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Preparing Safety Professionals for the 21st Century Manufacturing Environment: A Partnership that Works

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The 21st century will bring new demands to the workplace, as we continue to see the development of a changing global economy. Moving into this new millennium, forward-thinking scholars, employers, professional associations, professional societies, and higher education accrediting bodies have realized the importance of interdependent collaboration to move toward excellence in higher education (Finn; Freeland, et al; Hall; Hutcheson; Itin). The purpose of this publication is to share the program improvement process developed through stakeholders' involvement to bring about continuous improvement in the classroom, and in the workplace, necessary to meet ever-increasing demands for safety and efficiency in the 21st century manufacturing environment. In addition, it is hoped this article will heighten awareness of the important role that you, as a safety and health professional, an employer, or an educator, play in developing tomorrow's safety professional in contributing toward maintaining our international competitiveness.

Oakland University and DaimlerChrysler have developed a partnership that better prepares occupational safety & health students for today's sophisticated and demanding manufacturing environment. This partnership is supported by a wide cross-section of active industry advisors and by the American Society of Safety Engineers (ASSE) through the ABET accreditation process for safety-related degree programs (ABET). This collaborative effort has resulted in an improved classroom curriculum, which is fully integrated with experiential learning in a real-world manufacturing environment provided by our University business partners. ABET accreditation provides additional quality assurance that the Oakland University Occupational Safety and Health (OSH) program meets the educational standards established by ASSE.

Upon moving into the new century, the federal government, scholars, employers, and professional associations have undertaken studies to determine the workforce skill set required to meet employer needs (MSU; SCANS; Tuller; U.S. DOL). The findings support mounting public and private sector concerns and pressures to revamp the education sector in the United States as a result of the drastic changes taking



place in the workplace. There are serious concerns that colleges and universities are not adequately preparing students for the post-industrial economy, characterized by high technology, rapid change and the intensely competitive international marketplace. The studies all concluded that new workforce skills are required to support employer needs and the emerging global economy in this new millennium. This paper will identify new skill requirements for general employment needs, as well as the more specific skills required in occupational safety and health in the manufacturing environment and address the partnerships available to institutions of higher education and employers to ensure employer needs are met for today and in the future.

However, not only is the required skill set changing for the workforce but the workplace and the workforce itself are changing as well. Lean manufacturing, participatory management, teamwork, and total quality management are some of the current buzz words that describe the 21st century workplace. Perhaps more significantly, according to the 2000 census report, the workforce in general will change dramatically in the next 20-30 years with more than 80% of the world's population being nonwhite. So, not only is the required skill set changing for the workforce but the workplace and the workforce itself are changing as well.

Society needs to acknowledge and appreciate our differences; just as responsible and forward-thinking employers, like DaimlerChrysler, recognize that every member of their team contributes to corporate success and has established diversity as a core value (DCC). For example, DaimlerChrysler strives to achieve the diversity in their workplaces that reflects the diversity of their customers and the communities in which they do business. This makes working effectively in a diverse environment an essential skill for today's college graduate.

In light of the changing workplace and workforce, employers want and need a total package in new hires. To determine what makes up this 21st century package of employee skills, the following is an overview of some key studies that have attempted to identify these skills.

One of the most significant studies designed to identify competencies and foundational skills required for effective job performance in the 21st Century was commissioned by the US Department of Labor in 1990 as the Secretary's Commission on Achieving Necessary Skills or SCANS. The final report from the Commission provides a blueprint that defines how educators should prepare young people for productive work in the 21st century and what the employers' role should be in that process. The report notes that the nation's schools must be transformed into high-performance organizations and employers should incorporate the SCANS know-how into all their human resource development efforts. Although this study has been refined in more recent years, it remains the basis for what skills college students need and is currently used at Oakland University and colleges across the country. Figure 1 outlines the highlights of the SCANS Report (SCANS).

Key workplace competencies identified in the SCANS Report include: effective allocation of time, money, materials, space and staff; interpersonal skills to include the ability to work on teams with others from culturally diverse backgrounds; information technology skills to include the ability to acquire and evaluate data; systems analytical skills to include ability to design and improve systems; and the ability to apply technology skills to specific tasks. The foundational skills identified in the SCANS Report include: basic math, science, and communication skills; creative thinking skills necessary to make decisions and solve problems; and personal qualities to include self-management, sociability and integrity.



More recent studies identified skills employers will require in the 21st century in slightly different terms and build on the SCANS Report. The Bureau of Labor Statistics (U.S. DOL) and various other public and private groups (MSU; Tuller) update their analysis of employer needs on an annual basis (see Figure 2). These current studies include SCANS skills and add business management and global thinking aspects to the job skill set for today's workforce. The more specific skill set required of today's safety professional is presented for your review and is based on current literature and qualitative data gathered from manufacturing sector employers in southeast Michigan serving on the Oakland University Industry Advisory Committee. Although there are significant similarities to other studies, there is additional emphasis on business and risk management skills, conflict resolution, and knowledge of organized labor (see Figure 3).

The 21st century manufacturing needs, coupled with ABET expected educational outcomes, clearly define expectations for a graduate safety practitioner. Oakland University, DaimlerChrysler, ASSE and ABET all recognize that the learning required to acquire these necessary skills cannot come about in the classroom alone. In fact, experiential learning through a cooperative educational experience is required in the ABET accreditation process. It quickly becomes apparent that effective educational partnerships must be developed between institutions of higher learning, businesses, and professional societies to move higher education to the high-performance level envisioned in the SCANS Report (Hall; NSC; SCANS). These partnerships involve more than just input and advising. Active involvement in providing needed resources and active learning environments through experiential learning by way of internships and cooperative education are essential (Hutcheson). In addition, these educational stakeholders must actively participate in the assessment of student learning and the continuous improvement process required to ensure effective curricular offerings (Freeland, et al).

ASSE is a key educational partner through the ABET accreditation process (ABET). Safety-related degree program outcomes for ABET accreditation are established through the ASSE Educational Standards Committee (ASSE). The outcomes are general in nature and require stakeholder involvement to ensure the accredited program meets employer needs. Student learning relative to established outcomes is assessed on a regular basis and results serve as input to a program improvement process. Another important aspect of the educational quality assurance process comes with the ABET peer review process, where educators and safety professionals trained by ASSE visit accredited programs and audit for compliance with ABET established accreditation criteria.

An effective industry advisory committee is an essential quality assurance element and provides input from a wide cross-section of area employers, alumni, safety professionals, professional associations, and students. Although student members are not industry advisors, they provide an important link to the classroom and student perceptions of the program effectiveness. The advisory committee is the link between the student, faculty and the world of work our graduates will soon enter.

The industry advisory committee is involved with development of the safety program educational objectives that are consistent with the university mission and ASSE-ABET criteria. In addition, the committee ensures these educational objectives and program-specific outcomes or competencies meet both graduate and employer needs. This process involves a complete curriculum review to include a review of course learning objectives. This review is complimented by a formal assessment of student learning based on perceptions of recent graduates working in the SH&E profession. This review is the first formal step in the continuous improvement process.



Industry advisory committee findings and recommendations from the review process are taken through a faculty and administrative review process to bring about change and continuous improvements in the occupational safety and health program. Although the committee is an advisory board and final decisions relative to curriculum changes rest with the university, the process has resulted in consensus to bring about significant change in the Oakland University Occupational Safety and Health curriculum (Oakland University OSH Program). See Figure 4 for a listing of significant changes and program improvements made through this process in the last three years. These changes resulted in eliminating unnecessary courses and reducing credit-hour requirements, while adding courses consistent with the identified skills needed by 21st century employers in manufacturing and beyond.

Courses were added in human resources development, labor relations, business writing, and global environmental and business perspectives. Fifteen credit hours of electives were eliminated and replaced with required safety and health courses directly related to local employer needs and ASSE-established program outcomes. In addition, laboratory experiences were added, along with problem-based learning exercise and undergraduate research assignments. Finally, an oral presentation and writing-intensive assignment were added to each required safety and health course; see Figure 5 for specific course additions. These changes to a long-established curriculum would likely not have occurred without the strong key partnership support developed through the industry advisory committee and ASSE.

DaimlerChrysler has provided a strong industry advisory committee participant and alumnus of the Oakland Safety Program who is currently committee chair. His leadership has extended beyond committee meetings to support research, which resulted in enhancements in experiential learning opportunities for Oakland University safety students that are high-caliber learning experiences connecting the classroom to the real-world manufacturing environment. In addition, DaimlerChrysler has spearheaded efforts to acquire laboratory equipment, fund new curriculum development, and support underrepresented minorities in the safety profession through diversity scholarships. DaimlerChrysler and other employers represented on the advisory committee have participated as guest speakers in safety classes, provided plant and construction site tours, provided internship and research opportunities, and donated resources to support the safety program at Oakland.

ASSE is a major partner contributing to the success and improvement in the Oakland University safety and health program through the ABET accreditation process previously discussed. However, ASSE also offers student development activities, such as the National Future Leaders Conference, which is an excellent extracurricular student development opportunity in which Oakland Student Section student members participate. On the local level, the Greater Detroit Chapter of ASSE provides several opportunities for joint chapter/student section professional development activities, provides guest speakers for student section meetings, offers a technical paper scholarship award competition, and funds student travel expenses to various conferences. The students in the Occupational Safety and Health program at Oakland are strongly encouraged to participate in student section, chapter, regional, and national ASSE professional development activities. These activities are recognized as an important part of the students' education.

Development of a Master of Science in Safety Management (MSSM) degree was another very important addition to the Oakland University OSH program that was encouraged and strongly supported through the University approval process by DaimlerChrysler, ASSE, and the industry advisory committee. The need for this degree was identified through the assessment of employer needs for safety professionals in the 21st century. It was recognized that the safety professional's job had moved from a focus on compliance 35 years ago to becoming an integral part of the 21st century management team in forward-thinking



companies that realize occupational safety and health makes good business sense. The safety professional skill set required to support making the business case for safety and health-related interventions in the workplace was beyond the technically based education acquired at the baccalaureate degree level and justified development of a master's degree in occupational safety and health with a business focus.

The Oakland University approach to this safety-related master's degree is unique but modeled after a successful degree offering in a Master of Science in Engineering Management taught at Oakland University and other universities across the country. The MSSM degree was developed through a cooperative effort between the School of Health Sciences and the School of Business Administration at Oakland University. This master's degree program focuses on the business aspects of safety management in the workplace and combines an effective balance of core MBA coursework with application of these business skills to safety-related case studies in risk assessment, loss control, risk management, and advanced topics in safety program planning, administration, and management.

The program improvements in the baccalaureate degree in Occupational Safety and Health and the development of an innovative Master of Science in Safety Management degree can be attributed, in large part, to the strong partnership developed between Oakland University and the DaimlerChrysler Corporation. This partnership is supported by a wide cross-section of active industry advisors and by the American Society of Safety Engineers through the ABET accreditation process for safety-related degree programs. Moving toward excellence in higher education in the 21st century requires this type of cooperative effort to identify employer needs and develop educational objectives and program outcomes to effectively address those needs. A strong, active industry advisory committee and stakeholder involvement at all levels are keys to success in developing tomorrow's safety professional that can contribute toward improving our international competitiveness.

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Figure 1

SCANS REPORT

Workplace competencies:

- Effective use of available resources
- Interpersonal skills in teamwork/diversity
- Information technology skills
- Systems approach to problems
- Apply technology to specific tasks

Foundation skills:

- Basic skills in math, science, & speaking
- Creative thinking in decision making
- Personal qualities in sociability & integrity

Figure 2

U.S. Department of Labor

Skills employers need

- Technical skills
- Problem-solving
- Human relations
- Computer programming
- Teaching-training
- Science & math
- Money management
- Information management
- Foreign language
- Business management

Monster.com:

Skills employers need

- Critical thinking
- Communication
- Visionary qualities
- Self-motivation
- Proficiency with information
- Globally-minded
- Teamwork



College & University Studies

Michigan State University

- Communication skills
- Computer aptitude
- Leadership
- Teamwork
- Interpersonal abilities
- Personal accountability
- Proficiency in public speaking & presentation skills

Figure 3

21st Century Manufacturing Needs

Technical & analytical skills
Business & risk management knowledge
Ethical & professional behavior
Leadership & team building skills
Knowledge of best practices
Problem solving/decision making skills
Conflict resolution skills
Understanding of organized labor
Verbal, written, & presentation skills

Figure 4

21st Century OSH Degree Improvements

BS OSH Curricular Changes:

- Credit hour reduction, 136 to 125
- Eliminated unnecessary courses
- Added human resources development & labor relations
- Added global environmental governance courses
- Added global business perspective courses
- Added business writing
- Eliminated OSH elective courses, 15 credit hours
- Added OSH required courses, 15 credit hours
- Added laboratory course & experiences
- Enhanced experiential learning & internships
- Added oral & written assignments in OSH courses
- Extended problem-based learning applications
- Added research assignments/reports

Developed MS in Safety Management



Figure 5

OSH Program Required Course Additions
(New courses or moved from elective to required)

Robotic & automation system safety
Industrial hygiene, fire science, & robotics labs
Accident investigation
Ergonomics
Safety training methods
Environmental regulatory standards
OSH regulatory standards
Construction safety management
Business writing
History of labor
Labor relations
Ethics
Global environmental governance
Global business perspective