our students in which they would earn college credit from our institution that may be applied to programs in CAE. In particular, CAE would like to move three of the concentrations (mechatronics engineering technology, computer engineering technology and mechanical engineering technology) under the Bachelor of Science in Applied Engineering program to their own major. As majors, the programs would be more visible and there would be more flexibility in the curriculum. These programs complement our associate level programs and can provide a valuable next step in a student's career pathway.

One of the reasons that the programs in CAE are such a good fit for our programs is their applied nature. I understand that CAE is participating in the NEO RAPIDS 2 proposal in the hope of acquiring a FANUC Integrated Cell. Our students in our engineering tech programs have the opportunity to receive training on FANUC robots. Having the opportunity to work with the FANUC Integration Cell at Kent State is again, the perfect complement to the training they receive with us.

In addition, I understand that CAE would like to offer the more theoretical mechatronics engineering program beginning fall of 2018. This program will offer a higher level of math and theory providing an additional pathway for our students who are progressing along calculus pathways in engineering and may prefer careers with a stronger theoretical focus.

In short, we are impressed with the work being done to move CAE forward and make it a stronger partner with community colleges.

Respectfully,

Greg Timberlake, Psy.D.
Dean of Business, Industry, Technology, &
Workforce Development
North Central State College

2441 Kenwood Circle
Mansfield, OH 44906
419.755.4800
888.755.4899

www.ncstatecollege.edu

Ruller, Jackie

From: Rachel S. Heidenreich <rsheidenreich@ra.rockwell.com>
Sent: Wednesday, January 18, 2017 4:31 PM
To: Sines, Robert
Cc: Ruller, Jackie
Subject: Kent State's Proposed Mechatronics Programs

Rockwell Automation (RA) would like to express its support of Kent State's proposed Mechatronics Engineering and Mechatronics Engineering Technology programs. RA and our customers have definite needs for students with experience in mechatronics, including controls expertise, working with motors, ability to program PLC's, etc. Here are some specific examples of applicability:

- Machine builders, systems integrators and distributors are all struggling to find young talent that has controls application expertise. Thus, these programs resulting in graduates with high level or theoretical experience using or designing machine control architectures as well as graduates with significant experience in the application, design, and use of today's machine control system architectures would give them a significant competitive advantage entering the workforce. Both programs would very much support our customers as well as RA as a source of future employees.
- In addition to the in-class curriculum, RA and our customers would be very interested in co-op or internship programs that expose your students to real world projects and opportunities. Again, this type of experience would provide your students with an important advantage when compared to other recent graduates.
- The applied nature of the program lends itself well to RA's sales resources that are focused on OEM's as well as our customer facing engineers that supply solutions to our customers in discrete manufacturing.
- Our customers with discrete manufacturing in key industries such as consumer goods, life sciences, food and beverage, tire and automotive manufacturing are facing workforce shortages and the engineering and technical skills to design and maintain mechanical and electrical systems is critical to their success.

As RA and many customers are located in the Midwest, it can be difficult to identify talent that is willing to relocate here. These types of skills are of particular interest in Ohio and the Midwest, so students attending school in this area are also be a good match to the opportunities here.

Sincerely,

Rachel Heidenreich
 VP Quality and Continuous Improvement
 Rockwell Automation

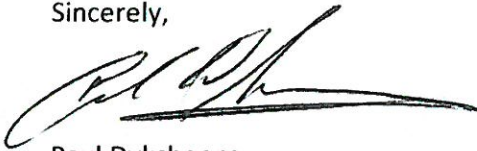
January 5, 2017

To Whom It May Concern:

Mechatronics is a blend of mechanical engineering, electrical engineering, computer control and information technology. As the need grows for automated manufacturing in Northeast Ohio to be competitive in the global market, there is a growing need for individuals with such a wide range of capabilities.

Moving the Applied Engineering concentration in Mechatronics to a major in Mechatronics Engineering Technology will allow this field of study to change with the growing technology needs of manufacturing in Northeast Ohio without being encumbered to the requirements of the current Applied Engineering Degree. I fully support such a move.

Sincerely,



Paul Dykshoorn
Director, Engineering Technology

cc: Dr. Bradley Bielski, Dean, Tuscarawas Campus