

PtD

- ▶ Where good design is important to business success
- ▶ Where smart planning minimizes hazards and risks to workers

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PtD Partners

American Industrial Hygiene Association (AIHA)
 American Society of Safety Engineers (ASSE)
 Center for Construction Research and Training
 (CPWR)
 Kaiser Permanente
 Liberty Mutual
 National Safety Council (NSC)
 Occupational Safety and Health Administration
 (OSHA)
 ORC Worldwide
 Regenstrief Center for Healthcare Engineering

Prevention through Design—Focus on Education

Welcome back to *PtD in Motion*. The PtD National initiative is framed within four functional areas: Research, Practice, Education, and Policy. Each area is considered to be vital to the success of designing workplaces, tools, machinery and processes that are inherently safer for the nation's workforce. This issue of *PtD in Motion* focuses on the functional area of Education. NIOSH has a long history of involvement in the education of occupational health and safety professionals and engineers, including NIOSH-supported university-based Education and Research Centers (ERCs), Project SHAPE (Safety and Health Awareness for Preventive Engineering), and NIOSH Training Research and Evaluation. However, the aspect of education that we will focus on in this newsletter is the education elements that are needed to launch and sustain the Prevention through Design (PtD) National initiative.

NIOSH is consulting with the National Occupational Research Agenda (NORA) industry sectors as well as our PtD organizational partners about the appropriate Educational goals to include in the National initiative.

- Questions about Education that are prompting discussion include:
- How can we include PtD concepts into engineering, design, architecture, and business curricula and continuing education courses?
 - How do we influence business leaders to include safety design education/experience in engineering and architectural position descriptions?
 - What materials are available for promoting PtD in educational programs?

This newsletter is intended to bring you into the center of those discussions. During the next four months, using your input we will draft the Education, as well as Research, Practice, and Policy goals for the PtD National initiative strategic plan and publish them on our website for your comments.

By Paul Schulte, Director, Education and Information Division, NIOSH

Issue Highlights

Donna S. Heidel, Coordinator, Prevention through Design National Initiative, NIOSH

In this issue we have five brief articles that demonstrate the importance of Education in the overall success of the PtD National initiative. Below is an outline of the articles in this issue:

- Dr. John Talty from NIOSH discusses the current mechanism for educating health and safety professions that are PtD savvy through the Education and Research Centers (ERCs).
- Tony Pasteris, President of Minerva Canada, outlines Minerva's successful efforts to promote health and safety education in academia.
- Dr. Don Bloswick describes the education of undergraduate mechanical engineers in Prevention through Design principles at the University of Utah.
- Dr. Rick Rinehart from NIOSH outlines a National Occupational Research Agenda (NORA) project that will demonstrate how PtD principles can be diffused to engineering school curricula by incorporating the concepts into existing engineering textbooks as they are being updated for new editions.
- Dr. Brooks Holtom from Georgetown University's McDonough School of Business presents two case studies of two companies that have embraced Prevention through Design principles as critical inputs into their companies' long-term business planning.

We encourage you to participate in the discussions about the education aspects of PtD by sending your thoughts and ideas to PtD@cdc.gov.

Education of OS&H Professionals and PtD

By John Talty, Office of Extramural Programs, NIOSH

The Prevention through Design initiative builds upon the activities and accomplishments of Project

SHAPE and the NIOSH Control Technology Program.

Project SHAPE (Safety and Health Awareness for Preventive Engineering) was a collaborative project in the 1990s between NIOSH, engineering professional societies, and engineering schools to enhance the education of engineering students in occupational safety and health (OSH). With expert assistance from engineering school faculty and engineering societies, NIOSH produced a series of nine instructional modules for use by engineering faculty interested in incorporating OSH topics within appropriate required and elective courses. These modules are available on the NIOSH website (www.cdc.gov/niosh/topics/SHAPE).

NIOSH has conducted a National Training Grant Program since 1971. The basic purpose has been to help assure an adequate supply of qualified professional practitioners and researchers for the OSH workforce. Initially NIOSH funded only Training Project Grants (TPGs) that generally focus on specific OSH academic disciplines, which NIOSH continues to do. In 1977 NIOSH initiated a program to establish university-based regional centers of OSH learning. These Education and Research Centers (ERCs) are supported to focus on OSH graduate degree programs including interdisciplinary interaction of faculty and trainees, research training programs, continuing education, and outreach programs. All training grant programs are supported on the basis of a competitive peer review process. For more information:

www.cdc.gov/niosh/oe

www.cdc.gov/niosh/programs/tg

NIOSH supports PtD within OSH educational programs via the TPGs and ERCs. NIOSH does not prescribe curricula for supported programs, but relies on the peer review process to evaluate programs that are proposed for support in terms of program content and management. Since medicine and nursing programs are unlikely to receive direct academic training relevant to PtD, the industrial hygiene (IH) and occupational safety (OS) programs are the logical targets for PtD consideration. NIOSH

currently supports 27 IH and 21 OS programs at the graduate level plus 1 IH and 3 OS baccalaureate programs. For both IH and OS programs, ABET has established minimum requirements to be accredited at baccalaureate and masters levels. NIOSH encourages IH and OS masters programs to be ABET accredited. ABET criteria stipulate that program graduates have the ability to recommend, evaluate, formulate, and/or design controls and programs for workplace hazards.

It is generally recognized that the capabilities of architects and engineers on design teams constitute the single most important factor in determining the success of overall designs. That is not to say OSH professionals should not provide significant input to the design process. That would appear to be the logical role of OSH professionals in the context of the PtD program.

Attracting engineers to the OSH field is a continuing challenge for OSH academic programs. They are natural candidates to develop expertise and contribute to the prevention of exposure through design. Hopefully the PtD initiative will help stimulate interest and provide opportunities for engineers to obtain OSH academic preparation and contribute to the OSH workforce of the future.

Promoting Health and Safety Education in Academia

By Tony Pasteris, President, Minerva Canada Safety Management Education Inc.

Minerva Canada Safety Management Education Inc. is a not-for-profit organization dedicated to promoting the teaching of Health and Safety (H&S) in post-secondary schools across Canada. It targets the educators of tomorrow's leaders by encouraging colleges and universities to embed H&S management education into the core curricula



of business and engineering programs. Minerva's Board of Directors and Working Committee consist of volunteers from industry, government, academia, and safety associations like the Industrial Accident Prevention Association (IAPA) from the Province of Ontario.

Minerva provides three key products and venues to allow educators and students to become more aware and better understand the importance and need for more H&S education.

Case Studies—Each year Minerva awards modest grants to Canadian business and engineering professors for research and documentation of H&S related case studies. Minerva currently has more than 10 case studies on its website for use by universities.

Summer Institute—In 2004 the Summer Institute was created to introduce engineering and business professors to the principles of Safety, Health and Environmental management education. The Institute is an intensive 3-day training program consisting of workshops, industrial site visits, and H&S presentations from industry, government, safety associations, and academia. There have been more than 120 engineering and business professors attending from 27 Canadian universities and 6 U.S. universities.

Minerva Canada James Ham Safe Design Award—This is Minerva's latest initiative introduced in 2007 with assistance from the Ontario Workplace Safety and Insurance Board. This award is intended to generate safety awareness among Ontario engineering students and to recognize those students who make an original and unique contribution to integrating safety into engineering design. Students are challenged to identify potential or existing safety problems in the workplace and to respond by:

- suggesting ways to improve the existing design of devices, processes or systems;
- envisioning new, innovative designs that will eliminate or reduce potential hazards;

- creating tools to help manufacturers and workplaces integrate safety into new or retrofitted designs.

Previous award winners have included an industrial stair climber to prevent back injuries, a regenerative automatic door opener for use in the event of power failures, and a safety management audit database system that is user friendly for small corporations. The winning students receive their awards at the annual IAPA conference in Toronto which is attended by over 3,000 H&S professionals. Minerva is planning to extend this award to all Canadian engineering students as well as establishing a student H&S awards program for Business Schools in Canada.

For more information or to e-mail Tony Pasteris:
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Engineering Education and PtD in the Undergraduate Mechanical Engineering Curriculum at the University of Utah

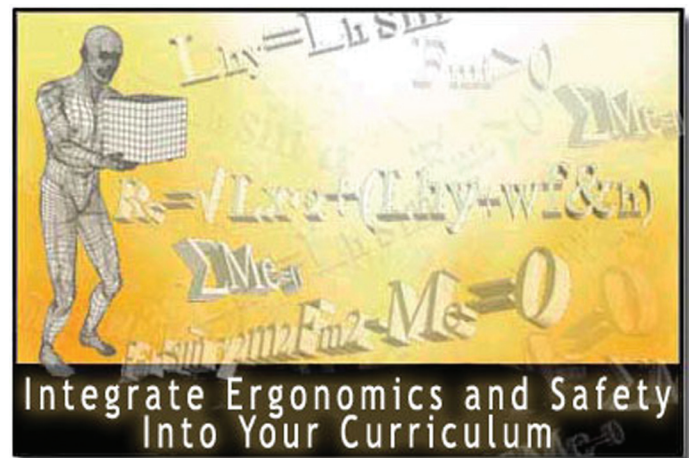
By Don Bloswick, Director, Ergonomics and Safety Program, University of Utah

It is noted in the NIOSH National Prevention through Design (PtD) Initiative that “the most effective means of preventing and controlling occupational injuries, illness, and fatalities is to ‘design out’ hazards and hazardous exposures from the workplace.” This requires that engineers and designers (1) be made aware of the need for PtD, and (2) are provided with the education and skills needed to include health and safety endpoints into the design of facilities, processes, equipment, and tools.

As part of the introductory freshman design course at the University of Utah (UU), undergraduate mechanical engineering students are introduced to the National Society of Professional Engineers (NSPE) Code of Ethics for Engineers Preamble that emphasizes “protection of the public health, safety and welfare.” They are also provided with a basic

understanding of systems safety techniques such as fault tree analysis and failure modes and effects analysis (FMEA), and are required to use these analytical tools in the design and fabrication of their freshman project. These systems safety analysis methods are introduced again during the junior/senior year and incorporated into the capstone senior design project, presentation, and written report.

The UU undergraduate mechanical engineering curriculum is presently being revised to be even more design-focused, with additional consideration of PtD concepts. The Ergonomics and Safety Program



within the UU Mechanical Engineering Department has also made available—with modest success—matrices to guide engineering professors to reference material related to safety, ergonomics, and health for the mechanical, civil, and electrical engineering undergraduate curricula. Also included, specific to the mechanical engineering curriculum, are 21 downloadable modules relating to safety, ergonomics, and health that can be easily incorporated into the undergraduate mechanical engineering curriculum. These include (1) lecture material for the instructor, (2) overheads for use during the lecture, (3) handouts for the students, and (4) a homework problem.

Please visit www.mech.utah.edu/ergo for more information.



Diffusing PtD Principles through Engineering Textbooks

By Rick Rinehart, Education and Information Division, NIOSH

Most educational programs for engineers today do not teach the tools and techniques needed for PtD. In 1996 the Institute for Safety Through Design hosted a symposium that promoted dialogue among educators, labor, business, and industry leaders to address two key questions: (1) What is the occupational safety and health (OSH) knowledge an engineer should have upon completion of a baccalaureate degree? (2) How can this knowledge best be delivered? The symposium concluded that there is no room in the existing engineering curricula for stand-alone OSH courses; changes to the curricula must be made through the existing course structure.

There have been numerous articles about the lack of OSH in engineering school curricula, but most initiatives to reverse the situation have developed stand-alone training materials or have worked with individual professors to incorporate OSH into their courses. While these approaches have had limited success, many have proven to be unsustainable because professors come and go and the openings to teach OSH to engineering students were not always made permanent by engineering programs.

Through a NIOSH National Occupational Research Agenda (NORA) funding mechanism, a project is underway to demonstrate how PtD principles can be diffused to engineering school curricula by incorporating the concepts through case studies and examples into existing engineering textbooks as they are being updated for new editions.

The NIOSH Education and Information Division has developed a unique relationship with a major engineering textbook publisher. The editor is responsible for numerous textbooks covering most

engineering subspecialties. Many of the books have leading or significant market shares within their areas of focus. The books are used in schools across the United States reaching thousands of students each year.

Examples of criteria that are used to select the most promising textbooks include opportunities for PtD, high annual sales volumes, early planned revision dates, relevance to design, and willingness of authors to work with NIOSH. External expert consultants with textbook-specific engineering and PtD expertise are being identified to provide input to authors. NIOSH researchers, authors, consultants, and the publisher are identifying opportunities for weaving PtD principles into new editions of textbooks to maximize effect and acceptance by professors and students.

NIOSH researchers envision a relationship with the editor that remains strong even after the NORA funding cycle ends, because of its potential long-term positive impact on work-related injuries and illnesses—by putting more informed engineers into the marketplace—and the relatively low cost to maintain the connection. They are also seeking opportunities to expand this project through collaborations with other textbook publishers and authors.

The process created and used by this project to diffuse PtD principles into engineering curricula, including the framework developed to evaluate textbooks and the criteria chosen to select promising books for PtD, will be disseminated widely through many channels. The goal is to catalyze other groups capable of replicating and improving on the project, ideally without the need for direct NIOSH involvement or resources in the future.

For more information, please contact Rick Rinehart at PtD@cdc.gov.

Promoting PtD by Winning the Hearts and Minds of Tomorrow's Business Leaders

By Brooks Holtom, McDonough School of Business, Georgetown University

Winning the hearts *and* minds of the next generation of business leaders is critical to the long-term

integration of Prevention through Design principles into business planning.

While I agree with my colleagues who recommend tying PtD concepts into similar course content on sustainability and corporate social responsibility, I do not believe it is enough. Such courses are almost always electives and attract an enlightened but relatively narrow segment of the population. Their *hearts* already appreciate the importance excellence in health, safety, and environment (HSE) protection. To truly influence business practice in the coming decade, I believe it is also necessary to integrate PtD materials into core courses where we can reach all business students. Moreover, it is necessary to speak to them in a language they understand to win their *minds*. That language is largely financial. In this language “return on investment” is the make or break criterion.

To accomplish the goal of winning the hearts *and* minds of business school students, I have written two cases revolving around critical decisions made by the leaders of the first two Robert W. Campbell Award winning companies: Noble Corporation and Johnson & Johnson.

In the Noble case, students step into the role of CEO Jim Day to decide whether to acquire the Neddrill organization—one that has important strategic assets but a poor HSE record. Through careful operational, cultural, and financial analysis, students generally conclude that Noble’s world-class HSE systems and corporate commitment will allow them to effectively integrate Neddrill and in a matter of time elevate

their HSE performance to the high organizational expectations.

In the Johnson & Johnson case, students find themselves in the role of a Wall Street analyst who questions the financial value of Johnson & Johnson’s extensive HSE investment. By crunching the extensive set of operational and financial numbers provided in the case, they more often than not determine that good HSE performance is an indicator of good performance in other areas such as quality, productivity, employee morale, and retention. The HSE investments do more than just improve HSE performance. They are part of the “preventive maintenance” done by Johnson & Johnson to ensure excellent performance in every aspect of its business. While some will argue that Johnson & Johnson’s financial success allows it the freedom to invest in HSE projects, top students will see that the logic should be reversed; the Company’s investment in HSE differentiates it from competitors in a way that ultimately lowers costs and better serves society.

These cases have been utilized effectively in undergraduate, MBA, and Executive MBA courses at Georgetown University’s McDonough School of Business as well as other top schools in the U.S. and Canada. While there is surely much work left to persuade the next generation of business leaders to embrace PtD, I can already see the fruits of the seeds that have been planted.

The Noble and Johnson & Johnson cases are available from the National Safety Council at no cost to students or instructors ([Visit: www.campbellaward.org](http://www.campbellaward.org)).

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