COVER PAGE

INSTITUTION: Indiana State University

COLLEGE: College of Technology

DEPARTMENT: Applied Engineering and Technology Management

DEGREE PROGRAM TITLE: Master of Science in Technology Management

FORM OF RECOGNITION TO BE AWARDED/DEGREE CODE: Master of Science

SUGGESTED CIP CODE: 15.1501

LOCATION OF PROGRAM/CAMPUS CODE: Terre Haute, IN/ 00180700

PROJECTED DATE OF IMPLEMENTATION: Fall Semester 2011

DATE PROPOSAL WAS APPROVED BY
INSTITUTIONAL BOARD OF TRUSTEES: May 6, 2011

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SIGNATURE OF AUTHORIZING
INSTITUTIONAL OFFICER

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DATE

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DATE RECEIVED BY COMMISSION FOR
HIGHER EDUCATION

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COMMISSION ACTION   (DATE)

A. ABSTRACT

Master of Science in Technology Management
Indiana State University, Terre Haute, Indiana

Objectives

The Master of Science in Technology Management (MSTM) will help professionals in technology gain the knowledge, skills, and experiences to further their professional advancement and enhance the industries with which they are affiliated. The program will include concentrations designed specifically to meet the varied professional goals of students. All required courses will be available via web-based delivery; this will facilitate the development of time- and place-bound professionals. Constituents who need or desire an on-campus experience will be served by strategic on-campus offerings. The program will also be a link between the Bachelor of Science (BS) in Technology Management and the Doctor of Philosophy (PhD) in Technology Management. The vision is that the academic, personal, and professional development provided by this program will also aid the economic and societal development of the State of Indiana.

Clientele to be Served

Though the MSTM is being submitted as a new program; curriculum-wise it is an expansion and improvement of the existing Master of Science in Industrial Technology (MSIT) program (which will be deleted if the new program is approved). The MSTM program will serve the same types of clients as the MSIT program, but serve additional clients by virtue of access to web instruction. Enhancements to the program will also be expected to attract additional clients (regardless of the mode of instruction). The clientele are summarized below.

Table 1 Clientele

Clientele	Notes
On-campus recent BS graduates who desire to immediately begin a graduate program.	The desire and life-situation of many undergraduate and graduate students best fit a traditional on-campus learning experience. This degree will offer enough on-campus courses to provide that experience. Also, because of visa requirements for international students and other reasons, e.g., reimbursement policies of some employers, some clients must take a certain number of on-campus courses.
Off-campus recent BS graduates who wish to immediately begin a graduate program.	The current BS in Technology Management and several other baccalaureate degrees (at ISU and elsewhere) that could feed into the MSTM program are available via the web. The current MSIT program not being completely at a distance is a road block to constituents in those programs furthering their education.
Those who have several years of experience after receiving a BS and now wish to earn an advanced degree.	This group is similar to the above groups but is even more time- and place-bound because of their families and careers. Many professionals wish to earn an advanced degree. Most of those professionals cannot come to campus for course work.
Those with a goal of earning a terminal degree in technology management.	ISU's PhD in Technology Management and similar degrees at other universities are at a distance. ISU's BS and PhD degrees in Technology Management are both (a) at a distance and (b) have named focuses. To best fit the current BS and PhD degrees, the current MSIT degree needs to be modified.

Curriculum

The MSTM curriculum is very much like the current MSIT program. The 36 credits proposed for the program are meant to be a graduate level experience that is also (a) articulated with the BSTM and similar programs and (b) a preparation for the PhD in Technology Management and similar programs. *Technology management* is currently a common term to describe supervision and management functions in industrial-technical environments. Previous terms included *industrial technology* and *industrial supervision*. The program consists of a 15 credit core, a 15-18 credit technical concentration, and a 3-6 credit culminating experience (thesis or project). The initial concentrations will include automotive, manufacturing, mechanical engineering technology, packaging, and quality.

Employment Opportunities

The employment opportunities of MSTM graduates will be similar to the current MSIT graduates. Most graduates advance in their professions to higher levels of managerial responsibility. Some graduates use the degree to better prepare themselves to teach at the community college level, be an instructor at a university, or be a trainer in industry. This is especially so for technical areas which require a focused expertise. In approximately equal numbers, graduates can (a) advance with their current employers and (b) further their career with a new employer. The letters of support for this proposal address employment opportunities. Those letters are also largely written by persons whose job title is similar to a graduate of the proposed MSTM program. The tabular enrollment data also provide evidence concerning BS students matriculating to the MS and MS students matriculating to the PhD. MSIT graduates have positions in industry, government, and education such as:

- Manager of production, quality, engineering, packaging, shipping, and many other industrial functions.
- Supervisor of machinists, welders, drafters, maintenance, and similar employees.
- Design of machine, tooling, product, package; facilities design; and other design functions.
- Project manager, team leader.
- Supply chain management including manager and/or customer service representative for vendors, customers, and partners.
- Compliance officers for quality, safety, environmental, or legal requirements.

B. PROGRAM DESCRIPTION

1. *Proposed Program and Its Objectives*

ISU has a BS in Technology Management and a PhD in Technology Management, both of which are: (a) offered at a distance and (b) have a technical focus area (minor in BS or specialization in PhD).

The faculty of the MSIT program determined a need to revise the program to bring it in line with the BS and PhD programs, specifically to give the MS more focus and have all courses available at a distance. Based on advice from the College of Technology's dean Dr. Bradford Sims and Associate Vice President of Academic Affairs Dr. Robert English, the MSTM program is being

proposed as a new program to upgrade the current MSIT program. If the Indiana Commission for Higher Education (ICHE) approves the change, the MSIT will be deleted. Another way to think about the change is that the new MSTM program will enhance and subsume the current MSIT program. In essence, the proposed MSTM program is the existing program with the numbered alterations that follow. These alterations have the following characteristics: (a) The alterations are based on input from current and former students, industry constituents, and nation-wide changes to the profession; and (b) The alterations will aid the marketing and administration of the program. New constituencies will be served. Graduates will be more marketable.

Alterations

1. Change the name of the degree from *Industrial Technology* to *Technology Management*. In recent years, the profession has updated "industrial technology" to "technology management," e.g., the associated professional organization of the National Association of Industrial Technology (NAIT) has changed its name to the Association of Technology Management and Engineering (ATMAE) (ATMAE, 2011). The aligned BS (Indiana State University, 2011) and PhD (Indiana State University, 2011) programs at ISU have already been changed to *Technology Management*.

2. Increase the total credits in the program from 33 to 36 by adding the MET 505 engineering economy course to the core. Most current students have been taking this course by election or advisement. The faculty decided that: (a) the credits in the program should be increased, and (b) that this course should be required. International students (who comprise at least one-half of the students in the program) usually take 36 or more credits. Thirty-six credits in the program better fits students' expectations, preparation for the PhD, and international students' programs of study. Most international students take 9 credits per semester for four (fall and spring) semesters for a total of 36 credits. MET 505 is now considered *core* content for most MS students with this type of degree.

3. Standardize and specify the concentrations. The current MSIT program requires a concentration but concentrations are not named. Therefore, concentrations cannot be stated on transcripts. Concentrations will provide clearer options for students. Defined concentrations will bring uniformity to the program that will better serve students, be more marketable, and enable better course scheduling and aid other faculty deployment issues.

    The change to the named concentrations is expected to increase enrollments. Many students considering the current MSIT program have stated they desire a more focused degree and would like their concentration stated on their transcript.

    Currently, the associated BS and PhD degrees have named minors or specializations that provide distinction and value. The changed MSTM program as proposed, would fill in

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the gap between the current BS and PhD programs. It is expected that more BS students will continue at ISU for the MSTM and that additional PhD students will use the MS concentration as a prerequisite to the doctoral program. It is expected that the enrollments in the PhD will increase due to the MSTM program being a better fit than the current MSIT program.

4. Become an ICHE-approved distance program. Though every required core course in the current MSIT has been available at a distance for several years, not all concentration courses were available at a distance. The proposal is that all concentration courses would also be available on-line. Via a roll-out, sufficient on-campus sections will also be offered to accommodate the on-campus visa-related needs of international students and other students who desire on-campus courses. The change that is necessary to make every course (core and concentration) available at a distance is to develop distance versions of only a few courses.

5. Add a required comprehensive evaluation to the culminating experience. Per policy at the program level this will become part (one of the steps) of how the culminating experience will be administered. Currently, a comprehensive evaluation is allowed but not standardized. The comprehensive evaluation is viewed as a significant increase in quality and will become a major part of the program's outcome assessment. A program policy exists to guide the outcomes assessment process.

This program change was developed by the current MSIT faculty with consultation from all faculty and administrators in the College of Technology; current and former students at the BS, MS, and PhD levels; employers; and advisory committee members. Approvals were obtained at all the internal curriculum levels, i.e., the MSIT program faculty, Applied Engineering and Technology Management Department faculty and Chairperson, College of Technology Graduate Affairs Committee and Dean, ISU Graduate Council, ISU Faculty Senate, Provost and Vice President of Academic Affairs, President of the University, and ISU Board of Trustees.

Outcomes Assessment

Outcomes Assessment for the MSTM program will be the same as for the MSIT program. The outcomes assessment plan is functioning. Following is an excerpt of that plan that summarizes the outcomes of the program and the methods of evaluating those outcomes.

Table 2 MS IT/TM Outcomes Assessment

Matrix of Program Outcomes and Assessment Methods				
	Follow-up Survey	Survey of Graduating Students	Analysis of Comprehensive Evaluations	Analysis of Culminating Experiences
1. Perform a variety of technical activities the student is likely to manage.		X		
2. The student will be able to communicate effectively in the production environment.	X			
3. The student will demonstrate the ability to solve production problems or control the environment.	X			X
4. The student will demonstrate the ability to make production related decisions.	X			X
5. The student will be able to effectively allocate resources	X			X
6. The student will operate well in team environments, whether as leader or team member, as well as operate well in an unsupervised environment.	X	X		
7. The student will integrate ethics in all dealings.	X			
8. The student will demonstrate proficiency as a researcher by conducting research on an approved technical topic.			X	
9. The student will demonstrate proficiency in dissemination of knowledge through written and oral presentation.			X	

2. *Admission Requirements, Anticipated Student Clientele, and Student Financial Support*

In addition to those for the College of Graduate and Professional Studies, the MSTM program has the following admission requirements.

1. A baccalaureate degree closely related to one of following: automotive, manufacturing, mechanical engineering technology, packaging, or similar technical, engineering technology or technology management field.

2. The student will also be required to select a MSTM concentration. If the concentration selected is not closely related to the prior course work and/or professional experience, the student may be required to complete deficiency course work in addition to the minimum required credits in the program. Due to the nature of the degree, no definitive list of baccalaureate prerequisite courses can be listed. To a certain extent, the student's past

course work and the MSTM concentration will determine if any deficiency course work is needed. However, as a minimum the student should have had at least one of each of following as part of their baccalaureate:

- A laboratory course in technology, e.g., automotive power train, drafting/CAD, fluid power, electronics, machining, package testing, etc.
- A management-focused course, e.g., engineering economy, industrial supervision, parts distribution, production planning, quality control, workplace law, etc.
- A course that integrates the above two, e.g., a simulated manufacturing enterprise course or suitable internship (co-op experience).

It is estimated that even if the current MSIT enrollments were to double with the change to the MSTM, no additional faculty, course sections, or other resources will be necessary. Therefore, no enrollment limits are anticipated at this time.

The program is designed for part-time off-campus working professionals. The scheduling of courses will allow full-time (9 credits per fall and spring semesters) and on-campus students to participate.

Student financial support will be available through institutional channels as for any graduate student.

3. *Proposed curriculum*
The proposed curriculum for the MSTM is as follows:

Table 3 Comparison of MSIT and MSTM Programs

Current MSIT Program		Proposed MSTM Program	
Courses	Credits	Courses	Credits
		MET 505-Economic Analysis for Engineering and Technology	3
TMGT 591-Creativity and Ideation Techniques and Practice	3	TMGT 591-Creativity and Ideation Techniques and Practice	3
TMGT 601-Technology and the Supervisor	3	TMGT 601-Technology and the Supervisor	3
TMGT607-Statistics for Experimental Research in Technology	3	TMGT607-Statistics for Experimental Research in Technology	3
TMGT 698 or ECET 698-Research Methods	3	TMGT 698 or ECET 698-Research Methods	3
Technical Concentration	9-12	Technical Concentration (can include electives)	15-18
Cognate (electives)	6		
Culminating Experience TMGT 697-Major Project (with 12 credit technical concentration)	3	Culminating Experience TMGT 697-Major Project (with 18 credit technical concentration)	3
or		or	
TMGT 699 Thesis (with 9 credit technical concentration)	6	TMGT 699 Thesis (with 15 credit technical concentration)	6
Total	33	Total	36

Technical Concentrations

The technical concentration is meant to allow a contract of study that can best fit the student's prior course work, experiences, and goals. The currently proposed technical concentrations follow.

Table 4 Currently Proposed Technical Concentrations

Concentration	Courses (All courses are 3 credits)
Automotive	Select at least four of the following AET 532 - Parts Distribution and Marketing AET 533 - Service Facility Organization and Management 3 credits AET 535 - Engine Thermodynamics 3 credits 5 AET 540 - Fixed Operations Management 3 credits AET 557 - Fleet Management 3 credits AET 558 - Technological Perspectives in Entrepreneurship 3 credits AET 577 - Advanced Vehicle Technologies 3 credits one or two advisor approved electives as needed
Manufacturing	TMGT 563 - Quality and Process Control 3 credits TMGT 571 - Production Planning and Control 3 credits TMGT 578 - Industrial Organization and Functions 3 credits MFG 700 - Human Relations and Leadership in Manufacturing 3 credits one or two advisor approved electives as needed
Mechanical Engineering Technology	Select at least four of the following MET 504 - Engineering Design and Management 3 credits MET 608 - Application of Simulation Modeling and Analysis 3 credits MET 610 - Vehicle Body Structure Design 3 credits MET 612 - Reliability, Maintainability, and Serviceability 3 credits MET 633 - Computer Aided Graphics Software 3 credits one or two advisor approved electives as needed
Packaging	PKG 582 - Package Development and Analysis 3 credits PKG 584 - Packaging Design, Analysis and Testing 3 credits PKG 586 - Packaging Machinery Systems 3 credits PKG 589 - Packaging Industry Projects 3 credits one or two advisor approved electives as needed
Quality	Select at least four of the following TMGT 561 - Lean Six Sigma 3 credits TMGT 563 - Quality and Process Control 3 credits TMGT 569 - Process Analysis and Improvement 3 credits MET 611 - Experimental Design and Process Analysis 3 credits MET 612 - Reliability, Maintainability, and Serviceability 3 credits TMGT 665 - Quality Standards Leadership 3 credits TMGT 669 - Seminar in Quality Systems 3 credits one or two advisor approved electives as needed

Scheduling of Course Work

Based on the current program and the new students expected due to the proposed changes, at least one-half of the students will be off campus students. Also, about one-half of the students will take less than a full load (9 credits) during the fall or spring semesters. Most courses will be offered once per year. Core courses will need to be offered once per year (based on the number of majors). Concentration courses will have less demand. However, most concentration courses are at the 500-level which will be taught in tandem with their 400-level counterparts, which are typically offered once per year. Most distance students take two courses per semester. There are established long-term schedules (rollouts) for the 400/500-level courses and the MSTM core courses. Historically, both on- and off-campus students have been able to enroll in courses so that they graduate on schedule as expected.

Table 5 Proposed Rollout of Courses

Core		Concentrations									
		Auto		Man		MET		Pack		Qual	
MET 505	Every S	AET 532[1]	Sp 12	TMGT 563	Every F	MET 504[2]	Every F	PKG 582	F 10	TMGT 561[3]	Every Su
TMGT 591	Every Sp	AET 533	Sp 12	TMGT 571	Every F	MET 608	Sp 11	PKG 584	F 11	TMGT 563	Every F
TMGT 601	Every F	AET 535	Every Sp	TMGT 578	Every F and Sp	MET 610	Su 11	PKG 586	Sp 12	TMGT 569	Every Sp
TMGT 607	Every F	AET 540	Sp 11	MFG 700	Sp 11[4]	MET 612	F 12	PKG 589	Sp 11	MET 611	Sp 12
ECT or TMGT 698	Every F, Sp & Su	AET 557	F 11			MET 633	Every Sp			MET 612	F 12
Culminating Experience	Every F, Sp & Su	AET 558	F 11			MET 605	F 11			TMGT 665	F 11
		AET 577	F 13			MET 611	Sp 12			TMGT 669	Su 11
		1 or 2 electives[5]		1 or 2 electives		MET 614	F 12	1 or 2 electives		1 or 2 electives	

The 500-level courses are all graduate versions of 400-level courses. The 400- and 500-level courses are taught simultaneously as a 400/500 level course. 500-level enrollment is restricted to graduate students who did not take the class at the 400-level. Graduate students must do more work (e.g., a graduate paper or project) and at a higher level (e.g., higher levels of Bloom's Taxonomy).

All courses will be delivered by Indiana State University.

Elements of the Culminating Experience

All ISU graduate programs require a culminating experience, e.g., thesis or other research project. The culminating experience for this program will be either a thesis or a graduate project. Both thesis and project have the following common elements.

- The culminating experience must be completed during the last semester of course work or after completing at least 24 credits of the approved Contract of Study.
- Normally, the student's advisor is the instructor of record.

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[1] Select four from list.
[2] Select four from the first five and the rest from the last three.
[3] Select four from list.
[4] Courses not listed are currently on a 3-semester or 2-year roll out.
[5] Concentrations are 18 credits with a project and 15 credits with a thesis. Advisor-approved electives are used when a concentration has less than 18 credits. Typical electives include other MSTM courses but other course can also be used.

- Every culminating experience focuses on a graduate level industrial-technical question, problem, or research and development requirement.
- Normally, the traditional five-chapter thesis model will be used.
- The written report will adhere to the *APA Publication Manual*. For a thesis, ISU's thesis style will be layered on top of APA style.
- The ISU thesis routing and approval process will be used.

Comprehensive Evaluation

As part of the culminating experience, each student will complete a comprehensive evaluation, the elements of which follow:

1. To be taken during the student's last semester in the program.
2. To be completed in two parts:
   2.1. Written
       2.1.1. To be comprised of three questions. One question each pertaining to the core, the technical concentration, and a third focusing on the student's culminating experience.
       2.1.2. To be word processed, proctored, closed book (no books, internet, notes, or outside sources), with a three hour time limit.
       2.1.3. To be conducted no later than four weeks before the end of the term.
   2.2. Oral
       2.2.1. To be used to discuss the results and clarify student's written responses as needed.
       2.2.2. To be conducted within two weeks after the written portion and no later than two weeks before the end of the term.
       2.2.3. The oral portion may be combined with the student's defense of their culminating experience.

4. *Form of Recognition*

Students who satisfactorily complete the requirements for this program will be awarded a Master of Science in Technology Management.

The suggested CIP code for the MSTM program is 15.1501.

5. *Program Faculty and Administrators*

The following table displays the faculty and administrators most closely associated with the program.

Table 6 Administrators and Faculty of the Program

Name	Degree	Rank	Specialization	Appointment
ADMINISTRATORS				
Bradford Sims	Ph.D.	Professor and Dean, College of Technology	Construction Management	Tenured
Robert English (Effective Jul 2011)	Ed.D.	Professor and Associate Dean, College of Technology	Electronics Engineering Technology	Tenured
FACULTY				
M. Affan Badar	Ph.D.	Associate Professor and Chair, Dept. of Applied Engineering and Technology Management	Mechanical Engineering Technology	Tenured
Phillip Cochrane	Ph.D.	Assistant Professor	Automotive Engineering Technology	Tenure Track
Michael A. Hayden	Ph.D.	Professor and MSTM Coordinator	Quality	Tenured
Gordon Minty	Ph.D.	Professor (retired)	Manufacturing Management	Adjunct
Randell Peters	Ph.D.	Associate Professor	Automotive Engineering Technology	Tenured
Marion Schafer	Ph.D.	Associate Professor	Packaging Engineering Technology	Tenured
A. Mehran Shahhosseini	Ph.D.	Assistant Professor	Mechanical Engineering Technology	Tenure Track
James Smallwood	Ph.D.	Professor	Manufacturing Management	Tenured
Ming Zhou	Ph.D.	Professor	Mechanical Engineering Technology	Tenured
Todd E. Alberts	M. S.	Instructor	Mechanical Engineering Technology	Full-time Instructor

6. *Needed Learning Resources*

Available learning resources include the Cunningham Memorial Library with its on- and off-campus student-friendly services and extensive collection of hardcopy and internet-based resources. Continually, a greater amount of relevant materials are available on-line. Also, hard-copy books and other materials are continually being made more available by booksellers and other vendors (both on-line and fixed-location). Students are very savvy and capable of utilizing all of these resources.

7. *Other Program Strengths*

An advantage of the existing program has always been the flexibility of having a technical concentration to compliment the core courses. The naming of the concentrations and their placement on transcripts will be a further advantage.

Another advantage of the existing program has been that most courses, especially core courses, have been available at distance. All courses being at a distance will make the program available to more constituents.

The faculty of the program has close ties with industry via alums, advisory committee members, and other professional contacts. Most faculty members are officers of professional associations or have other active participation in their associated professional organizations at the local or national levels. For example, the Quality Council of Indiana (QCI) is the world leader in producing body-of-knowledge material (*Primers*) for professional certifications in quality. QCI is located in West Terre Haute. QCI, MSTM program coordinator Dr. Michael Hayden, and other faculty members work together closely, e.g., a QCI executive is a member of the program's advisory committee; also, QCI personnel and Dr. Hayden are officers of the local professional chapters of the American Society for Quality and the Society of Manufacturing Engineers. Dr. Marion Schafer, another program faculty member, is the first academic in the nation to become a Certified Packaging Professional and is very active with the International Organization of Packaging Professionals. Most faculty members have similar professional certifications and leadership roles. See the faculty resumes in the appendix for more details.

On-campus students and faculty benefit from College of Technology laboratories and equipment. Most off-campus students are employed full-time in industry, thus their real-world laboratories are even a greater advantage—and not just for them but for faculty and on-campus students as well (including undergraduate students). Off-campus contacts (current students and others) lead to many cooperative endeavors, e.g., internships and employment opportunities for students, faculty sabbatical activities, and other research collaborations.

C. PROGRAM RATIONALE
1. *Institutional Factors*

Most of the reasons to create this program to replace the existing MSIT program have already been discussed. Of particular note is the potential for better articulation with existing BS and

PhD programs. The changes will allow more BS students (from ISU and elsewhere) to further their education.

Bachelor of Science Program Articulation
The following table lists the current College of Technology bachelor of science programs that can feed into the current MSIT program. Of particular note is the BS in Technology Management because: (a) it also has the intent to prepare technology managers, and (b) it is one of few BS programs available at a distance. Most graduates of a BS program at a distance who want to earn an MS degree want to also earn that MS degree at a distance. Therefore, for a majority of majors in the table below, the current MSIT is their only MS option—but that option is not an option that is completely available at a distance. The current MSIT program also does not have named concentrations; therefore, it lacks the focus and the appeal that every BS degree requires.

On-campus or off-campus Electronics Technology BS graduates can enroll in the MS in Electronics Technology (MSECT), which is available off and on campus; however, BS in Technology Management, Mechanical Engineering Technology, and others cannot enroll in the MSECT. In part, this proposal is to allow the MSIT program to function at a distance similar to the MSECT program. The MSECT currently has approximately 70 majors, 30 at a distance and 40 on campus, and has been successfully offered at a distance since 1996. The MSTM major is likely to eventually have more majors than the MSECT because the MSTM's concentrations would cover more technologies.

Table 7 Pertinent College of Technology Degrees Available at a Distance

BS Degree	Last 2 Years of Degree Available at a Distance?	Most Suitable MS Degree
Electronics Engineering Technology	Yes	MS in Electronic and Computer Technology
Automation and Control Engineering Technology	Some courses	(Available completely at a distance)
Computer Engineering Technology	Some courses	
Technology Management	Yes	Current MSIT degree (some courses at a distance)
Mechanical Engineering Technology	Yes	
Advanced Manufacturing Management	Some courses	Proposed MSTM degree (available completely at a distance)
Automotive Engineering Technology	Some courses	
Packaging Engineering Technology	Some courses	
Safety Management	Some courses	
Construction Management	No	

It is clear from the table above that there is potential for more students to be served by this proposed change. The table also displays the logic of concentrations for the MSTM, e.g., concentrations in Automotive, Manufacturing, Mechanical Engineering Technology, Packaging,

and Quality are currently proposed. The addition of future concentrations, e.g., Construction and Safety are envisioned.

The BS in Technology Management is one of the smaller programs in the College of Technology (current headcount of 58). In 2010, 12 degrees were conferred. When the degrees conferred for other programs that feed into the current MSIT are added, the tally is more than tripled. However, on the average, only a couple of those BS graduates continue on for the MSIT. Part of the reason that the number is not greater is that the current MSIT is not available completely at a distance and does not have named concentrations.

Doctor of Philosophy Articulation

The doctor of philosophy (PhD) in technology management has a current headcount of 86. The program is completely at a distance and has named concentrations (specializations). The current MSIT (largely because it is not completely at a distance and does not have named concentrations) does not fit well with the PhD. For the last five fiscal years, no MSIT graduates have enrolled in the PhD. This is startling and reason enough to better articulate the MS with the PhD program.

Indiana State University is recognized for excellence in experiential learning, community engagement, and cross-constituent collaborations. This current MSIT (and its MSTM replacement) is inherently experiential by the industrial nature of its content and the technological nature of its pedagogy. Community engagement and collaboration are built into the program by virtue of student body characteristics (previously described) and the nature and object of instruction.

2. *Student Demand*

Following are recent headcount statistics for the current MSIT program.

Table 8 Headcount of Current MSIT Program

Fiscal year	2006	2007	2008	2009	2010	Five-year average
MSIT headcount	34	30	17	27	27	27

The MSTM program will maintain these levels and add more students due to the following:

- Officially advertising that the program is available completely at a distance will attract more time- and place-bound students.
- The program will be more desirable because it will have named concentrations.
- The program will be better articulated with the BS and PhD programs.

It is difficult to accurately predict how many new individuals will be served due to the changes. How ISU decides to market the program will be a large factor. The method of marketing at the College of Technology and department levels will include the usual methods, e.g., brochures,

targeted mailings, web site, and networking with professional colleagues. Over the past five years the program has averaged a headcount of 27. Based on prior experiences and the bullets above, the faculty think that a headcount of 50-60 by 2015 is a reasonable expectation.

Table 9 Projected Headcount of MSTM Program

Fiscal year	2011	2012	2013	2014	2015
Projected MSTM headcount	30	35	40	45	50

3. *Transferability*

Per ISU policy, up to nine credits of equivalent course work, at the graduate level, from a regionally accredited institution, with a grade B or better, may be transferred into the program.

4. *Access to Graduate and Professional Programs*

As previously discussed, it is expected that the MSTM program will allow a greater number of students to enter the MSTM program after obtaining a BS degree and continue on for a PhD program.

5. *Demand and Employment Factors*

Geographic Region to Be Served

Though Indiana residents will be the primary marketing audience, students in any location can enroll in the program as distance students. There has been an increasing trend for students to further their education at a distance. For instance, from 2007 to 2008 the demand for distance education increased by 70 percent, according to a recent study by the Sloan Consortium (Lewis, 2010). Programs similar to the proposed MS in Technology Management are usually categorized as Engineering or Management. GradSchools.com lists 422 on-line masters programs in engineering alone (GradSchools.com, 2010).

D. PROGRAM IMPLEMENTATION AND EVALUATION

Implementation
As previously discussed, this program is an enhancement of the current MSIT program. The implementation will be very simple and mainly consist of changes to (a) advising and catalog materials and (b) brochures, web sites, and other marketing materials. Following are ways by which the program will be marketed.
- The web sites of the university, college, and department.
- Newsletters and alumni publications and activities.
- Brochures for current baccalaureate students at ISU will also be made available to other institutions and targeted employers.

Table 10 Sample of Faculty Member's Leaderships Roles in Professional Associations

Name	Professional Memberships	Certifications/Licensures/Etc.
M. Affan Badar	American Society of Mechanical Engineers (ASME) Association of Technology, Management, and Applied Engineering (ATMAE) Institute of Industrial Engineers (IIE) Society of Manufacturing Engineers (SME)	ATMAE Certified: Senior Technology Manager
Phillip Cochrane	Society of Automotive Engineers (SAE) American Society of Engineering Educators (ASEE)	
Michael A. Hayden	American Society for Quality (ASQ) Society of Manufacturing Engineers (SME)	ASQ Certified: Quality Engineer, Manager of Quality/Organization Excellence, & Six Sigma Green Belt SME Certified: Manufacturing Engineer
Gordon Minty	Association of Operations Management (APICS)	APICS Certified: Production and Inventory Management
Randell Peters	National Institute for Automotive Service Excellence (ASE) Association of Technology, Management, and Applied Engineering (ATMAE)	ASE Certified: Advanced Light Diesel Engine Performance, Parts Specialist, Service Consultant, Undercar Specialist, Master Medium/Heavy Truck Technician, Alternative Fuels Compressed Natural Gas Technician, Master Automobile Technician, Advanced Engine Performance ATMAE Certified: Senior Technology Manager
Marion Schafer	Association for Standards in Testing and Materials (ASTM) Association of Technology Management and Applied Engineering (ATMAE) Institute of Packaging Professionals (IoPP) International Safe Transit Association (ISTA)	IoPP Certified: Packaging Professional, Packaging Laboratory Professional
Mehran A. Shahhosseini	American Society of Mechanical Engineers (ASME) Society of Automotive Engineers (SAE) Society of Manufacturing Engineers (SME)	Certified Engineer-in-Training (EIT)
James Smallwood	Association of Technology Management and Applied Engineering (ATMAE) Society of Manufacturing Engineers (SME)	SME Certified Manufacturing Technologist
Ming Zhou	Institute of Industrial Engineers Society of Manufacturing Engineers (SME) Society of Computer Simulation and Modeling	

- Via the status and recognition afforded by accreditation.
- Via the networking that is accomplished by the many College of Technology collaborations with advisory committees, industrial projects, grants and contracts involving business and industry partners.
- Professional affiliations of the faculty.

The last bullet is somewhat unique to ISU's College of Technology's historic and continuing community engagement and experiential learning environment. The faculty of the program have many professional certifications and are heavily involved with the leadership of their professional societies. Much networking is accomplished via the faculty's professional collaborations. Table 10 lists only a few of the primary faculty member's professional affiliations.

Evaluation
The current MSIT program has a functioning outcomes assessment plan. In part, this proposal is due to assessing the current MSIT program. The modified MSTM program will use the same plan. In addition to outcomes assessment, all College of Technology programs are reviewed periodically for alignment with university, college, and department goals and strategic plans. This program well fits those goals and strategic plans.

1. Quality and Efficiency

Along with outcomes assessment and normal ISU oversight, the primary measure of quality and efficiency will be via an accrediting body. Both ATMAE and ABET accredit BS programs. Within the past couple years they have started to accredit MS programs as well. The organizations and their respective accreditation practices are similar enough that programs can often choose which one to use. The programs that will feed into the MSTM program are either ATMAE or ABET accredited. Over the next year or so, the faculty in the MS program will determine whether to seek ATMAE or ABET accreditation during the next accreditation cycle (2016).

2. Appropriateness of Program Offering to Institution's Identity and Mission

The following table states the goals of the University, College of Technology (COT), and Department of Applied Engineering and Technology Management (AETM). The MSTM mission aligns with the university, college, and department missions, especially due to the program's focus on the professional advancement via graduate-level instruction (which requires research on the part of faculty and students).

Table 11 Alignment of Mission

Mission			
ISU	COT	AETM Department	MSTM Program
Indiana State University combines a tradition of strong undergraduate and graduate education with a focus on community and public service. We integrate teaching, research, and creative activity in an engaging, challenging, and supportive learning environment to prepare productive citizens for Indiana and the world.	The College of Technology will provide exemplary undergraduate and graduate programs, generate solutions and knowledge through research, and serve the technology needs of the State, the nation, and the international community.	Through teaching, research, and service, we create and develop knowledge in AETM fields producing value-added student scholars.	The master of science in Industrial Technology furthers the academic preparation and professional advancement of the baccalaureate graduate with a degree in and professional orientation toward technology management or similar industrial-technical field.

The following table states selected goals. Pertaining to ISU goals, the program: (a) is likely to increase enrollment for reasons already discussed, e.g., available at a distance; (b) is inherently experiential and fosters community engagement and other collaborations; (c) aids in diversifying revenue streams because of its graduate level instruction, projects, and collaborations. Pertaining to COT goals, the program: (a) focuses on graduate-level professionals in technology and management, (b) is likely to better serve underrepresented groups by being available at a distance, (c) is experiential, and (d) disseminates new knowledge and technology via real-world collaborations. Pertaining to department goals, the program, for the reasons already stated, likely to increase student enrollment, experiential-based community engagement, and grants and contracts.

Table 12 Alignment of Goals

Selected Goals			
ISU	COT	AETM Department	MSTM Program
Increase enrollment and student success. Advance experiential learning. Enhance community engagement. Diversify revenue though philanthropy, contracts, and grants.	Be recognized as a global leader in the preparation of future professionals for careers in technology, teachers/trainers for industry and education. Continue to increase participation of underrepresented groups in technology careers. Develop critical thinking, problem solving, and communication skills through the use of practical experiences. Provide the knowledge and skills to prepare people to create, understand, apply, manage, and evaluate technology ethically and responsibly. Contribute to the areas of state economic development, technology transfer, professional development, and community service. Extend partnerships with schools, businesses, industry, and other agencies through co-op programs, internships, research and development projects to expand access to higher education and better prepare our future workforce. Evaluate, refine, and enhance all academic programs to assure a sound basis for lifelong learning and living in a multi-cultural and interdependent world. Maintain a concern for future developments, be known for innovativeness, and participate in the search and application of new technologies.	Increase enrollment and student success. Continue leadership in advancing experiential learning and community engagement. Continue to seek revenue through contracts and grants.	The program provides theoretical and practical learning experiences to prepare graduates for leadership positions in industry and/or prepare them for doctoral level programs such as the Ph.D. in Technology Management. [The program also has outcomes assessment goals discussed elsewhere in the document.]

3. Availability of Similar Programs

Nationwide, there are scores of similar programs. Purdue and Ball State Universities have similar programs. The MSIT program has been in existence, with one name or another, for 40 plus years. Many, if not most, similar programs, nation-wide are available at a distance. It suppresses headcount that ISU's current program is not available at a distance.

4. Personal and Social Utility

Among the ranks of professionals, especially those in management and supervision, the BS degree is usually the entry degree required. Increasingly, the graduate degree is the ticket to advancement. For some professionals, the MBA is a logical graduate degree. For many professionals in technology a professionally and technically focused graduate degree is more appropriate for a manager.

5. Student Demand

State and nation-wide student demand for this type of program is stable. There is a current unfilled demand for the current MSIT to be available completely at a distance. The number of persons served by the new program is expected to increase due to the factors already discussed.

6. Student Access

The program will expand access due to its availability at a distance (with enough on-campus sections to continue to satisfy on-campus demand).

7. Flexibility of Program Design

The program provides individual flexibility for the busy, time- and place-bound professional by: (a) being available off and on campus, (b) having multiple technical concentrations, (c) offering internship as an elective course in the program of study, and (d) by the student's individual culminating experience.

8. Market Demand

The current average enrollment of 27 students shows a demand, as does the dozens of similar programs across the nation. The following table summarizes U.S. Department of Labor, Bureau of Labor Statistics job projections for a sampling of professions associated with current MSIT degree alums and expected MSTM graduates (Bereau of Labor Statistics, 2008).

Table 13 Employment Projections

U.S. Projected Increase in Employment from 2008 – 2018		
Occupations Related to the MSIT/MSTM Programs	Increase (in thousands)	Percent Increase
Industrial Production Managers for R&D	0.3	22.1%
All Engineering Managers	11.3	6.2%
All Industrial Engineers	30.6	14.2%
All Industrial Engineering Technicians	4.8	6.6%
Mechanical Engineering Technicians		
for Consulting Services	0.4	85.2%
for Testing Laboratories	0.3	9.9%
All General Engineering Technicians	4.0	5.2%
All Training and Development Managers	3.6	11.9%
All Technical Writers	8.9	18.2%

9. Inter-institutional and Inter-departmental Cooperation

Transfer credit is allowed according to ISU policy. Though every currently proposed MSTM concentration is based on a technical area in the Department of Applied Engineering and Technology Management, other departments can propose technical concentrations, e.g., Construction Management or Safety Management in the Department of Built Environment.

10. Flexibility of Providing Instruction

Every required course in the core and every concentration will be available at a distance at least once every two years. Enough on-campus courses will be offered to satisfy on-campus demand to meet the visa requirements for international students.

E. TABULAR INFORMATION
Table 1: Enrollment and Completion Data

Table 2A and 2B: Cost and Revenue Data

No additional resources or faculty lines are needed at this time. With program growth, additional faculty lines could be warranted in the future.

Table 3: New Program Proposal Summary

Table 1: Program Enrollments and Completions
Annual Totals by Fiscal Year (Use SIS Definitions)

Campus: Indiana State University

Program: M.S. in Technology Management

Date: May 2011

	Total Year 1 FY 2011-2012	Total Year 2 FY 2012-2013	Total Year 3 FY 2013-2014	Total Year 4 FY 2014-2015	Total Year 5 FY 2015-2016
A. PROGRAM CREDIT HOURS GENERATED					
1. Existing Courses	396	462	528	594	660
2. New Courses					
TOTAL	396	462	528	594	660
B. FULL-TIME EQUIVALENTS (see Table 3)					
1. FTE's generated by Full-Time Students	13.5	15.75	18	20.25	22.5
2. FTE's generated by Part-Time Students	3	3.5	4	4.5	5
TOTAL	16.5	19.25	22	24.75	27.5
3. On-campus Transfer FTE's					
4. New-to-Campus FTE's	7.5	10	11.75	12.75	13.75
C. PROGRAM MAJORS (HEADCOUNT)					
1. Full-time students	18	21	24	27	30
2. Part-time students	12	14	16	18	20
TOTAL	30	35	40	45	50
3. On-campus Transfers					
4. New-to-campus Majors	14	18	21	23	25
5. In State	9	11	12	14	15
6. Out-of-State	21	24	28	31	35
D. PROGRAM COMPLETIONS	13	15	18	20	22

Table 2A
Total Direct Program costs and Sources of Program Revenues

Campus: Indiana State University
Program: M.S. in Technology Management
Date: May 2011

A. TOTAL DIRECT PROGRAM COSTS	Total Year 1 FY 2011-2012		Total Year 2 FY 2012-2013		Total Year 3 FY 2013-2014		Total Year 4 FY 2014-2015		Total Year 5 FY 2015-2016	
	FTE	Cost	FTE	Cost	FTE	Cost	FTE	Cost	FTE	Cost
1. Existing Departmental Faculty Resources	0	$0	0	$0	0	$0	0	$0	0	$0
2. Other Existing Resources		$0		$0		$0		$0		$0
3. Incremental Resources (See Table 2B)		$1,000		$1,000		$1,000		$1,000		$1,000
TOTAL		$1,000		$1,000		$1,000		$1,000		$1,000

B. SOURCES OF PROGRAM REVENUES	Total Year 1 FY 2011-2012	Total Year 2 FY 2012-2013	Total Year 3 FY 2013-2014	Total Year 4 FY 2014-2015	Total Year 5 FY 2015-2016
1. Reallocation	$0	$0	$0	$0	$0
2. New-to-campus Student Fees	$202,079	$235,759	$269,438	$303,118	$336,798
(Note: MSIT already exists)					
3. Other (non-state)	$0	$0	$0	$0	$0
4. New State Appropriations:					
a. Enrollment change funding	0	0	0	0	0
b. Other State Funds	0	0	0	0	0
TOTAL	$202,079	$235,759	$269,438	$303,118	$336,798

Table 2B
Total Direct Program costs and Sources of Program Revenues

Campus: Indiana State University
Program: M.S. in Technology Management
Date: May 2011

	Total Year 1 FY 2011-2012		Total Year 2 FY 2012-2013		Total Year 3 FY 2013-2014		Total Year 4 FY 2014-2015		Total Year 5 FY 2015-2016	
	FTE	Cost	FTE	Cost	FTE	Cost	FTE	Cost	FTE	Cost
1. PERSONAL SERVICES										
a. Faculty	0	$0	0	$0	0	$0	0	$0	0	$0
b. Support Staff	0	$0	0	$0	0	$0	0	$0	0	$0
c. Graduate Teaching Assistants	0	$0	0	$0	0	$0	0	$0	0	$0
TOTAL		$0		$0		$0		$0		$0
2. SUPPLIES AND EQUIPMENT										
a. General Supplies/Equipment		$0		$0		$0		$0		$0
b. Recruiting		$1,000		$1,000		$1,000		$1,000		$1,000
c. Travel		$0		$0		$0		$0		$1,000
d. Library/Acquisitions		$0		$0		$0		$0		$0
TOTAL		$1,000		$1,000		$1,000		$1,000		$1,000
3. EQUIPMENT										
a. New Equipment Necessary for Program		$0		$0		$0		$0		$0
b. Routine Replacement		$0		$0		$0		$0		$0
TOTAL		$0		$0		$0		$0		$0
4. FACILITIES										
5. STUDENT ASSISTANCE										
a. Graduate Fee Scholarships		$0		$0		$0		$0		$0
b. Fellowships		$0		$0		$0		$0		$0
TOTAL		$0		$0		$0		$0		$0
SUM OF ALL INCREMENTAL DIRECT COSTS		$1,000		$1,000		$1,000		$1,000		$1,000

Table 3 New Program Proposal Summary

Prepared by Institution: Indiana State University

Institution Location: Terre Haute, IN

Program: M.S. in Technology Management
Proposed CIP Code: 15.1501
Date: May 2011

	Total Year 1 FY 2011-2012	Total Year 2 FY 2012-2013	Total Year 3 FY 2013-2014	Total Year 4 FY 2014-2015	Total Year 5 FY 2015-2016
Enrollment Projections (Headcount)					
Full-Time	18	21	24	27	30
Part-Time	12	14	16	18	20
TOTAL	30	35	40	45	50
Enrollment Projections (FTE) FTE for FY = credit hours/24					
Full-Time (18 cr hr in FY)	13.5	15.75	18	20.25	22.5
Part-Time (6 cr hr in FY)	3	3.5	4	4.5	5
TOTAL	16.5	19.25	22	24.75	27.5
Degree Completion Projections	13*	15	18	20	22
New State Funds Requested (Actual)	$0	$0	$0	$0	$0
New State Funds Requested (Increases)	$0	$0	$0	$0	$0

*Currrent MSIT

II. Prepared by CHE

New State Funds to be considered for recommendation (Actual)					
	$	$	$	$	$
New State Funds to be considered for recommendation (Increases)					
	$	$	$	$	$

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APPENDICES

Appendix A: Letters of Support
Appendix B: Faculty Qualifications

Appendix A: Letters of Support

TRI AEROSPACE, LLC

1055 South Hunt St.
Terre Haute, Indiana 47803

Phone: 812-872-2400
Fax: 812-877-3330

Website: www.TriAerospace.com

ISO 9001:2000
AS9100
Registrar
Registered Firm

October 7, 2010

Mr. Michael A. Hayden
Department of Applied Engineering and Technology Management
200 North Seventh Street
Terre Haute, IN 47809

Dear Mr. Hayden:

This letter is respectfully submitted in support of the change of name at Indiana State University from the Master of Science in Industrial Technology (MSIT) to the Master of Science in Technology Management (MSTM).

The proposed name change better reflects the current trend of using the title of "technology management" rather than "industrial technology" to better align the Master program with the BS PhD program description of technology management.

By adding an engineering economy course to the required courses and increasing the total hours required from 33 to 36, you have the added benefit of economics knowledge to the graduate. As a employer of ISU engineers, we want manufacturing engineers to be the career of choice so they will aggressively acquire the skills necessary to effectively meet the challenges of today's technologically advanced workplace. They must come with at least a basic knowledge of the cost constraints placed on the engineering process.

An informed, capable workforce is needed for any region to grow and enhance its economic well-being. Business, and particularly manufacturing, cannot and will not prosper without a skilled workforce. I support this initiative being undertaken by the Department of Applied Engineering and Technology Management.

Best regards;

Robert R. Brown
President & CEO

BSH HOME APPLIANCES CORPORATION

To Whom It May Concern,

As a full time engineer with over ten years working experience and a part time PhD student in the Indiana State College of Technology I fully support the proposed changes to the current Masters of Science in Industrial Technology to the Masters of Science in Technology Management (MSTM). By increasing course requirements and defining the concentration there will be a significant improvement to the marketability of the students upon entering the job market.

In my personal experience as a manufacturing and quality engineer there is a present and future need for individuals with technical management skills. Specifically, companies are finding that higher and higher levels of quality are required not just to win new customers, but to keep existing customers. A specific example is the addition, by Whirlpool, of a Vice president of quality that reports directly to the CEO. This position is in support of the company wide QualityFirst program designed to completely overhaul the quality program at Whirlpool. The increasing standard of quality is demanding college graduates specifically concentrating in quality areas. Increased competition has made companies very interested in the financial aspect of projects. The addition of economic analysis creates more marketable graduates that can easily decide if a project makes financial sense. It will be to the benefit of the student and ISU if specific concentrations are added to transcripts as well adding economic analysis to the program core requirements.

Again, as an engineer and student, I believe the proposed changes to the MSTM are to the benefit of the students and to Indiana State University.

Nathan Baker
Customer Service Engineer
BSH Home Appliances
130 Memorial Drive
Jacksboro, TN 37757
423-563-6137
714-230-2577 fax
Nathan.Baker@bshg.com

October 24, 2010

Jon F. Persinger
7025 Harrier Circle
Indianapolis, IN 46254-9506

Indiana Commission of Higher Education:

I wish to support the changes to the Master of Science in Industrial Technology program being proposed by the faculty and staff of Indiana State University.
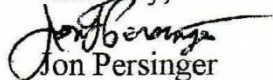
I have been a student for the past several years within ISU's doctoral program in Technology Management. During this time, I have seen the need for a supporting Master's level program that would better prepare students for the challenges one faces in doctoral level research. The proposed changes to the MSIT program not only include adding a beneficial class in Economic Analysis, but also boost the commitment to the culminating program experience, such as a more strenuous thesis option. When one considers that a large percentage of students never finish a doctoral program due to the difficulty in completing the dissertation phase, the challenge provided by a longer culminating Master's thesis or project seem evident. Students would get an early exposure to the process and rigor required for advanced graduate work. Increasing the number of successful graduate students is a desirable goal for both our state and our nation as technology continues to evolve in the 21st century.

In addition, the change in the title of the program to Master of Science in Technology Management, with the relevant program concentrations duly noted, more clearly align with both the B.S. and Ph.D. programs of the same name. This provides a logical path of progression for incoming undergraduates, as well as two viable graduate level options for those who obtained undergraduate degrees elsewhere.

Please feel free to contact me with any questions or concerns.

Thank-you for your time and consideration!

Sincerely,

Jon Persinger
Doctoral Candidate
Indiana State University

zimmer

Indiana Commission of Higher Education
C/O Professor Michael A. Hayden
Department of Applied Engineering and Technology Management
Indiana State University
200 N. 7th St.
Terre Haute, IN 48709

October 17, 2010

Dear Professor Hayden:

The proposed changes to the Master of Science in Industrial Technology program (MSIT) reflect the evolving needs of students and the desire of ISU's College of Technology to ensure the program's relevance to serving the needs of the citizens and employers of the State of Indiana. The name change also reflects the growing emphasis on technology management in the modern economy of Indiana and the United States. An additional beneficial proposed change is to align the MSIT program with the BS and PhD programs. This facilitates efficiencies among the three programs.

Another important proposed change is the technology concentration will be defined and listed on a student's transcript. This is important for students to get credit for the work they have completed and for prospective employers to be able to confirm the student's accomplishments and abilities. The proposed concentrations reflect the current technological needs and proficiencies of Indiana companies.

I fully support the changes in the MSIT program and respectfully urge the Indiana Commission of Higher Education to review and positively support the changes as well.

Sincerely,

Scott Stamm
Senior Quality Engineer
Ph. D. Student

October 4, 2010

10037 E. Flesher Avenue
Terre Haute, IN 47803-9638

Dr. Michael A. Hayden
Department of Applied Engineering
and Technology Management
Indiana State University
200 N. 7th St.
Terre Haute, IN 47809

RE: Proposed MSTM Program

Dear Dr. Hayden:

This letter is in support of the proposed change of the MSIT Program with the required 33 credit hours to the MSTM Program with the required 36 credit hours, which includes the addition of the MET 505, Economic Analysis course.

In the business world, it is important to not only understand the technical aspects of products and equipment, but to include the economic benefits and costs of alternatives being considered.

Sincerely,

Wesley R. Richardson, MS, MBA
Quality Knowledge Manager
Quality Council of Indiana

ISU_MSTM_WR_support_letter_20101004.wpd

A&M Sciences

Architectural and Manufacturing Sciences
Western Kentucky University

1906 College Heights Blvd 51066
Bowling Green, Kentucky 42101-1066
Phone: 270.745.3251 • Fax: 270.745.5946

Commission of Higher Education,

As an alumnus of Indiana State University (B.S. Mechanical Technology 1996 and Ph.D. Technology Management 2004), I have always felt a strong connection with continuous improvement in the field of Industrial Technology. The premier accreditation body for this field has recently led the way by changing their name from the National Association of Industrial Technology (NAIT) to the Association of Technology Management, and Applied Engineering (ATMAE).

ATMAE defines Technology Management as, "The field concerned with the supervision of personnel across the technical spectrum and a wide variety of complex technological systems. Technology Management programs typically include instruction in production and operations management, project management, computer applications, quality control, safety and health issues, statistics, and general management principles."

Technology Management is vitally important for both private-and public-sector organizations that must manage technological change. Today all businesses and public organizations are managed with and through technology and must understand that the technological basis of management is essential. For example, information technology is used in planning and controlling operations and in marketing. Product and production technologies are used in designing and producing products. Service technologies are used in delivery and distribution. Technologies permeate the entire organizational structure and supply chain.

The Master of Science in Technology Management (MSTM) provides a broad-based core of management competency in business functions, along with a solid understanding of specific business technologies and capabilities. Courses build upon existing technical competency while allowing the student to customize their depth of study in specific management technologies that enhance long-term professional career goals.

Dr. McCusker, of the University of Texas at Austin, stated: "Unlike the study of General Management or Business Administration, Technology Management places primary emphasis on the study of the uses of technology to drive innovation, strategy, product and service development, process innovation, IT systems and operation."

I fully endorse the proposal by the faculty of Indiana State University to move forward the MSTM program and all of the curricular changes. Please contact me if you have further questions.

Gregory K. Arbuckle, Ph.D. C.S.I.T. C.T.M.
Associate Professor
Architectural and Manufacturing Sciences
Western Kentucky University
1906 College Heights Blvd 51066
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Phone: 270-745-6592
Email: greg.arbuckle@wku.edu

GENERAL DYNAMICS
Ordnance and Tactical Systems

February 14, 2011

Professor Michael A. Hayden
Department of Applied Engineering and Technology Management
Indiana State University
200 N. 7th St.
Terre Haute, IN 47809

Dear Dr. Hayden,

This letter is in support of a change at Indiana State University in the title and content of the current MS program titled 'MS Industrial Technology'. The new program, which I strongly support, is to be titled 'MS Technology Management'. The program includes additional courses and the accommodation for the student to highlight and demonstrate areas of concentration in their official degree.

Today the rapid change of technology is dramatically impacting the content and coursework in most advanced degree programs. Similarly in industry, our operations and processes are changing rapidly as we look to acquire and implement these new technologies. We will be requiring our future employees to have the necessary management skills to handle and pull the most out of these technology changes.

As important as knowing and applying these latest technologies is to our operations, it is equally important to be able to understand, analyze and manage the required acquisition, implementation, and sustainment of these changes. Let me stress again that our next generation of employees must be able to understand and manage these technologies to get the most positive benefit for our corporations.

As outlined, this updated program – MSTM, includes not only Economic Analysis but also the ability of our future employees to focus and show concentration as part of their degree. This concentration will provide direct reference to capabilities and coursework in specific areas, especially Manufacturing, Mechanical Engineering, and Quality.

Finally, the new upgraded program will align with the University's current BS and PhD programs in name and thus show continuity throughout the program. Also by stressing the importance of providing a management solution for industry at all degree levels, Indiana State University will be giving the students the ability to demonstrate their interest in the need for current and viable management skills.

I am in strong support for this change.

Regards,

Dean L. Bartles, Ph. D.
Vice President and General Manager
Large Caliber Weapons & Ammunition

General Dynamics - Ordnance and Tactical Systems   Phone: 727-578-8200
11399 16th Court North – Suite 200   Fax: 727-578-8199
Saint Petersburg, FL 33716   Cell: 727-251-7671
E-mail: dean.bartles@gd-ots.com

February 11, 2011

Dear Dr. Hayden;

I fully support the change in title and content of the Indiana State University Master of Science in Industrial Technology (MSIT) to the Master of Science in Technology Management (MSTM).

As times and the program have and continue to change, the name change in particular more accurately reflects how the degree is applicable to more than simply "Industrial" operations. This change is past due. Moreover, I believe the name change will increase student and business interest and enrollment.

Jeff Cunion, PhD
Staff Manufacturing Engineer
Lockheed Martin Aeronautics Company

Michael A. Hayden
Department of Applied Engineering and
Technology Management
Indiana State University
200 N. 7th St.
Terre Haute, IN 47809

20 February 2011

Dear Professor Hayden,

I wish to express my firm support for your proposed changes to the Indiana State University Master of Science in Industrial Technology program (MSIT). The proposed changes provide several tangible program improvements; the resulting Technology Management program (MSTM) is the timely evolution of a valuable program. The changes are meaningful and based on the needs of the industry as well as important scholarly considerations.

A thorough review of the proposed changes reveals that this is not simply a change in the program name from "Industrial Technology" to " Technology Management".

- The proposed change to increase the number of program hours dedicated to the concentration properly reflects the need for each student to master highly specialized and complex technological areas of study.
- The addition of "Economic Analysis for Engineering and Technology" addresses a critical industry need. Senior Technology Managers must not only understand the technological and process related aspects of their field; they must also understand the economic value and business impact of their decisions. Competence in this area of study is mandatory for mid and senior level positions in an increasingly competitive and resource constrained business environment. Without this knowledge, Technology Managers would likely be excluded from executive level consultation or positions.
- The name change itself is significant and needed. It aligns better with key organizations (ATMAE and NAIT) as well as with existing scholarly programs (the ISU BS and PH.D programs). It also reflects the increasing reach of this field of study beyond traditional Industrial Technology applications. I also think it characterizes the program more succinctly.

Please contact me if can be of further assistance.

Regards,

Clinton M. Banner
Member, Alcatel-Lucent Technical Academy (ALTA)
Senior Member, IEEE
Business Development Manager
2301 Sugar Bush Rd.
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February 20, 2011

Michael A. Hayden
Department of Applied Engineering and Technology Management
Indiana State University
200 N. 7th St.
Terre Haute, IN 47809

Dear Dr. Hayden:

This letter is in support of the proposed change of the Master of Science in Industrial Technology (MSIT) program to the Master of Science in Technology Management (MSTM) program.

The proposed MSTM Program with the defined technology concentration will provide students a solid foundation for a distinctive career in technology management. Defined concentrations will be articulated with the BS and PhD programs in Technology Management at ISU. The proposed courses will better serve students to broaden the fundamentals of management theories and practices from interdisciplinary perspective as well as develop a great deal of depth and confidence within the concentration area.

Sincerely,

Kevin Liao, Ph.D. Candidate
Sr. Software Engineer
Network Support Systems
AT&T

Appendix B: Faculty Qualifications

Name: M. Affan Badar Chairperson and Associate Professor Department of Applied Engineering and Technology Management	Office Phone: 812-237-3982 Email: M.Affan.Badar@indstate.edu
Degrees / Schools: Ph.D. in Industrial Engineering, University of Oklahoma, 2002. M.S. in Mechanical Engineering, K.F. Univ. of Petrol. and Minerals, 1993. M.S. in Industrial Engineering, Aligarh Muslim University, 1990. B.S. in Mechanical Engineering, Aligarh Muslim University, 1988.	Research Interest: Coordinate Metrology, Lean Manufacturing, Health Care, Supply Chain, Energy System Design, Failure Analysis, Stochastic Modeling and Reliability
Professional Activities and Accomplishments: ASME (member), IIE (senior member), SME (senior), and ATMAE (professional) ABET Program Evaluator Training, Apr 2010 Certified Senior Technology Manager (CSTM), ATMAE, Dec 2009	
Presentations and Publications (Selected) Badar, M.A., Zhou, M., & Thomson, B. (2010). Application of QFD into the design process of a small job shop. IAJC *Int. J. of Modern Engineering*, *10*(2), 69-75. Chandler, M., & Badar, M.A. (2009). Effect of Individual Components on System's Reliability: A Case of Web-Based US Federal Highway Administration Project Recommendation and Approval Software. Emerald *Int. J. of Quality & Reliability Mgmt*., *26*(6), 614-628. Badar, M.A., Gardner, L., & Sammidi, S.S. (2009). Profit analysis of supply chain ordering strategies. *IIE Annual Conference 2009, IERC Track: Engineering Economics, Session: Engr Eco 2.* El Mounayri, H., Badar, M.A., & Rengifo, G.A. (2008). Multi-parameter ANN Model for flat-end milling. CSME, *Transactions of the Canadian Soc. for Mech. Engineering*, *32*(3-4), 523-536. Pondhe, R., Asare, S.A., Badar, M.A., Zhou, M., & Leach, R. (2006). Applying lean techniques to improve an Emergency Department. *Proceed. of the IIE Annual Conference 2006, Session: IERC03 Engineering Management 6*, CD-ROM.	
Relevant teaching experience: Fifteen years' experience teaching undergraduate and graduate courses.	Industrial Practice: worked in industry as a mechanical design engineer and manufacturing engineering intern.

Name: Phillip Cochrane Assistant Professor Department of Applied Engineering and Technology Management	Office Phone: 812-237- 3978 Email: Pcochrane@indstate.edu
Degrees / Schools: DBA, University of Phoenix MA, Theology Fuller Seminary MBA, University of Montana BSE, Western Michigan University BS, Western Michigan University AAS, SUNY Morrisville	Research Interest: Small Work Teams Entrepreneurship
Professional Activities and Accomplishments: Society of Automotive Engineers American Society of Engineering Educators	
Presentations and Publications (Selected): Improving student team laboratory performance, CEIC 2010. Collaborations in progress motorsports at Indiana State University, CEIC 2010. African American entrepreneurship in the underground economy, ASEE 2009.	
Relevant teaching experience: Four years' upper level HS mathematics Fifteen years' university level business, mechanical and automotive technology courses.	Industrial Practice: Twenty years' military engineering.

Name: Prof. Michael A. Hayden, Coordinator of MSIT (MSTM) BS and PhD in TM faculty member	Office Phone: 812-237- 3359 Email: michael.hayden@indstate.edu
Degrees / Schools: PhD in Industrial Education and Technology, Iowa State University, 1989.	Research Interest: Management of Technology Quality Workplace Law
Professional Activities and Accomplishments: Several Professional Certifications including: Manufacturing Engineer: Management focus by the Society of Manufacturing Engineers. Certified Quality Engineer by the American Society for Quality. Certified Manager of Quality by the American Society for Quality. PI or Co-PI of several grants. Recent past Chair and continued leadership of the local senior chapters of the American Society for Quality and the Society of Manufacturing Engineers.	
Presentations and Publications (Selected): Hayden, M.A., & Nicoletti, T. (1999). Results of a national survey of technology-based degrees offered at a distance. ISU Winterfest. Hayden, M.A., & Hellmann, J. (1999). How to orient, advise, and mentor distance education and non-traditional students. ISU Winterfest. Hayden, M. A. (1997). Work place legislation impacting Industrial Employees. National Association of Industrial Technology Annual Convention. Atlanta, GA.* Hayden, M. A. (1996). Industrial technologists' and their supervisors' perceptions of industrial technologist duties and job performance. National Association of Industrial Technology Annual Convention. Los Angeles, CA.*	
Relevant teaching experience: Over 20 years' experience teaching graduate courses. Approx. 30 courses taught mostly related to research methods, quality, and the management of technology.	Industrial Practice: In addition to consulting, full-time experience in industry as a machinist and drafter.

Name: Jeffrey McNabb Associate Dean, College of Technology Associate Professor Department of Applied Engineering and Technology Management	Office Phone: 812-237- 3347 Email: jmcnabb@indstate.edu
Degrees / Schools: Ph.D. in Curriculum and Instruction, Technology Education, Indiana State University, 1994 M.S. in Music Technology (MSMT), Indiana University-Purdue University Indianapolis (IUPUI), 2007 M.S., Industrial Technology Education, Indiana State University, 1985 B.S. Industrial Technology Education, Indiana State University, 1979 Certificate in Management, Harvard Graduate School of Education, 2009	Research Interest:
Professional Activities and Accomplishments: President / Research Division, National Association of Industrial Technology Member, Association of Technology, Management and Applied Engineering Member, National Association of Industrial and Technical Teacher Educators Member, Computer and Automated Systems Association	
Presentations and Publications (Selected): McNabb, J., & Balzer, B. (2008). Significant effect of microwave curing on tensile strength of carbon fiber composites. *Journal of Industrial Technology*, *24*(3). McNabb, J. (2006). Rule of thumb measuring system both English and metric (3rd ed.). Rule of Thumb Publishing. McNabb, J. (2002). A reading list for establishing a base of knowledge for technology management: A Delphi study. *Journal of Industrial Technology*, *19*(1). McNabb, J. (1995). Tech prep and the development of personal qualities: Defining the affective domain. *Education*, *115*(4).	
Relevant teaching experience: Almost two decades' experience teaching undergraduate and graduate courses.	Industrial Practice: More than two decades of industrial experience as a carpenter, aircraft maintenance technician and officer.

Name: Gordon Minty Professor Department of Applied Engineering and Technology Management	Office Phone: 812-237-3380 Email: Gordon.Minty@indstate.edu
Degrees / Schools: Ph.D. in Industrial Education, Michigan State University, 1984 M.S. in Industrial Technology, Eastern Michigan University (EMU), 1977 B.B.A. in Business (Finance), EMU, 1974	Research Interest: Production Systems People and their Work
Professional Activities and Accomplishments: Certified in Production and Inventory Control (CPIM) through The Society for Resource Management President of Illiana Chapter of American Production & Inventory Control Society, 1995-1998, 2002-2004 Secretary of Illiana Chpt. of American Production & Inventory Control Society 1991 1995 Co-Chair of NAIT Management Focus Group (National) 2003-2004 Secretary of Wabash Valley Chapter of Society of Manufacturing Engineers, 2003	
Presentations and Publications (Selected): Minty, G. (2007). Our management predicament. *IT Insider*, *8*(3), 9. Minty, G. (2003). The future history of industrial technology. *Journal of Industrial Technology*, *20* (1). Minty, G., & Lee, J. (2000). Building a Sense of Community with Technology Distance Students. *NAIT Annual Conference*, Pittsburgh, PA. Minty, G. (1998). Production planning and controlling: A problem based approach. Tinley Park: The Goodheart-Willcox Company, Inc.	
Relevant teaching experience: Twenty-five years' experience teaching undergraduate and graduate courses.	Industrial Practice: Sixteen years' industrial experience as a troubleshooter, toolmaker, and apprentice engineer.

Name: Randell W. Peters Associate Professor of Automotive Engineering Technology Department of Applied Engineering and Technology Management	Office Phone: 812-237-4962 Email: rpeters@indstate.edu
Degrees / Schools: PhD in Curriculum Instruction specializing in Industrial Technology Education, Indiana State University, 2005.	Research Interest: Automotive Engines Motorsports

Professional Activities and Accomplishments:
President, University Division, Association of Technology, Management, and Applied Engineering (ATMAE), since November 2009 Executive Board Member, National Association of Industrial Technology (NAIT), 2006 -2010 President, Management Division, National Association of Industrial Technology (NAIT) 2006 – 2008 Indiana State University, Curriculum Academic Affairs Committee, Member, 2006 – 2010, Associate Chair, 2007 – 2009, Chair, 2009 - 2011 Motorsports Certification team member working with the Society of Manufacturing Engineers (SME) to develop certification exams for Motorsports Engineers and Technicians 2006 - 2008

Presentations and Publications (Selected):
Peters, R.W. (2009). Advancing motorsports at Indiana State University. *National Hot Rod Association*, *Division 3 Track Operators Conference*, Indianapolis, IN. Peters, R.W. (2008). Automotive management: Understanding perception of potential customers. *National Association of Industrial Technology Conference*, Nashville, IN. Peters, R.W. (2008). Concept mapping: Does it increase performance on multiple choice testing in technology oriented fields? *National Association of Industrial Technology Conference*, Nashville, IN. Peters, R.W. (2008). Technology aspects of the Indiana State University motorsports management minor. American Society for Engineering Education, Engineering and Technology Leadership Institute, Indianapolis, IN Peters, R.W. (2007). Motorsports studies at Indiana State University. *American Society for Engineering Education, Illinois-Indiana Section Conference Spring 2007 Proceedings.* Peters, R.W. (2006). Assessing the need for a master of science degree in automotive technology management. *American Society for Engineering Education 2006 Illinois-Indiana and North Central Joint Section Conference Proceedings.*

Relevant teaching experience: Eight years of teaching automotive technology and management courses at the bachelor and master's degree levels.	Industrial Practice: Fifteen years' service as Technician, Service Manager, Body Shop Manager, and Fixed Ops Director.

Name: Marion D. Schafer Associate Professor Coordinator of Ph.D. in Technology Management	Office Phone: 812-237-3352 Email: Marion.Schafer@indstate.edu

Coordinator of Packaging Engineering Technology Department of Applied Engineering and Technology Management	
Degrees / Schools: Ph.D.in Curriculum and Instruction, Indiana State University, 2001 M.S. in Industrial Professional Technology, Indiana State University, 1995 B.S. in Packaging Technology, Indiana State University, 1990 B.S. in Civil Engineering, Rose-Hulman Institute of Technology, 1970-73	Research Interest: Packaging and its environmental impacts Accident and damage prevention through proper packaging

Professional Activities and Accomplishments: Certified Packaging Professional - Lifetime Certified Packaging Laboratory Professional - Lifetime Member, American Society for Testing of Materials (ASTM) Member, Association of Technology, Management, and Applied Engineering (ATMAE) Member, Epsilon Pi Tau (EPT) Member, Institute of Packaging Professionals (IoPP) Member, Indiana State Teachers Association (ISTA)
Presentations and Publications (Selected): Schafer, M. D. (in press). Environmental issues of packaging. DES Tech Publications. Schafer, M. D. (2007). Case studies in packaging: Million dollar solutions. Central Indiana Institute of Packaging Professionals. Indianapolis, IN. Schafer, M. D. (2004). Trends in petfood packaging. Presentation to petfood industry forum. Hyatt Regency O'Hare. Rosemont, IL. Schafer, M. D. (2003). Leak detection. Petfood Technology. Mt. Morris, IL: Watt Publishing Schafer, M. D. (2003). Bundling, case packing and palletizing petfood products. Petfood Technology. Mt. Morris, IL: Watt Publishing.

Relevant teaching experience: Almost two decades' experience teaching undergraduate and graduate courses.	Industrial Practice: Almost two decades' industrial experience as a packaging consultant and in various positions.

Name: A. Mehran Shahhosseini Assistant Professor Department of Applied Engineering and Technology Management	Office Phone: 812-237-3349 Email: ashahhosseini@indstate.edu
Degrees / Schools: D.Eng. in Mechanical Engineering, Lamar University, 1999 M.Sc. in Materials Engineering, Isfahan University of Technology, 1991 B.Sc. in Metallurgical Engineering, Tehran University, 1991	Research Interest: Finite Element Modeling and Analysis Automotive Structural Analysis Computer Aided Design (CAD) Manufacturing Processes of Materials Extraction Metallurgy

Professional Activities and Accomplishments: Member, Society of Automotive Engineers (SAE) Member, American Society of Mechanical Engineers (ASME) Member, Society of Manufacturing Engineers (SME) student chapter, Faculty member, 2009 Engineer-in-Training (EIT) Certificate, 1999 Top Ten Faculty Favorites out of 237 faculty members, University of Louisville, 2007
Presentations and Publications (Selected): Shahhosseini, A.M., Prater, G., Osborne, G., Kuo, E., & Mehta, R. (2010). Major compliance joint modeling for automotive body structures. *International Journal of Vehicle Systems Modeling and Testing*, *5*(1). Shahhosseini, A.M., & Prater, G. (2010). Beam-Like Major Compliant Joint methodology for automotive body structures. *ASME International Mechanical Engineering Congress & Exposition*, Vancouver, Canada. Prater, G., Shahhosseini, A.M., Osborne, G., Lone, J., & Zhang, S. (2010). Simulation studies for determining hydraulic hybrid powertrain subframe response characteristics. *International Journal of Heavy Vehicle Systems*, *17*(2). Kuo, E., Mehta, P., Shahhosseini, A.M., & Prater, G. (December, 2004). Analytical benchmarking of body architectural efficiency (Ford versus Honda Civic). *Ford Research and Advanced Engineering Technical Reports*, SRR-2004-0207.

Relevant teaching experience: Twelve years' experience teaching undergraduate and graduate courses.	Industrial Practice: Almost five years' industrial experience as a senior research engineer and co-op engineer.

Name: Bradford L. Sims Professor of Construction Management Dean, of the College of Technology	Office Phone: 812-237-3166 Email: brad.sims@indstate.edu
Degrees / Schools: Ph.D. in Industrial Technology/Curriculum and Instruction, Purdue University, 1999 M.S. in Building Construction, University of Florida, 1996 B.S. in Building Construction Technology, Purdue University, 1990	Research Interest: Lean construction, technology applications in construction, leadership factors in construction

Professional Activities and Accomplishments:

- Founded and headed the Construction Management undergraduate program at Western Carolina University, growing it from zero majors in 2002 to 400 majors by 2007.
- Instituted the complete online Master of Construction Management graduate program (2005), a collaborative degree arranged with the College of Business's very successful online Master of Project Management degree. Grew program to 30 majors (Fall 2008).
- Attracted Joe Kimmel from a large national construction executive search firm that provided a $10.4 million endowment for the new School of Construction Management and Technology (2005), representing the largest donation in the history of Western Carolina University.

Presentations and Publications (Selected):

Ford, G., Patterson, J., & Sims, B.L. (2009). How to determine construction project rain delay times using local rainfall databases in Asheville, American Society of Civil Engineering: *Proceedings of the 2009 Construction Research Congress*, North Carolina.

Jensen, D., & Sims, B.L. (2008). Restitution: Applying quantum merit to the construction contracting process. The American Professional Constructor, *Journal of the American Institute of Constructors*, *32*(2), 41-47.

Jensen, D., Sims, B.L., & Mau, R. (2007). The General Indemnity Agreement: Can it also function as a secured transaction? Yes, The American Professional Constructor, *Journal of the American Institute of Constructors*, *32*(1), 16-22.

Sims, B.L., Ferguson, C.W., & Birnberg, H. (2006). Computer graphics history and effects on a current construction management curriculum, The American Professional Constructor, *Journal of the American Institute of Constructors*, *30*(1), 7-10.

Orth, D. L., Sims, B.L., & Alter, K.D. (2003). Improving professionalism in the construction industry, The American Professional Constructor, *Journal of the American Institute of Constructors*, *27*(2), 41-44.

Relevant teaching experience: Almost 15 years' experience teaching undergraduate and graduate courses.	Industrial Practice: Besides being the president of constructioneducation.com, full-time experience in industry as a project controls supervisor, cost engineer, and project control engineer.

Name: James E. Smallwood Professor Department of Applied Engineering and Technology Management	Office Phone: 812-237-3462 Email: jim.smallwood@indstate.edu
Degrees / Schools: PhD in Curriculum and Instruction/Industrial Technology Education, Indiana State University (ISU), 1988 M.S. in Industrial Arts Education, ISU, 1980 B.S. IN Industrial Arts Education, ISU, 1978 B.S. in Law Enforcement, University of Evansville, 1975	Research Interest: Automation Distance Learning Manufacturing Technology Education

Professional Activities and Accomplishments:
Certified Manufacturing Technologist by the Society of Manufacturing Engineers. Member, ATMAE, Epsilon Pi Tau (Mu Chapter), Sigma Lambda Chi (honorary), Indiana State University

Presentations and Publications (Selected):
Smallwood, J. (2007). A marketing/recruiting strategy for your manufacturing program. *National Association of Industrial Technology National Conference*, Panama City, Florida. Smallwood, J. (2005). Accreditation for an industrial technology program. *Cheng Shiu University (Taiwan) National Conference*, *Selected Papers.* Smallwood, J. (2000). Developing an in-state regional association. *Tech Directions, 60*(1). Smallwood, J., & Zargari, A. (2000). The development and delivery of a distance learning (DL) course in industrial technology. *Journal of Industrial Technology*, *16* (3).

Relevant teaching experience: Over 20 professional publications on technology related topics and teaching courses associated with distance learning, curriculum, professionalism and manufacturing issues.	Industrial Practice: Industrial experience in various manufacturing engineering roles.

Name:	Office Phone: 812-237-3357
Mr. Todd E. Alberts Instructor Department of Applied Engineering and Technology Management Mechanical Engineering Technology Program	Email: Todd.Alberts@indstate.edu
Degrees / Schools: AS, Ivy Tech State College, 1988 MS, Indiana State University, 2007 BS, Indiana State University, 2005	Research Interest: Engineering/Design Education Computer Aided Design Lean Manufacturing Engineering Management

Professional Activities and Accomplishments:
 Instructor, Indiana State University – College of Technology
 ASME Student Chapter Faculty Advisor
Member, ASME / ASEE / SAE

Presentations and Publications (Selected):
Alberts, T. E. (in press). An experimental evaluation of performance variance for internally threaded geometry related to extended tap wear in low carbon steel. *International Journal of Industrial Manufacturing*.

Alberts, T. E., Badar, M. A., & El-Mansour, B. (2005).Teaching engineering economics to engineering technology students. *Proceedings of the IIE Annual Conference,* research track: engineering economics, CD-ROM, Atlanta, GA.

Alberts, T. E. (2006). Managing the human element of the lean manufacturing culture, management track. *NAIT National Conference*, Cleveland, OH.

Relevant teaching experience: Lab based hands-on experiential learning based education.	Industrial Practice: Seventeen years' real-world industrial experience in various engineering related roles.

Name: Ming Zhou Professor Department of Applied Engineering and Technology Management	Office Phone: 812-237-3983 Email: Ming.Zhou@indstate.edu
Degrees / Schools: Ph.D. in Systems and Industrial Engineering, The University of Arizona, 1995 B.S. in Mechanical Engineering, Wuhan Institute of Technology, 1982	Research Interest: Knowledge-based simulation modeling for discrete manufacturing systems Pattern and knowledge-based modeling and simulation of logistics and distribution systems Data mining and rule formation with neural networks, knowledge extraction from massive data/database Artificial Intelligence (AI) in the design and control of engineering systems
Professional Activities and Accomplishments: Member, Institute of Industrial Engineers (IIE), 1994 – present Member of the Editorial Board, International Journal of Industrial Engineering, 1997 – present Member of the Editorial Board, Journal of Simulation, 2006 – present 1999, 2001, 2003, 2004, 2005, 2006 Session/track Chairs, 8th and 10th Industrial Engineering Research Conference (IERC99); and Winter Simulation Conferences (WSC). Since 1996: invited referee for Journal of Computers & Industrial Engineering, IIE Transactions (Design & Manufacturing Systems), IEEE Transactions (Neural Networks), Prentice Hall (Reliability analysis), Reviewers for IERC97, 98, 99, 2000; and WSC04 and 05.	
Presentations and Publications (Selected): Zhou, M., Chen, Z., & Setavoraphan, K. (2005). Conceptual simulation modeling of warehousing operations. *Proceedings, 2005 Winter Simulation Conference*, Orlando, Fl. Zhou, M., Son, J., & Chen, Z. (2004). Knowledge representations for conceptual simulation modeling. *Proceedings, 2004 Winter Simulation Conference*. Washington D.C. Zhou, M., & Paik, J. (2004). An application of neural network and genetic algorithm for optimizing food extrusion process parameters. *International Journal of Industrial Engineering*, *11*(2), 132-139. Zhou, M., & Zhao, C. (2002). An optimization model and multiple matching heuristics for quality planning in manufacturing systems. *Journal of Computers & Industrial Engineering*, *42*, 91-101.	
Relevant teaching experience: Almost 20 years' experience teaching undergraduate and graduate courses.	Industrial Practice: Five years' industrial experience as a project coordinator and engineer.