An Integrated Ethics Component with Direct Assessment

Joseph P. Fuehne, Ph.D.
jfuehne@purdue.edu
Purdue University
College Of Technology at Columbus/Southeast Indiana

Abstract
The Mechanical Engineering Technology program at Purdue University at Columbus/SE Indiana was newly accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology in the fall of 2006. Both the program objectives and outcomes of the MET program contain elements of ethical behavior which, not coincidentally, is also mentioned in the TC2000 criteria developed by ABET. This work will describe the use of test cases and specific exercises that are incorporated in classes during the first semester and final semester of the two-year Associate of Science program.

The goal of ethics instruction is to encourage students to consider the interests of others, become more thoughtful and to see the ethical significance in their daily work experiences [1]. Ethics, according to Sinha, Thomas and Kulka [1], cannot be taught. Instead, "what can be taught is a framework for evaluating ethical dilemmas and making decisions."

The test cases are presented in multiple parts with students required to finish their answers to the questions from the first part before they're allowed to see the second part. The same procedure is followed for the remaining parts of the test case. Each part of the test case also includes comments from a panel of experienced engineers who lend their expertise to the situation. These comments are shared with the students.

I. Introduction

The program outcomes [2] affirmed in criterion 2 for engineering technology programs as specified by the Technology Accreditation Commission (TAC) of the Accreditation Board for Engineering and Technology (ABET) include the following:

2h) a recognition for the need for, and an ability to engage in lifelong learning
2i) an ability to understand professional, ethical and social responsibilities
2j) a respect for diversity and a knowledge of contemporary professional, societal and global issues

Although accreditation criteria have basically mandated the inclusion of these skills into engineering and technology programs, there are other good reasons for including these "professional skills" into a program. In 2003, Russell and Stouffer [3] argued that ethics is central to the engineering profession especially considering that most Codes of Ethics include

dedication "to upholding public safety, health and welfare". They also argue that the present education system is already too overloaded with technical classes to add classes covering the professional skills. Their contention is that "if educational changes are not enacted soon, the ethical and professional standards of the profession will be significantly challenged." In 1999, Stephan [4] conducted a "catalog-based survey" and determined that "nearly three-fourths of the engineering programs in the U.S. allow at least some students to graduate without taking a course whose catalog description mentions ethics." The need for ethics instruction in engineering and technology programs is, according to Shuman, Besterfield-Sacre, and McGourty [5], "no longer debated".

II. Learning Ethics

An important distinction in the ABET criteria, as mentioned by Pfatteicher [6] is that programs are not required to demonstrate that graduates *are* ethical, only that they *understand* professional and ethical responsibilities. Pfatteicher contends, then, that "we are charged with evaluating students on their knowledge and skills rather than their values and beliefs." The goal is to "teach students about ethics" instead of teaching them to be ethical. Or, as stated later in Pfatteicher's work, faculty need to "focus on teaching our students how to think about ethics rather than what to think about ethics."

Several approaches to implementing ethics and professional skills in a curriculum are available. In a recent work, Sinha, Thomas and Kulka [1] conclude that there are "five basic means to deliver this instructional content:

1. a required course in engineering ethics:
2. an elective course that integrates engineering ethics with the social context of engineering:
3. integration of engineering ethics across the curriculum:
4. integrated humanities and social science programs that addresses all nontechnical ABET 2000 outcomes:
5. integrated engineering related community service projects and lecture series."

In their work, Sinha, Thomas and Kulka [1] choose to integrate ethics instruction into four courses in the civil engineering curriculum – sophomore and junior-level courses that emphasize the basic theories of ethics plus the legal issues involved. During the senior year, an elective course and a required capstone course cover the more practical aspects of ethics including reviewing case studies.

Another approach to learning ethics is proposed by Hipp [7], who chose an integrated approach that included ethics theory and codes, guidelines for making an ethical decision, and practical applications using case studies. His plan starts with an effort to identify moral issues through lectures and readings from classic, contemporary or secondary sources. Also included is a review of the codes of ethics of various engineering organizations. According to Hipp, "ethical codes connect theory to their profession (engineering) generally and specifically." [7]

Students are presented a four-part framework for making ethical decisions. Those include

1. Identify the moral issues.
2. Determine morally relevant facts.
3. Explore alternative options.
4. Make a personal decision.

Finally, the students are presented with case studies as a way to practice applying the framework above and connecting real cases to moral theories and ethics codes. One of the warnings made by Hipp is the use of only dramatic cases that involve well-known disasters. Case studies involving disasters are often simplistic in ethical dimension and require little reflection. However, case studies that include day-to-day activities with no definitive or obvious answer are more appropriate.

The approach described in this paper integrates ethics within the MET program by instituting case studies with writing exercises in several different classes and is similar to that used by Litizinger. [8] In his work, elements of lifelong learning, ethics and global engineering issues are introduced using writing assignments. Each exercise was introduced by telling the students the very specific learning objectives of the assignment. This was not done in the present work and will be instituted in the future. Students were presented the case studies one component at a time and asked to write their solution and submit it to the instructor prior to being told of the next component. Similar to this is the approach used by Schmaltz [9], who used case studies in a four-year integrated program where freshmen and sophomores are exposed to cases and perform simple analyses of the cases. Juniors and seniors do more in-depth analyses with ethics integrated into their project activities. In any event, case studies are used throughout the program.

III. Ethics Games

Another learning approach to teaching ethics was developed largely by industry in response to government initiatives to "encourage good corporate citizenship." [10] The ethics games varied from simple short scenarios to complex role-playing simulations as described by Dyrud. [10] Different types of environments were used including paper, face-to-face discussion formats, Web-based and PC-based games. Many of these games relied on case studies for their content. One particular game described by Carpenter [11] uses *The Engineering Ethics Challenge* Game. This game was developed by Lockheed Martin to use with their employees and is similar to *Monopoly*. According to Carpenter, the big advantage of this game is that it "addresses ethics in a way that keeps students involved". It also requires communication and teamwork skills. In fact, Lockheed Martin invested so much in ethics that it eventually created the Ethics Resource Center (www.ethics.org).

According to Dyrud [10], "Industrial ethics games can be a boon to the classroom, for not only do they reinforce the notion with students that business and industry care about ethics, but the games offer insights into organizational structure which is truly new information." Having used *The Engineering Ethics Challenge* game in the classroom, Dyrud considers it a "delight in the classroom." Students find it a welcome change from the usual classroom routine.

IV. Engineering Ethics Courses

Brown and Pfile [12] have developed a one-credit hour course in ethics for engineering technology students. Their class begins with students being presented a writing assignment that explores their personal ethics and the differences between personal ethics and business ethics. With this background, students are then presented case studies in different technology areas like automotive, electrical, mechanical and project management. Some of the examples used include the space shuttle Challenger disaster, the Denver Airport, the Kansas City Hyatt Regency walkways failure, and the Bhopal chemical plant disaster among others.

The case studies provided by the Texas A&M University ethics center also contain written transcripts by engineering faculty and engineering practitioners and are introduced after the completion of the exercise to enhance discussion with the group. Brown and Pfile complete their class with a test to ensure that the students have digested the topics. Average scores of more than 90% convince them that "students leave the class with a basic understanding of what will be required of them at the first place of employment." [12]

V. Case Studies

Using case studies to enhance ethics instruction is not particularly new. Other professional fields like medicine, law and business where, according to Barry and Yadav [13], "the domain is complex and ill-structured", utilize case-based instruction. Research in biology education and other fields indicates that the understanding of ethical issues among students increases with case-based instruction. Barry and Yadav state in their paper that "using case studies significantly increase students' awareness of ethical issues as compared to students who did not use cases." Unfortunately, they published no data to support this assertion. In fact, they concede at the end of the paper that rigorous research needs to be done to determine the most effective way to integrate ethics into the curriculum.

Integration of case studies is usually accomplished with one of four approaches: individual assignment, lecture format, discussion format, and small group format. This classification comes from Herreid [14], who goes on to suggest that a more effective method for using case studies might be the "Interrupted Case Method." This approach, which is used by this author to integrate ethics study into the MET curriculum, includes having students consider the case in separate parts. Only a small amount of information is provided initially as students consider and write their own reaction/approach to the situation. After submitting a short essay about the situation, more information is provided and students are asked to continue to consider the situation and respond again with a short essay. This process continues throughout the entire case study with students submitting several short essays describing their handling of the predicament. According to Barry and Yadav, this process "emulates much of work conducted in engineering: our thoughts and processes are continually refined as additional data are received." [13]

VI. Assessment of Demonstrated Ethics

Assessment of ethics has also taken many forms but most assessment is done with surveys. Loui [15] used two different surveys in his classes that utilized the *Incident at Morales* video. The first survey uses a 1 – 5 scale with 1 indicating strongly disagree and 5 indicating strongly agree. The questions are very general and Loui additionally surveyed professional engineers as well as students to provide different perspectives on the questions and answers.

The second survey is the Defining Issues Test (DIT) that is described by Loui as "a standard paper-and-pencil multiple-choice test of moral reasoning that was developed by the Center for the Study of Ethical Development at the University of Minnesota in the 1970s." The DIT includes 6 stories with moral dilemmas and has participants answer questions about the most critical issues that affect their decisions. It has been validated through many studies and thousands of participants. Drake [16] et al also use the DIT-2 test as the assessment instrument in their work. Their description of the DIT-2 test is that students were to make "judgments and generate arguments in response to difficult though somewhat contrived, moral dilemmas."

Shuman, Besterfield-Sacre, and McGourty [5] ask two questions in their paper: Can professional skills be taught? And, can professional skills be assessed? Their answer to the first question was a "qualified yes", questioning whether the traditional lecture format is suitable for teaching ethics. In fact, they recommend active and cooperative learning styles to teach ethics.

As for the second question, the answer was also a qualified yes. In their words, "Certainly, elements of each are being assessed, but to varying degrees and with much work left to be done. The assessment challenges are greater, but we are encouraged by the number of investigators who are rising to the challenge." [5] Considering these challenges, the MET faculty at the Purdue University College of Technology in Columbus sought to integrate ethics into the curriculum without adding credit hours and to utilize direct assessment to demonstrate the understanding of ethics.

VII. Implementation at Purdue University – Columbus, Indiana

Program outcome five of the Mechanical Engineering Technology program at Purdue University at Columbus/SE Indiana states that students should

> "Demonstrate awareness of accepted standards of professional integrity and ethical conduct"

Although the implementation of introducing ethics into engineering and engineering technology programs may be different, most are based in some way on case studies and typically rely on written descriptions, oral presentations or classroom discussion of the cases. This paper describes how the MET program in Columbus utilizes the "Interrupted Case Method" mentioned earlier with students submitting written essays recounting their approach to the circumstances. Texas A&M University has an engineering ethics website [17] that presents many case studies and was supported by NSF. Some of the case studies require only discussion while others actually contain numerical calculations. The website also lists web links, references and other ethics resources. One of the case study assignments from this website has been used by the

author and is described in a previous paper [18]. Since publishing that paper, the author has added additional assessments using case studies and they are briefly described with a comparison of the results.

VIII. Case Study – *The Price Is Right*

Introducing and assessing the efforts to achieve this ethics outcome were originally done in the fall of 2005 in a fourth-semester course (MET 230 – Fluid Power) using a case study from the Texas A&M University ethics website. [17] Students are presented with a 4-part ethical problem titled "The Price is Right". The issue revolves around an engineer who confirms through analysis that a cheaper material can be substituted for a more expensive material in a production operation. However, the company has already signed a contract including price agreements for the more expensive material with a client. The interactions between the engineer and management and their obligations to the customer are under investigation. More detail is available in the previous paper. [18]

For this initial study, the rubric for the assignment is detailed below.

5. **Excellent:** Recognized the ethical issues; identified stakeholders, costs, benefits; considered persons involved; considered ramifications; considered character implications; made legal and moral decision.
3. **Satisfactory:** Recognized the ethical issues; identified obvious stakeholders, weighed costs & benefits; made legal decision.
1. **Unsatisfactory:** Did not recognize the ethical issues; did not apply ethical approaches; made an unfortunate, if not illegal decision.

The two-part form in Appendix A summarizes the assessment of this assignment. This form was adopted by the MET program at Purdue University College of Technology at Columbus to summarize all assessments. On the first page of the form, there are columns that briefly summarize Purdue University's mission statement, the MET program learning outcomes, the core learning objectives of the specific class, and details of the assessment, including the evaluation criteria. The second page of the form contains the assessment results and details the actions of the instructor to improve the results. To briefly state, the first page is the "What and How of Assessment" and the second page is "Results and Closing the Loop". This form is utilized as part of continuous quality improvement in the MET program and was well-received by ABET evaluators during their visit in the fall of 2005.

Each of the four essays submitted by the student was assessed individually and the results of the 13 participating students were collated in a spreadsheet. Only essays from the first part actually earned a 3.00 or satisfactory result. The remaining parts were all less than satisfactory. Not surprisingly, as mentioned on the form, non-traditional students who are employed full-time while working on an ASMET degree earned high marks due to their experience in the workplace. Traditional students, not having had that experience, were more likely to offer confused and simple answers to a complex scenario.

IX. Case Study – *The Deadline*

During the spring semester of 2006, a first-year class in manufacturing methods was exposed to an ethics case study. The students were presented with a 5-part ethical problem titled "The Deadline". The issue revolves around an engineer who discovers that a new component of a machine is in short supply and that his company will miss a critical shipping deadline. Old components could be substituted or machined to replace the new component. There aren't really any good options. The interactions between the engineer and management and their obligations to the customer are under investigation. Seventeen students in the class participated in the assignment.

As with the previous assignment, the "Interrupted Case Method" is utilized for the exercise and assessment. Each of the 5 parts is assessed separately and the results are shown in Table 1. Again, the non-traditional students in the class were able to successfully identify the ethical

	The Deadline - MET 142 - Spring 2006					
Student	1	2	3	4	5	Average
1	3	1	1	3	3	2.2
2	1	1	1	3	1	1.4
3	5	5	5	5	5	5.0
4	1	1	1	1	1	1.0
5	5	5	5	5	5	5.0
6	5	3	3	5	5	4.2
7	5	5	5	5	5	5.0
8	3	3	1	1	1	1.8
9	5	3	3	5	3	3.8
10	3	1	1	1	1	1.4
11	3	1	1	3	1	1.8
12	5	3	1	1	1	2.2
13	1	1	1	1	1	1.0
14	5	1	1	3	3	2.6
15	3	1	1	1	5	2.2
16	5	3	5	5	3	4.2
17	5	1	3	1	5	3.0
Averages	3.71	2.29	2.29	2.88	2.88	2.81

Table 1. Rubric scoring results for a case study conducted in the Spring semester, 2006.

issues and recommend proper behavior. Many of the other students were concerned about how the engineer in the study should behave to protect himself. Most recommended a "cover your backside" approach so that the engineer would be protected should the customer learn the truth. As before, the overall average of the scores was less than satisfactory. One of the recommended options of the instructor was to present prior to the case study a professional code of ethics. This approach was used in the next opportunity.

X. Code of Ethics Plus Case Study – *The Price is Right*

In the fall semester of 2007, the author introduced ethics using a code of ethics prior to presenting the case study exercise *The Price is Right*. Students were first presented a professional code of ethics using the work by Oakes and Leone. [19] The exercise involved reviewing the code of ethics and identifying which particular canon applies to various ethical situations. This allows students to consider how the separate canons of a code of ethics might apply to real situations.

	The Price is Right - MET 160 - Fall 2007				
Student	1	2	3	4	Average
1	5	5	5	5	5
2	5	3	3	1	3
3	3	3	3	1	2.5
4	3	5	5	3	4
5	5	3	3	3	3.5
Averages	4.2	3.8	3.8	2.6	3.6

Table 2. Rubric scoring results for a case study implementation in 2007

When presented with the case study, *The Price is Right*, students in this first semester class developed a better approach to the case study. Table 2 shows the rubric results for the students. The overall rubric average for all the students was nearly a point higher than previous classes that had been assigned a case study. Clearly, the addition of the code of ethics exercise helped students to better classify and identify the real ethical issue in the circumstances.

XI. Conclusions

This work developed from a larger effort to implement a continuous quality improvement plan for the Mechanical Engineering Technology program of Purdue University in Columbus, Indiana with the ultimate goal of gaining accreditation from the Accreditation Board for Engineering and Technology programs. The first-ever ABET evaluation occurred in the fall of 2005 and resulted in the program receiving a Next General Review, the best possible result. The quality improvement program, however, is continuous and the ethics component of the program has continued to develop. Initially, only a case study approach was utilized and the results were marginal. This paper describes a more-successful methodology to first introduce a professional code of ethics and then apply the case study.

The literature revealed that most ethics components use some form of survey to assess their effectiveness. This is indirect assessment and relies on the opinions and feelings of the survey participants. Direct assessment, in the form of evaluating students' written responses with a

rubric is illustrated in this endeavor. The rubric is explained and used for the responses of students to case studies in three separate classes from different years and from varying semesters in the MET program. It is significant that the best scoring class was a group of first semester students who had the benefit of reviewing a professional code of ethics prior to encountering the case study. The other classes, although further along in the program, were simply exposed to the case study without prior study and struggled to identify the ethical issues.

The goal with this or any ethics program is not to create ethical professionals but to ensure that those professionals understand their ethical responsibilities and have been exposed to a proper framework for making ethical decisions. The direct assessment described herein provides an accurate measure of whether students understand their ethical responsibilities.

References

1. Sinha, S.K., Thomas, H.R., and Kulka, J.R., "Integrating Ethics into the Engineered Construction Curriculum", *Journal of Professional Issues in Engineering Education and Practice*, Vol. 133, No. 4, October 1, 2007, pp 291 – 299.
2. *Criteria for Accrediting Engineering Technology Programs*, Effective for Evaluations During the 2004-2005 Accreditation Cycle, ABET Technology Accreditation Commission, Baltimore, MD.
3. Russell, J. S. and Stouffer, W. B., "Some Ethical Dimensions of Additional Education for the 21st Century, *Journal of Professional Issues in Engineering Education and Practice*, Vol. 129, No. 4, October 1, 2003, pp 225 – 231.
4. Stephan, K. D., "A Survey of Ethics-Related Instruction in U.S. Engineering Programs", *Journal of Engineering Education*, Vol. 88, No. 4, October, 1999, pp 459 – 464.
5. Shuman, L. J., Besterfield-Sacre, M. and McGourty, J., "The ABET 'Professional Skills' – Can They Be Taught? Can They Be Assessed?", *Journal of Engineering Education*, Vol. 94, No. 1, January, 2005, pp 41 – 55.
6. Pfatteicher, S. K. A., "Teaching vs. Preaching: EC2000 and the Engineering Ethics Dilemma", Vol. 90, No. 1, January, 2001, pp 137 – 142.
7. Hipp, C., "An Integrative Approach to Teaching Engineering Ethics", *Proceedings of the 2007 ASEE Annual Conference and Exposition*, Honolulu, Hawaii.
8. Litzinger, T.A., 2002, "Using Writing to Address Lifelong Learning, Ethics, and the Global Context of Engineering in Mechanical Engineering Courses", Session 2566, *Proceedings of the 2002 ASEE Annual Conference and Exposition*, Montreal, Quebec, Canada.
9. Schmaltz, K., "Engineering Ethics Instruction As An Integrated Professional Component", *Proceedings of the 2006 ASEE Annual Conference and Exposition*, Chicago, Illinois.
10. Dyrud, M., "Industrial Ethics Training: A Look At Ethics Games", *Proceedings of the 2006 ASEE Annual Conference and Exposition*, Chicago, Illinois.
11. Carpenter, W.C., 2005, "Teaching Engineering Ethics with *The Engineering Ethics Challenge* Game", *Proceedings of the 2005 ASEE Annual Conference and Exposition*, Portland, Oregon.

12. Brown, J. and Pfile, R., "The Development of a One Credit Ethics Course For Engineering Technology", *Proceedings of the 2006 ASEE Annual Conference and Exposition*, Chicago, Illinois.
13. Barry, B. and Yadav, A., "The Case Method: Using Case-Based Instruction to Increase Ethical Understanding in Engineering Courses", *Proceedings of the 2007 ASEE Annual Conference and Exposition*, Honolulu, Hawaii.
14. Herreid, C. F., "*Start with a story: The case study method of teaching college science*", NSTA Press, Arlington, Virginia.
15. Loui, M. C., "Assessment of an Engineering Ethics Video: *Incident at Morales*", *Journal of Engineering Education*, Vol. 95, No. 1, January, 2006, pp 85 – 91.
16. Drake, M.J., Griffin, P.M., Kirkman, R., Swann, J.L., "Engineering Ethical Curricula: Assessment and Comparison of Two Approaches", *Journal of Engineering Education*, Vol. 94, No. 2, April, 2005, pp 223 – 231.
17. Rabins, M.J., Harris, E., Pritchard, M.S. and Lowery, L.L., http://ethics.tamu.edu/, *Introducing Ethics Case Studies Into Required Undergraduate Engineering Courses.*
18. Fuehne, J., "Incorporating Ethics and Lifelong Learning into a Mechanical Engineering Technology Program", *Proceedings of the 2006 ASME International Mechanical Enginering Congress and Exposition*, November, 2006, Chicago, Illinois.
19. Oakes, W. C., Leone, L. L., and Gunn, C. J., *Engineering Your Future: A Comprehensive Introduction to Engineering*, Great Lakes Press, Inc., Wildwood, Missouri, 2006.

APPENDIX A

Purdue College of Technology at Columbus/SE Indiana
Class Assessment Form
Part A- What and How of Assessment

Topics from the Purdue University at Columbus/SE Indiana Mission Statement	**Program or Area Learning Outcomes**	**Core Learning Objectives**	**Assessment of Core Learning Objectives**
The mission of Purdue University at Columbus/SE Indiana is: 1. To prepare its graduates to succeed as leaders, professionals, informed consumers, responsible citizens, and lifelong learners. 2. To admit to its programs an academically proficient population of students pursuing post-secondary education. 3. To reach out to an expanded audience of learners through residential and distance education utilizing a variety of learning media and technologies. 4. To play a leadership role in Indiana's economic and social development. 5. To promote human and intellectual diversity by providing equal access and opportunity to representatives of a rich variety of populations and cultures. *6.* To contribute to the welfare and advancement of human societies throughout the world.	*Upon completing their course of study in Mechanical Engineering Technology at Purdue College of Technology at Columbus/SE Indiana, students should be able to demonstrate:* 1. Apply knowledge, problem solving techniques, and hands-on skills in the areas of product development, manufacturing processes, materials specification, fluid power, energy systems, and continuous improvement. 2. Recognize the need to continue professional development by engaging in lifelong learning. 3. Demonstrate proficiency in written and oral communications. 4. Solve problems in a team environment. 5. Demonstrate awareness of the accepted standards of professional integrity and ethical conduct	**Course Title: Fluid Power** **Course Number: MET 160** Faculty Member: Professor Joe Fuehne Year: 2007 Term: ☒ Fall ☐ Spring 1. Apply the general solution format known as GFSA, GIVEN-FIND-SOLUTION-ANSWER. 2. Demonstrate the following techniques of algebra: • Solution of first order linear equations • The application of the least common denominator • Manipulation of exponents and exponential algebra • Solving an equation for a specific variable • The use and meaning of logarithms • The evaluation of radical expressions 3. Apply conventional and scientific notation in conjunction with determining significant figures. 4. Properly use a calculator when carrying out computations. 5. Apply both U.S. Customary and S.I. (metric) units. 6. Apply the factor-label method of converting units. 7. Demonstrate the following aspects of geometry: • The basic regular polygons and the formulae for area • The identity of the conic sections and all formulae, for a circle • The basic solid shapes and the formulae for area and volume 8. Demonstrate the following aspects of trigonometry: • Definitions and terminology associated with plane angles, • The units of angular measurement, • The basic trigonometric functions of sine, cosine, and tangent. 9. Apply the Pythagorean Theorem, Law of Sines and Law of Cosines to achieve solutions to problems involving triangles. 10. Present numerical data on graphs in both linear form and logarithmic form. 11. Draw an acceptable quality graph. 12. Apply the technique of linear regression to numerical data. 13. Apply logarithmic coordinates and their representation in graphs. 14. Demonstrate the technique of power regression applied to exponential equations and their graphs. 15. Apply both single and double linear interpolations of tabular data. 16. Apply simple applications of trial-and-error solutions to problems.	**Core Learning Objectives being assessed this semester:** This assessment relates to **Outcome #5** dealing with demonstrating an awareness of the accepted standards of professional integrity and ethical conduct. **Methods of Assessment:** Students are presented with a 4-part ethical problem titled "The Price is Right". The issue revolves around an engineer who confirms through analysis that a cheaper material can be substituted for a more expensive material in a production operation. However, the company has already signed a contract including price agreements with the more expensive material with a client. The interactions between the engineer and management and their obligations to the customer are under investigation. **Criteria:** 5. **Excellent:** Recognized the ethical issues; identified stakeholders, costs, benefits; considered persons involved; considered ramifications; considered character implications; made legal and moral decision. 3. **Satisfactory:** Recognized the ethical issues; identified obvious stakeholders, weighed costs & benefits; made legal decision. 1. **Unsatisfactory:** Did not recognize the ethical issues; did not apply ethical approaches; made an unfortunate, if not illegal decision.

TWO-PART FORM FOR ETHICS ASSESSMENT

Purdue College of Technology at Columbus/SE Indiana
Part B – Results and Closing the Loop

Course Title: Fluid Power
Course Number: MET 160
Faculty Member: Professor Joe Fuehne
Year 2007
Term: ☒ Fall ☐ Spring

Assessment Results

Data summary and brief analysis for each course outcome assessed this semester: *(Include outcome, method, timing, criteria, and results.)*

A previous assessment of this outcome by the instructor indicated unsatisfactory results and recommended exposing the class to an appropriate professional Code of Ethics before presenting the case study. This was done for this assessment and the results are positive. Where previous assessments had overall averages of 2.2, 2.75 and 2.8, this assessment had a much more acceptable 3.6, likely due to the exposure to the professional code.

	The Price is Right - MET 160 - Fall 2007				
Student	1	2	3	4	Average
1	5	5	5	5	5
2	5	3	3	1	3
3	3	3	3	1	2.5
4	3	5	5	3	4
5	5	3	3	3	3.5
Averages	4.2	3.8	3.8	2.6	3.6

Faculty Signature:

Based on Assessment Results,

1. What do you wish to <u>continue</u>?

These types of case study assignment will continue to be presented to students in first semester and last semester classes.

2. What <u>changes</u> will you make to course, e.g. course emphases, assessment instrument, timing of assessment?
(Briefly describe instructional change(s) and your rationale.)

In this case, exposure to the professional code of ethics significantly improved the results of the assessment. This practice will continue.

Date: