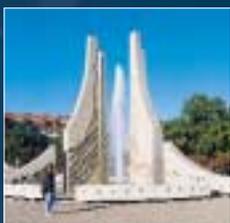
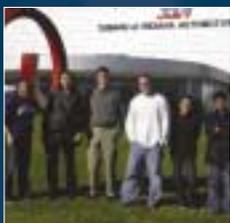


DCMME

THE DAUCH CENTER FOR THE MANAGEMENT
OF MANUFACTURING ENTERPRISES



PURDUE
UNIVERSITY

2003
ANNUAL REPORT

DIRECTOR'S MESSAGE



Preparing Students for New Opportunities in the Next Century

There is but one constant in this world; that is change. Manufacturing in the United States has been a witness to, and in many cases an unwilling participant in these changes. Change has come at a terrific price to manufacturing as a whole in the United States, where an estimated 22 million jobs have eroded in recent years in the sector, possibly never to return. Change has come, in this instance, in the form of global competition. International companies have access to highly trained and educated workforces, access to cheaper raw materials, and in many cases cheaper labor. Despite these advantages, many manufacturing companies in the United States continue to thrive, and those that remain domestic have done so because of economic Darwinism. Clearly, the companies that remain domestic have done so because there is some advantage in staying domestic. While the pressures of increased global competition continue to force a process of selection in the sector domestically, the companies that remain have found ways to prosper despite higher costs of direct inputs.

Many organizations have prospered through quality initiatives that ultimately lead to higher productivity levels. Scientific, data driven approaches to problem solving have proliferated and now dominate many manufacturing cultures. DCMME excels in training new manufacturing “scientists.” Our technically competent students are analytical problem solvers capable of analyzing data, converting it to information, and using this information to make tough decisions. Through this process our students are able to provide value to manufacturing organizations.

Other companies have found that in order to prosper domestically, they need to develop, recruit, and retain top talent. Through partnerships such as those that manufacturing organizations have with DCMME, they are able to gain first hand knowledge of the top performing students at Purdue University, and are able to have access to students that have been trained to address current problems and to create innovative solutions to future problems. Our DCMME students are trained to be business unit owners and have an enterprise-wide perspective. They are capable of translating the foundation of knowledge with which DCMME and Purdue provide them into a competitive advantage for domestic manufacturing organizations. Simply put, leadership, scientific acumen, and business knowledge are the skills developed in our students via academic and practical training and experiences. It is this competitive advantage generated through superior application of knowledge that enables the manufacturing organizations that choose to recruit at Purdue to compete both domestically and globally.

Many companies have excelled through increased productivity. DCMME has aided in these efforts through our collaboration with corporate partners. Through innovative research projects, internships, applied manufacturing coursework, and independent study courses, DCMME has saved our corporate partners millions annually for a minuscule initial investment. By leveraging their partnership with DCMME, our corporate partners are able to gain and retain a competitive edge through an infusion of innovative ideas. It is this innovation that is most highly sought after as companies attempt to actively change for the better, rather than acting as passive participants.

What is DCMME All About?

Still, many companies that desire to be active participants in their own destinies look for one thing – leadership. In a time of continual and rapid change, organizational behavior theory tells us that this is when charismatic leaders are most likely to emerge. At DCMME, this is apparent through the observation of our students. We teach the foundations of leadership in the classroom here at DCMME, but everyone knows, “You can lead a horse to water....”. In addition to coursework on the subject, DCMME students must learn how to lead project and work teams from their first day on campus. The most successful students quickly learn that leaders are not born, they are made. While learning concepts in a classroom is not enough to make someone a leader, DCMME students, by design, are continually put into situations in which they must exercise effective leadership simply to survive. Through the quality of their actions and the content of their character, combined with applied knowledge, DCMME students will be the ones who lead manufacturing into the next century.

In fact, teamwork is a critical component of any DCMME student’s time at Purdue. Many students comment on how much they learn outside of the classroom, from their peers and experiences while at Purdue. By leveraging these experiences, our students learn not only how to interact and be productive in work groups, but also grow as human beings. In thinking about what I wanted to convey in this message, I was reminded of this quote:

“If you meet a sectary, or a hostile partisan, never recognize the dividing lines; but meet on what common ground remains, – if only that the sun shines, and the rain rains for both; the area will widen very fast, and ere you know it the boundary mountains, on which the eye had fastened, have melted into air.”

– Ralph Waldo Emerson

Our students are exposed to people from hundreds of different cultures and backgrounds. By working with, socializing with, and living with students who are different from them, our students learn to focus on similarities, not differences. In so doing, DCMME students expand their horizons, open their minds to new people and ideas, and are better prepared to excel in this global manufacturing environment.

It remains our mission at DCMME to arm the future leaders of the manufacturing sector with **Knowledge**, participate in the success of manufacturing through the **Discovery** of innovative ideas, and to aid in the application of both knowledge and discovery through **Networking**. Our vision of the future stresses collaboration and teamwork, and fostering ever closer relationships with our industry partners.



Herbert Moskowitz – DCMME Director – Lewis B. Cullman Distinguished Professor of Manufacturing Management

Learning

The Dauch Center for the Management of Manufacturing Enterprises was founded fifteen years ago to prepare future leaders of manufacturing organizations to preserve and enhance the competitiveness of manufacturing organizations on the world stage. During this time, DCMME has focused on educating tomorrow’s leaders through an innovative educational program that focuses on developing technically skilled manufacturing “scientists” that have an enterprise perspective and can transfer this knowledge into the leadership of processes and business units of manufacturing organizations. Flexibility, adaptability, managing change in organizations, and openness to new ideas are the attributes that DCMME instills in its core group of leaders.

Discovery

While providing a state of the industry education to its student partners, DCMME is tasked with providing solutions to today’s manufacturing challenges to its corporate partners. Through research by Purdue University faculty and staff, such as the Automated Intelligent Manufacturing Systems Research (AIMS) project, which envisions the factory of the future by developing and assessing the value of deploying an automated system capable of facilitating continuous process improvement, collaboration between the corporate and academic environments are fostered.

Engagement

The Centers final goal is to serve as a communications nexus which enables an ongoing dialogue amongst student partners, faculty, and corporate partners. These partners share a common commitment to the present successful management of manufacturing enterprises and to the future successes of the industry as a whole.



*John Dyer
Ingersoll-Rand / VP of Global Consulting*

THE INSIDER'S ADVANTAGE:

IR Global Consulting Helps Ingersoll-Rand Managers Implement Best Practices for Stronger Operations

The trouble with outsiders is that they don't know what it's really like to be inside.

So rather than turning primarily to outside consultants the way many of its peers might for guidance on reducing costs and boosting productivity, Ingersoll-Rand has taken a different tactic. The diversified industrial manufacturer established an internal consulting group to provide support for its managers in helping to apply the principles of continuous improvement to their hard-won business experience.

"Our people within IR are the experts, and no one knows better than they do what their businesses need to run more efficiently and better serve their customers," said John Dyer, vice president of IR Global Consulting, an internal management consultancy that provides strategic counsel and tactical tools to IR's businesses. "Unlike outside consultants, we at IR Global Consulting strive to give the company's managers the tools, guidance and support to exploit fully the considerable industry and business intelligence they already possess."

The approach is working well. After working with IR Global Consulting, which is comprised of Dyer and 17 team members with experience in diverse areas of IR's operations, many of Ingersoll-Rand's businesses have improved their operations, sometimes dramatically, through the institution of continuous-improvement processes.

"For us, one of the most exciting things about IR Global Consulting is our ability to guide sustained change and improvements for a wide range of businesses," said Dyer.

"Because IR Global Consulting is an internal consulting group, our team understands IR's vision, strategy and culture, as well as the best practices that have been effective in the past for the company's various businesses. This knowledge enables us to identify quickly which strategic business approaches will succeed and which won't for the IR managers we counsel."

— John Dyer

The Value of Knowing Your Client Well

IR Global Consulting is a fairly unique corporate service, according to Dyer, who has 18 years of experience in quality and process improvement. "To my knowledge, IR belongs with a small group of companies that operate an internal consulting group charged with helping business units adopt best practices for driving quality improvement and process efficiencies," he said.

Dyer should know. In addition to spending the past eight years instructing quality and Operational Excellence at IR, he spent a decade at General Electric collecting and advancing the use of continuous improvement best practices. Dyer, who earned his M.B.A. from Purdue University, led the first process improvement team for the GE Appliances business. His work enabled the company to cut quality rejects in side-by-side refrigerator manufacturing by 66%.

Operating an internal consultancy affords distinct advantages for IR, according to Dyer. The consultants, who typically have an average of seven to ten years of manufacturing experience with various Ingersoll-Rand businesses, have a profound knowledge of IR that helps streamline processes and accelerate change.

"We at IR Global Consulting share and understand the same corporate goals, mission and culture as the business managers we support," said Dyer. "With our intimate knowledge of the company, we can quickly assess a situation and guide a management team to develop a plan tailored to its specific needs while supporting the broader objectives of IR. We know how to work within the corporate culture, and therefore are better able to recognize which strategic approaches will succeed and which will fail."

This knowledge also enables the group's consultants to provide immediate responses to their internal clients' situations. Dyer explained that it is normal to field a request for help at the start of the day and deploy a consulting team by the afternoon.

“On a recent assignment, we had less than four days to prepare a major change-initiative plan and presentation for senior management. Our ability to respond immediately, coupled with our corporate knowledge (such as understanding common measurements and scorecards), resulted in an approach that satisfied everyone,” he said. “Because of our ability to respond quickly, we often are able to work with IR managers to identify and act on industry trends, changing market conditions and competitive pressures.

Providing exceptional service to IR’s internal clients is critical to Dyer and his team, since IR businesses have the option of retaining outside consultants instead of IR Global Consulting. “We may work inside the company. But like any consultant, if we don’t deliver client satisfaction, we know that we will not be attracting future assignments from our colleagues,” he explained. (Article Produced and Copy-righted by Ingersoll-Rand. Reproduced with express permission of Ingersoll-Rand)

Setting the Stage for Operational Excellence

The original goal for IR Global Consulting was to help integrate lean manufacturing throughout the company’s design and assembly operations. In contrast to batch manufacturing, in which products are built and inventoried until sold, lean manufacturing calls for producing goods in exact response to customer orders, greatly reducing inventory costs and cutting production cycle times.

Today, the group’s focus has expanded dramatically to encompass all areas of Operational Excellence and the bringing together of IR talent through Dual Citizenship. Specifically, IR Global Consulting works closely with the company’s businesses to maximize plant production efficiencies, define manufacturing strategies, and drive Operational Excellence. Dyer’s team also helps IR perform one of industry’s most challenging tasks: successfully integrate acquired businesses.

Before working with managers to plot quality improvement plans, Dyer and his team conduct a preliminary survey and audit to ensure that the four fundamental elements necessary for making sustainable change are in place: the alignment of senior leadership around a common goal and vision; the support of the organizational structure to help foster change; metrics to measure success; and the availability of necessary resources. “In one week’s time, we help managers evaluate their prospects for success and advise them in making significant changes required to improve their operations,” said Dyer.

Dyer and his team next provide strategic tools that will complement these fundamental elements. These tools range from knowledge resources and instruction in value engineering and design for assembly techniques, to operational enhancement approaches, such as process mapping and lean manufacturing, to Six Sigma and other advanced continuous improvement strategies.



IR Global Consulting worked closely with Dresser-Rand to create dedicated leadership teams to oversee innovation initiatives.

According to Dyer, many businesses leap right into the adoption of sophisticated process improvement methodologies, such as Six Sigma, without assessing whether the fundamental elements necessary for making sustainable change exist. Often, the consequences of such leaps fall short of desired goals, and the benefits of Six Sigma never materialize.

“Businesses must prepare carefully for the adoption of tools such as Six Sigma,” said Dyer. “Six Sigma is a powerful methodology, but companies need to implement it on top of a strong foundation of teamwork, commonly shared goals, and a commitment to change to make it worthwhile. Lots of companies make the mistake of launching into Six Sigma without this foundation, and their efforts miss their mark.”

To help ensure that IR business teams are well prepared to succeed in driving change within their operations, Dyer and his team conduct accelerating change process events, or ACPs. Lasting one intense week, ACPs enable IR Global Consulting’s resources to help local teams of experts implement successful continuous improvements. In 2002, IR Global Consulting conducted approximately 50 ACPs across the company.

“We serve as the conduit for transferring knowledge and best practices so the business managers can drive and sustain quality improvements on their own,” said Dyer. “After all, the ultimate goal for IR Global Consulting is to produce thousands of experts in best practices and continuous improvement - not just 17 consultants. We can then leverage this talent across the company to help continue to drive Operational Excellence throughout.”

The contributions of IR Global Consulting typically help to generate substantial cost savings for IR. Over the last year, for instance, Dyer estimates that he and his team have helped the Business Units reduce costs by as much as \$60 million through the implementation of lean manufacturing and value engineering at several IR businesses. Dyer comments, “By leveraging resources throughout the company, we are seeing an acceleration of improvement in every sector across the enterprise.”

Safe Harbor Statement

This article includes “forward-looking statements” that involve risks and uncertainties. Political, economic, climactic, currency, tax, regulatory, technological, competitive and other factors could cause actual results to differ materially from those anticipated in the forward-looking statements. Additional information regarding these risk factors and uncertainties is detailed from time to time in the company’s SEC filings, including, but not limited to, its report on Form 10-Q for the three-months ended March 31, 2003.

ROLLS-ROYCE LEAN ACADEMY

Collaborative education in applying lean principles in the workforce for the next generation

Re-printed with permission of Rolls-Royce corporation, Indianapolis, IN

Introduction

The Lean Academy is an opportunity for students to participate in a one week, intensive, hands-on learning experience that introduces lean principles in conjunction with an opportunity for “real world” applications, such as an internship or co-op experience.

Initially targeted at undergraduate students nearing graduation, Lean Academy is also an excellent opportunity for graduate students or new-hires.

The Lean Academy was offered as a pilot course, June 2-6, 2003 at Rolls Royce Corporation in Indianapolis, IN for summer interns. The faculty for the week included participants from both the Department of Aeronautics at the Massachusetts Institute of Technology and the Krannert School of Management at Purdue University, as well as experienced industry practitioners.

Lean Academy Beginnings

The concept of the Lean Academy evolved from discussions within the Lean Aerospace Initiative Educational Network (LAI EdNet). The LAI EdNet facilitates sharing between academics related to the development and deployment of curriculum on lean topics. The EdNet leverages the learning community of the LAI consortium, a group of aerospace industry, government, labor, and academic organizations working to accelerate transformation of the aerospace industry. The Lean Academy was founded with the mission: Educate; Motivate; Innovate.

Overview

The Lean Academy combines and melds theory, lectures, application through hands-on simulations, case studies, individual and active team learning, anecdotal evidence, and real world examples into a coherent learning experience.





Day 1 Introduction and Context Setting

- Factory Tour
- Icebreaker
- The Aerospace Industry at 100
- Plan for the week and expectations
- Social activity

Day 2 Lean Basics

Processes, Customers, and Value

- Thinking Lean
- Delivering Value to Your Customer
- Lean Enterprise Value Manufacturing Situation (a/k/a “the game”)
- Company Presentation of Lean Implementation

Day 3 Implementing Lean in Various Contexts

- Lean Engineering
- Lean in Transactional Processes
- Lean Supply Chain Management
- People: The Heart of Lean
- Implementing Lean
- Company Presentation of Lean Implementation

Day 4 Taking Lean to the Next Level

- Quality Tools
- The Lean Toolbox
- The Enterprise View
- Company Presentation of Lean Implementation
- Group Interviews with Company Change Agents
- Social Activity

Day 5 Wrap-up, Final Presentations, and Graduation

- Factory Tour
- Student Final Presentations
- Graduation

Overall, the Lean Summer Academy provides an example of how academia and business can collaborate to provide an enriching and valuable experience to future manufacturing leadership. Simply put it is an excellent example of how creativity and innovation can blossom when collaborative relationships such as these are developed. At DCMME, it is our goal to create and foster relationships with our industry partners which will provide value to students, and corporations. Together, we can make a difference in the future of manufacturing. Contact DCMME today, and find out how we can help in molding you companies future.



learning

HOW DOES DCMME FACILITATE LEARNING?

UNDERGRADUATE PROGRAM

DCMME directs a Manufacturing Management (MM) minor within the 14th*-ranked Krannert School of Management's Bachelor of Science in Industrial Management (BSIM) program.

The goal of this minor, directed by DCMME, is to develop students who have the ability to excel in contemporary manufacturing environments characterized by rapid change, advanced technology, rapid product and process innovation, and short product life cycles. Graduates of this option generally assume entry-level leadership roles in production functions in manufacturing firms such as these. BSIM/MM graduates understand how the manufacturing process interacts and drives the organization's other activities, and how it fuels the organization's strategic goals. BSIM/MM graduates possess a broad base of knowledge from which to draw upon in making any decision, which includes human resources considerations, financial implications, marketing and product placement and contemporary manufacturing techniques. This enterprise view also prepares BSIM/MM students to advance beyond entry level positions and take leadership roles in organizations.

Coursework in the MM option builds upon the already strong analytical base of the BSIM program. Students take interdisciplinary courses in operations management, strategic management, and organizational behavior/human resources. These core manufacturing management courses are supplemented by electives in Krannert, the School of Industrial Engineering, and the School of Technology. These courses broaden and complement student's knowledge beyond their extensive technical expertise and enable them to be creative and adaptable when solving problems in organizations.

Required Curriculum:

- Advanced Manufacturing Planning and Control Systems
- Manufacturing Strategy
- Management of Manufacturing Organizations

Optional Curriculum

(Must Complete Two):

- Introduction to Database Systems
- Systems Analysis and Design
- Computer-Integrated Manufacturing
- Work Methods and Measurement
- Total Quality Management
- Quality Control
- Function and Structure of Industry and Distribution (Supply Chain Management)
- Labor Relations

MM Statistics 2003

Krannert Undergraduate Students	2,422	
BSIM Program overall	322	(13%)
Pre-IM	138	(43%)
Upper-Level IM	184	(57%)
Total BSIM/MM Students	51	(16%)

2003 Recruiting Companies

Allegiance
Bank One Corporation
BKD
Caterpillar
Chrysler
Cintas
Consolidated Graphics
Eli Lilly
Ford Motor Company
GE

General Motors
Healthcare
The Home Depot
Ideal industries
Kimberly Clark
Life Investors
Maxim Healthcare Services
Menard's
Northwestern Mutual Financial
Pharmedic

Philip Morris USA
Rubbermaid
Sanford
Sanford and Newell
Steak n' Shake
Susquehanna International Group
Toys "R" Us
United States Marine Corps Officer
Selection Team
Wal-Mart

MASTER'S PROGRAM

In the Master's of Business Administration program, Krannert students may specialize in option areas by selecting a specific group of electives. Manufacturing and Technology Management (MTM) is an option which was developed and is administered by DCMME. This program is designed to provide a strategic, multidisciplinary view of manufacturing enterprises.

The MTM option requires students to take courses in a broad range of disciplines, as well as requiring students take additional electives to achieve depth within an area. The coursework required by the program is as follows:

Part I

(must take one course in five sections)

SECTION 1:

Human Resources in Manufacturing

- (must choose one or skip section)
- HR for Manufacturing Enterprises
 - Industrial Relations I
 - Industrial Relations II
 - Negotiations
 - Organizational Change
 - Training in Organizations
 - Human Factors in Engineering
 - Technology & Conflict Management

SECTION 2:

Product Design & Development

- (must choose one or skip section)
- New Product Laboratory I
 - Product Management
 - Project Management
 - Marketing Analysis and Planning
 - Design for Manufacturing & Assembly
 - Product and Process Design

SECTION 3:

Production Planning & Control

- (must choose one or skip section)
- Manufacturing Planning and Control
 - Manufacturing Practice and Models
 - Advanced Manufacturing Technology
 - Production Management Control
 - Lean Manufacturing/Kaizen
 - E-Commerce & Supply Chain Management
 - Logistics

SECTION 4:

Systems Integration & Information Management

- (must choose one or skip section)
- Decision Support and Expert Systems
 - Enterprise Integration
 - Systems Simulation
 - Data Mining

SECTION 5:

Total Quality Management

- (must choose one or skip section)
- Tools for TQM
 - Quality Control

SECTION 6:

Manufacturing Strategy

- (must choose one or skip section)
- Manufacturing Strategy
 - Competitive Analysis in Strategic Management
 - Engineering Economic Analysis

SECTION 7:

Finance for Manufacturing

- (must choose one or skip section)
- Financial Management III

Part II

(must take four courses)

- Any Part I course in excess of requirement

Finance/Accounting

- Advanced Management Accounting
- Strategic Cost Management
- Financial Risk Management
- Managing Corporate Capital Structure
- Mergers, Acquisitions & Corporate Control

Business Law

- Labor Law
- International Business Law

Economics

- Advanced Labor Economics
- International Marketplace: Efficiency & Ethics I

Manufacturing

- Projects in Manufacturing
- International Multidisciplinary Management Project

Marketing

- New Product Marketing II
- Research Methods in Marketing Management
- Marketing in a Global Economy
- Marketing of Industrial and technological Products

Management Information Systems

- IT for E-Commerce

Organizational Behavior

- Leadership
- International Human Resource Management
- Teamwork
- Project Teams
- Training in Organizations
- e-People
- Mentoring and Socialization

Operations Management

- International Operations Management
- Management of Service Operations
- Management Operating Systems

Quantitative Methods

- Spreadsheet Modeling
- Management Science III

Strategy

- Corporate Strategy Concepts and Models
- International Strategy
- Strategy Implementation in Multinational Corporations
- Management of New and Small Firms
- Competition in E-Commerce

Industrial Design

- Computer Aided Manufacturing
- Design and Evaluation of Material Handling Systems
- Scheduling Models
- Economic Decisions in Engineering
- Advanced Production Control
- Knowledge-Based Systems

MBA/MTM Students

Number of MTM Students: 65

Graduate GPA: 3.4

SECOND OPTION AREA SELECTED:



Student Profile 2003 1st Year MBA's

ENROLLMENT BY DEGREE

MBA	160
MSHRM	36
MSIA	38

STATISTICS (MBA only)

Mean GMAT Score	658
Median GMAT Score	660
Mean GPA	3.31 / 4.0
Mean Post-Bac Work Experience	4.1 years
Students with Post-Bac Work Experience	88%

DEMOGRAPHICS (All programs)

Domestic Students	60%
No. of states	31
International Students	40%
No. of countries	23
Women	26%
Minorities	17%
Under represented minorities	8%
Average Age	28 years
Undergrad Schools Represented	157
% Holding Purdue Baccalaureate Degrees	15%
% Holding Advanced Degrees	20%

UNDERGRADUATE DEGREE DISTRIBUTION

	(MBA & MSIA)	(MSHRM)
Business / Economics	36%	28%
Engineering / Science / Technology	50%	14%
Liberal Arts / Other	14%	58%

1- Pre-baccalaureate experience is calculated only for students who graduated in 2003 and includes military, full-time, and significant internship/co-op experiences. As of 8/25/03

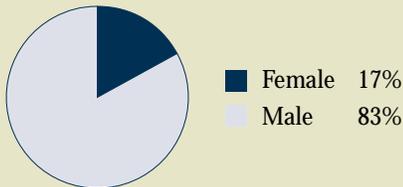
GEOGRAPHIC DISTRIBUTION (All programs)



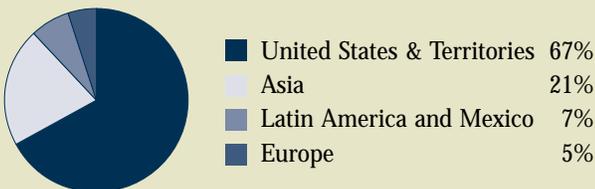
2nd Year MBA Students

150	(51%)
GMAT	651
Undergraduate GPA	3.23
Work Experience	4.4 years

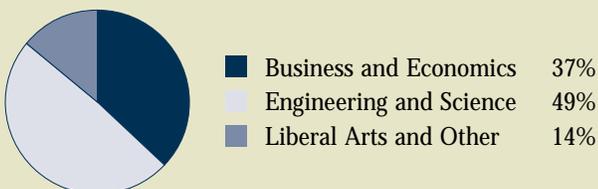
GENDER



GEOGRAPHIC ORIGIN



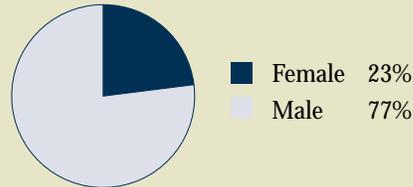
UNDERGRADUATE DEGREE AREA



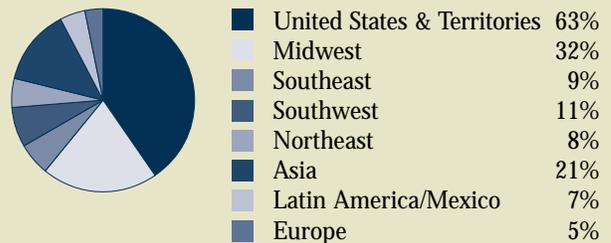
MBA/MTM Students

Krannert Students:	386
GMAT:	655
Work Experience:	4.2 years
MBA Students:	310 (80%)

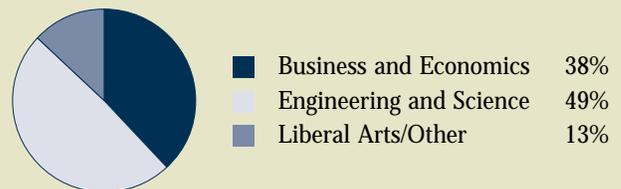
GENDER



GEOGRAPHIC ORIGIN



UNDERGRADUATE DEGREE AREA



2003 Recruiting Companies

Air Products and Chemicals	General Motors	Pfizer
Allison Transmission	Guidant	Phillip Morris USA
American Axle and Manufacturing	Honeywell	Rolls-Royce
Bristol-Meyers Squibb	IBM	Ryerson-Tull
Capital One Services	Ingersoll-Rand	Saint-Gobain Containers
Cinergy	Integrated Management Services	SBC Communications
Cintas	Intel	Shell Finance
Citibank	Johnson Controls	Synthes Brandywine
Daimler Chrysler Financial Services	Kimberly Clark	Target
Dell Computer Corp.	Liberty Medical Insurance	TRW
Eaton	Merrill Lynch	United Technologies Corp.
Eli Lilly	NCR	Wabtec
Ford Motor Company	Owens-Corning	
Galyan's	Peabody Energy	

MASTER'S SCHOLARSHIP/AWARDS

DCMME Manufacturing & Technology Management Scholarships

DCMME made five graduate student awards for the Fall 2003 semester. The students were awarded up to \$2,000 for a year of MBA study, up to \$1,000 per semester.



2003 Recipients

Martin Madden

Sean Anderson

Christopher Hiatt

James Serstad

Layne Jones

Michael and Jo Ann Allen Graduate Award

This award is given annually to a second-year MTM student who demonstrates a high level of enthusiasm for manufacturing management through participation in the Projects in Manufacturing course and the activities of the Operations Club. The scholarship carries a cash award of up to \$750 per semester, or \$1,500 per year.



2003 Recipient

Geoffrey Inget

Philip Morris Manufacturing Scholarship

Philip Morris gives three master's level scholarships annually to first-year students who are interested in operations or manufacturing management. This award carries a \$3,000 annual cash award, \$1,500 over two semesters.



2003 Recipients

Steve Rodriguez

David Meyer

James Perkins

(not pictured)

DCMME FUNDS AN AGGRESSIVE SCHOLARSHIP PROGRAM
DESIGNED TO ATTRACT TOP-CALIBER STUDENTS TO MANUFACTURING.

UNDERGRADUATE SCHOLARSHIPS / AWARDS

DCMME Manufacturing Management Scholarships

DCMME made 5 undergraduate student awards for the Fall 2003 semester. The students were awarded up to \$1,000 per semester over up to four semesters, or up to \$4,000 to manufacturing students. Students may apply at the end of their sophomore year.



2003 Recipients

Jan Martin

James Harrigan

Alejandro Londono

Felipe Camacho

Kok Seong Ngan

Joseph E. Turk Manufacturing Scholarship

2003 is the first year that the J. E. Turk Mfg. scholarship has been awarded. It was established by Inland Paperboard and Packaging Inc. to honor Joseph E. Turk for his 32 years of outstanding service to their company. This scholarship is intended to encourage exceptional undergraduate students to enter the field of manufacturing. Recipients must be Indiana residents and maintain a GPA of 3.0/4.0 to be eligible, and demonstrate leadership qualities through involvement in extracurricular activities within the school and community at large. Recipients are awarded \$1,000 for one academic year of study.



2003 Recipient
Matthew Shearer

ACADEMIC PERFORMANCE IS THE PRIMARY CRITERION
FOR THE DCMME SCHOLARSHIPS.

THESE SCHOLARSHIPS ARE FUNDED IN PART THROUGH THE GENEROSITY
OF DCMME PARTNERS AND BENEFACTORS.

KRANNERT OPERATIONS CLUB (KOC)

KOC

The Krannert Operations Club (KOC) is a student-led organization sponsored in part by DCMME. The KOC is a vehicle by which students interested in operations management careers participate in networking, educational and social activities. KOC activities include learning tours, industry speakers, social gatherings, workshops, seminars, case competitions and certification assistance. The KOC also co-sponsors and promotes activities for other student organizations on campus, including APICS, Industrial Management Student Association (IMSA) and the Institute for Operations Research and Management Science (INFORMS).

2002-03 Officers

Alan Swanson, *President*

Luis Lopez, *Vice President of Finance*

Cecilia Diaz, *Vice President of Communications*

Pete Anetsberger, *Vice President of Education*

William Wenz, *Vice President of External Events*

David Zeng, *Webmaster*

Ryan Chan, *Vice President for DCMME/GISMA*

Steve Shade, *Staff Advisor*

Prof. James Ward, *Faculty Advisor*

2003-04 Officers

Geoffrey M. Inget, *President*

Christopher Hiatt, *Vice President*

Layne Jones, *Vice President*

Daniel Guo, *Vice President*

Mark Wang, *Vice President*

Sanjay Garg, *Vice President*

Steve Shade, *Staff Advisor*

Prof. James Ward, *Faculty Advisor*

Highlights

In 2003, the KOC expanded its activities in quantity and interest area, responding to its members' growing interests in supply chain management, Six Sigma, APICS certification and service operations. The KOC maintained its strong focus on manufacturing operations management, adding breadth which returned significant value to its members.

Speakers

JOHN P. DITTMANN, Vice President, Supply Chain Strategy, Projects and Systems - Whirlpool, "Leveraging the Supply Chain at Whirlpool to Achieve Superior Financial Performance," April 2003

LINDA WIGGS, Delphi, September 2003
(co-sponsored by APICS Wabash Valley)

TOM RIBAR, Management Solutions International, "Ten Commandments of Manufacturing," September 2003
(co-sponsored by IMSA)

DAVE HINKO, Rolls Royce, "Project Management the APICS Way", October 2003
(co-sponsored by Dave Hinko)

DIANE BEEVER, DAVID GILE and LEE KIRK, Dell Computer, "Supply Chain & Operational Excellence," November 2003 (co-sponsored by Krannert Operations Management Department)

Learning Tours

- Delphi, Operations, Kokomo, IN, April 2003 (sponsored by DCMME)
- FedEx, Express and Freight Hub Tours, Indianapolis, IN, September 2003 (co-sponsored by DCMME)
- Target, Distribution Center Tour, Indianapolis, IN, October 2003
- Owens Corning, Roofing Plant Tour and Improvement Exercise, Brookville, IN, October 2003 (co-sponsored by Owens Corning and DCMME)
- American Axle & Manufacturing, Driveline Facility Tour and Improvement Exercise, Three Rivers, MI, October 2003 (co-sponsored by DCMME)
- Subaru of Indiana Automotive, Plant Tour, Lafayette, IN, November 2003 (co-sponsored by IMSA)
- Navistar, Engine Plant Tour, Indianapolis, IN, December 2003
- Caterpillar, Engine Plant Tour, Lafayette, IN, December 2003 (co-sponsored by APICS Purdue)

Case Competitions

- Krannert Operations Case Competition, October 2003
- Carnegie Mellon International Operations Case Competition, November 2003
(sponsored by Krannert Leadership Fund)

Social Events

- Family Picnic, October 2003
- Night Out/BW-3, November 2003

ISMA

The Purdue Industrial Management Student Association (IMSA) is a student-run organization open to all undergraduate students. Its members share a common interest in the technical aspects of the modern business environment and many are pursuing minors in fields such as manufacturing management, industrial engineering, management information systems, and various sciences. The mission of the organization is to assist members in their academic pursuits, to increase their familiarity with the job search process, to act as a liaison between students and companies, and to provide community service. These goals are accomplished through activities such as guest speakers, plant trips, workshops, social events, and service events in the local area.

Speakers:

EDDIE MIDHA, Caterpillar, "Six Sigma"

ANN SCHNEIDER, Allison Transmission,
"Lean Manufacturing"

TOM RIBAR, Management Solutions International,
"The 10 Commandments of Manufacturing"
(joint event with Operations Club)

DAVE HINKO, Rolls Royce, "Evaluating and Managing
Projects the APICS Way"

BRIAN HOLTZ, Goelzer Investment Banking

JANE HAETTINGER, former IMSA president,
"Making the Most of Your Internship"

Plant Trips:

Caterpillar
Subaru of Indiana Automotive (SIA)

Social Activities:

Pool Tournament
Bowling Night

Community Service Events:

Tippecanoe County Humane Society
Columbian Park Zoo

2003 IMSA Officers:

President: *James Harrigan*
Vice President: *Emerson Pacheco*
Treasurer: *Young Shin*
Secretary: *Elizabeth Abbott*
Community Service: *Jason Busenbark*
Webmaster: *Joe Pavlecich*

PROJECTS



MIDAS Project

This project focused on (a) modeling and understanding the demand process for parts faced by the US Coast Guard (USCG) Central Repair facility from bases using transactional information from USCG databases, (b) Understanding and integrating these demands with transactional data regarding the maintenance procedures for parts and (c) building statistical demand models using these two databases in order to separate demands into predictable and unpredictable demand streams that permit use of a process control view of demands and budgets. A significant source of intellectual and pedagogical value of this project was the actual transactional data of demands for five years for about 40 parts in the system that accounted for about 50 % of the total dollar value of transactions. The MTM students spent time as part of their internship at the USCG facility in Elizabeth City, NC and worked with personnel there as well as faculty at Purdue to document and transfer the databases. DCMME Staff Member Steve Shade played a key role in managing the contracting process between USCG and Purdue's Division of Sponsored programs who administered the finances for the \$ 150,000 project. The statistical analysis, data modeling and code developed to automate the analysis of part demands permitted us to suggest alternate models of system monitoring and supplier coordination. A quick summary of the project (a) The analysis suggests the value of a Data driven planning process, (b) analysis of the data provides a Process Control view of demands for parts, which suggests monitoring demands to check if they are within confidence interval (over 65 % of the parts had all observed demands falling within the confidence interval) and (c) a Proactive Planning and parts staging based approach can be implemented in order to separate predictable and unpredictable demand streams (an average of 38 % of the demands were in the predictable category with a range from 10 % to 66 % of demands across parts) and (d) a budgeting approach that is bottom up, i.e. uses part level demand confidence intervals to develop a budgeting process (around 51.6 % of the repair budget is accounted for by predictable demands). The project was a success, based on feedback from USCG, pedagogical value to student interns and intellectual capital for the faculty.

BICEPS - Benchmarking Indices of Supply Chain Efficiency & Performance Study

Our goal is to develop a series of metrics that can enable a firm to benchmark supply chain performance. We believe that an ultimate goal for these benchmark statistics is to incorporate both financial metrics as well as operational metrics to enable comparison across industries and to learn from other industry best practices. However, our approach is to reach this goal in a phased manner.

- (1) Phase 1: This phase will focus on developing benchmark metrics across entities in the grocery supply chain. Our goal in year 1 will focus on development of an instrument that enables us to understand the role of manufacturers, distributors, transportation companies and retailers in the grocery supply chain.
- (2) Phase 2: This phase will focus on expanding this benchmarking study to include firms in other industries. Our goal in year 2 will be to expand this study where we will incorporate issues we have learned in Phase 1 as well as develop best practice caselets that can enable learning across companies and industries.
- (3) Phase 3: This phase will incorporate both financial metrics as well as operational metrics in the benchmarking study. In this phase, we will thus focus on linking some financial measures with operational measures to understand how commitments regarding financial metrics might affect operational performance etc.

While the actual evolution of the work is planned to evolve in phases, we believe that it is important to start work immediately on all fronts. To that end, we have already started on work to take firms across different industry segments and assess how supply chain metrics could link to financial measures such as gross margin, sales uncertainty etc. Our goal is to build on this publicly available data through the use of a well-designed survey across industry of detailed supply chain performance data. In what follows, we preview the kind of analyses we expect to do as we move forward across phases.



While there have been several studies that focus on the use of surveys to assess individual responses to issues regarding supply chain performance, there are few studies that rely on comprehensive data collected from competing firms.

Automated Intelligent Manufacturing Systems (AIMS) Research

Purdue faculty members Kemal Altinkemer (Associate Professor in Management Information Systems), Okan Ersoy (Professor in Electrical Engineering), and Herb Moskowitz (Lewis B. Cullman Distinguished Professor of Manufacturing Management and Director of the Dauch Center for the Management of Manufacturing Enterprises) are currently conducting research into Automated Intelligent Manufacturing Systems (AIMS). The goal of this research is to move one step forward in advanced manufacturing; namely, in helping to define and envision the factory of the future by developing and assessing the value of deploying an Automated Intelligent Manufacturing System to facilitate continuous process improvement. AIMS will be designed to employ the development and use of artificial neural networks as a means of continuously monitoring, providing feedback, and adjusting system parameters and configurations to contemporaneously optimize (i.e., achieve what is theoretically possible) system performance, minimize cost, maximize quality (yield) and productivity (minimize cycle time). Six Sigma, as a business strategy and quality discipline, is highly amenable to such an approach, in the sense that it combines the advantages of what both humans and rule-based (non-human, automated) systems can do best in process management. What makes the approach feasible and indeed desirable is the fact that IT has enabled organizations to automate their data/information gathering systems in manufacturing (and in other domains). What remains to be done is to automate the analysis and synthesis of this information to enhance the decision process. Since much of such analysis is statistical in nature, it is plausible that this task be automated, freeing the individual (or teams) to perform more creative activities, which complement and support the analytical and decision-making process.

Center for International Business Education and Research (CIBER)

The Purdue University Center for International Business Education and Research (CIBER) was established in 1993 at the Krannert Graduate School of Management and is part of a national network of thirty Centers at universities across the country. CIBERs support research in international business and provide services and programs to assist United States businesses succeed in the global marketplace.

Purdue's CIBER supports academic, research, and business outreach programs in collaboration with the schools of Management, Liberal Arts, Agriculture and Engineering, as well as with representatives of the business community and the government of the State of Indiana.

CIBER Objectives:

Instill in students the motivation, confidence, and knowledge to think and compete globally; stimulate international research to enhance U.S. global competitiveness; educate Indiana managers regarding international trade challenges and opportunities; increase global awareness among the general public.

CIBER/Maple Leaf Farms

Maple Leaf Farms is the dominant player in the North American duck market and is the innovator in nutrition, feed conversion, genetics, biologics, and value-added processing. As Maple Leaf Farms (MLF) enters the new millennium, they have decided to strengthen their leading position in the Americas by establishing strategic alliances.

Maple Leaf Farm's vision is to form a strategic alliance for the production and marketing (domestic and international) of ducks, processed poultry entrees (chicken and duck), and formed, processed poultry products in South America. As a company that has the mission to be the world leader in the duck business and the leading poultry entree producer in the Americas, MLF sees opportunity to utilize its strengths to meet this mission.

PROJECT OPPORTUNITY:

Goal: Deliver an analysis and report that -

1. Identifies all cost drivers and recommends a plan of action for reducing the cost of production by \$0.20 per pound while maintaining – or improving – existing quality and performance metrics.
2. Determines if there is any way that Maple Leaf Farms can be globally competitive in the duck business while maintaining North American operations.
3. Analyze the North American market potential (including Mexico and Canada) and relate the potential back to the existing cost model to identify sources of additional savings.

Some options to consider:

- Increase volume at current plants, sell whole ducks at cost, and make profit on value added.
- Consolidate production and increase automation (to reduce labor); in conjunction with new operational models for production/processing flow, mass customization, and distribution.
- Acquire additional production in Mexico or Canada and reduce U.S. production.

When you mix a successful, competitive business with inquisitive Krannert MBA students, you expect to learn, apply your knowledge, and acquire a fresh perspective. But a recent project by DCMME (Dauch Center for the Management of Manufacturing Enterprises), CIBER (Center for International Business Education and Research), and Maple Leaf Farms, a world leader in the duckling production

business, also taught students and plant execs an important lesson in today's competitive, global market: Step back and look at the basics; things are not as obvious as they appear. Maple Leaf Farms (MLF), an Indiana-based, family-owned (CEO Terry Tucker, BS '63, Agricultural Economics) business with headquarters in Milford, Indiana, asked Purdue's CIBER for assistance with an international project. As the largest duckling producer in the Western Hemisphere with the latest technology and operations in four states, MLF hoped to improve its global perspective and increase leadership and value-added products internationally, explained Anthony Flesch, director of new business ventures for MLF. The company's goals were a perfect fit with CIBER's aims to internationalize the Krannert curriculum and assist "home-grown" Indiana companies to grow globally and become more competitive internationally, according to Greg Cutchin, CIBER's Associate Director.

CIBER and MLF teamed up with DCMME, and the new relationships evolved into several projects, among them, an opportunity with MLF for Krannert's 690Y "Projects in Manufacturing" students. For eight weeks, the students put their knowledge and creativity to work, charged with cutting production costs for a specific product at one of MLF's plants. "We were asked to evaluate the possibility of reducing the cost of the product by 20 percent, which was not possible," said Bill Wenz, MBA '03, one of the four MBA students involved in the project. In the process, the students discovered an improvement that could be made to MLF's cost-collection methods, which could more accurately describe cost information from the start of production.

The students went back to the drawing board to rework MLF's cost-collection process, developing an activity-based model to collect and analyze accurate cost information that could be applied to other company products and incorporated into the company's accounting methods. The activity-based cost model calculates individual activities and their cost, assigning costs to everything that contributes to the production of a particular product. Although not a new concept, MLF had not incorporated the model into this plant's operations. "Being a successful company, they hadn't changed their costing procedures," explained Wenz. "There is resistance to change, especially when a company has been very successful. We emphasized during our presentation that you must be proactive and prepare for the future. Now is the time for change."

MLF execs appreciated the reminder to look beyond the obvious and become more proactive. "The additional perspective and abilities through the new resources gained from the students was the greatest benefit from this project for the company," said Flesch.

The students learned a valuable lesson. "This project taught me to look for the root of a problem instead of looking at the surface symptoms ... because there is usually an underlying cause," remarked Wenz.

Other international projects have developed from the new CIBER/MLF relationship, among them, an internship opportunity for CIBER international students who collected market research data in their own countries this summer to assist MLF to grow internationally. As global perspectives expand and the world shrinks, these international collaborations become priceless in linking Krannert MBA students with Indiana "home-grown" companies to compete in the global market

BKD Indiana Quality Improvement Awards

The BKD Indiana Quality Improvement Awards (IQA), are intended to enhance competitiveness, promote the development of performance excellence and recognize the quality improvements of public and private organizations in Indiana. The 2003 BKD Indiana Quality Improvement Awards recognize organizations that achieve significant improvements in quality. Winning organizations will demonstrate commitment and measurable improvements in efficient and effective quality practices. DCMME was proud to be chosen by BKD, LLP to serve as judges for the Manufacturing and Distribution category as well as for the overall IQA winner. The five award categories were Manufacturing and Distribution, Service and Financial, Health Care, Construction and Real Estate, and Non-profit and Government. Textron Fastening Systems (Greensburg, IN) was the Manufacturing and Distribution category winner and also claimed the overall BKD Indiana Quality Improvement Award.

National Coalition for Manufacturing Leadership

The primary mission of NCML is the facilitating, coordination, and nurturing of the envisioned network of education and industry partnerships. Through education, training and research, the partnerships seek to emphasize interdisciplinary Engineering/Business Management efforts that support the goal of U. S. manufacturing preeminence. The Coalition also seeks to embed mutually supportive attitudes and actions in our industrial and educational institutions. DCMME attended the Fall 2002 NCML, hosted by Loyola Marymount University (LMU) and TRW. Twenty-three participants, representing 16 universities in the United States, Mexico, and Canada together with Ray Haynes, Director of University Alliances for TRW Space and Electronics Group and Hossein Nivi, Director Global Product Development & Manufacturing Leadership Programs for Ford Motor Company heard presentations on LMU's new dual-degree program and updates on program status and initiatives at the attending universities.





FALL 2003 PARTNER'S STEERING COMMITTEE MEETING



Become a financial partner by participating in the funding of DCMME at a level appropriate for your organization.

Identify a representative from your organization to serve on DCMME's advisory committee. This representative will attend our spring and fall partners' meetings and provide feedback on our educational and research programs to ensure they remain aligned with the current issues facing manufacturing enterprises.

Provide summer internship and/or full-time employment opportunities for qualified manufacturing management students.

becoming a partner.

Let DCMME help quarterback your recruiting and networking efforts.

The topic of discussion for the Fall 2003 Partner's meeting was AMMO—Advanced Manufacturing Option for Executive Education. Our partners provided feedback and counsel regarding the new proposed option in the Krannert Executive Master's Program. Those in attendance listened to the proposal and helped to direct the vision of what the option would deliver to those enrolled, and how that vision would impact Krannert and Purdue as a whole.

American Axle and Manufacturing summer interns Columbo Eddleman and Martin Madden provided information on their experiences this summer, and how together, through their efforts, they were able to define and implement initiatives that saved American Axle \$2 Million annually. John Sophia also illustrated the structure of the summer internship program at American Axle, and how American Axle, through its association with DCMME and Purdue is adding value to the bottom line of the company by capitalizing on the intellectual capital of Krannert Master's students.

In the afternoon, Partners attended lunch with current MTM and MM students, and stayed to participate in the dedication of RAWLS hall. There was universal praise for the building and the manner in which the students conducted themselves.

DCMME is grateful for the continuing support of our faithful corporate sponsors:

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BRINGING DCMME TO ITS STAKEHOLDERS IN REAL TIME

For many years, DCMME has been pleased to serve as a channel between Purdue's talented students, expert Purdue academicians and the manufacturing world through its missionary activity of Learning, Discovery and Engagement.

In the fall of 2002, DCMME changed its role from a channel to a live wire by bringing many of its services to the World Wide Web on its new website. Now, students, faculty and Partners can access much of the information they need from DCMME on its website, tapping into the resources of Learning, Discovery and Engagement more quickly and conveniently than ever before.

LEARNING:

***Click Here to Get Your Information,
Then Get Back to the Books!***

DCMME's past, present and future undergraduate and graduate students will find the new DCMME website a superb resource for:

- Understanding the value that DCMME affiliation delivers.
- Planning and measuring academic progress toward an MM or MTM degree.
- Viewing manufacturing-specific employment opportunities.
- Collecting alumni and company contact information.
- Updating DCMME on employment progress beyond graduation.
- Seeking immediate help in frequently-asked questions.
- Directing questions and issues quickly and conveniently to DCMME helpers.
- Requesting a DCMME scholarship.
- Registering for DCMME events.

DISCOVERY:

Click Here to Get All Your DCMME News

DCMME's faculty advisors and research partners will find the new DCMME website an ideal resource for:

- Acquainting with DCMME's Faculty Advisory Committee.
- Following DCMME-sponsored working papers and PhD funding.
- Familiarizing with current DCMME research initiatives.
- Requesting speaking engagements.
- Registering for DCMME events.

ENGAGEMENT:

***You're Busy Running a Company,
So Click Here and Let Us Do the Work***

DCMME's Corporate Partners will find the DCMME website a readily-available, convenient resource for:

- Quickly locating online resources pertinent to manufacturing.
- Maintaining job postings open to DCMME-affiliated students.
- Viewing profiles of DCMME-affiliated students conveniently in just one place.
- Registering for Partner's Meetings and other DCMME events.
- Engaging in online discussions with DCMME and Partners.
- Submitting proposals for student manufacturing projects.
- Requesting speaking engagements at Purdue University.

The website DCMME launched in 2002 was not the end of a process but rather the beginning of a new era of even greater stakeholder service. We encourage all of our stakeholders to join us in this progression forward – by reaping the benefits and by giving us as much of your vital feedback as possible. If you haven't registered yet with the DCMME website, please don't wait any longer, we look forward to welcoming you to our online community!

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The DCMME Faculty Advisory Committee is made up of senior faculty members in the Krannert School of Management who provide advice and counsel concerning the direction and goals of the center. A major task of the committee is to provide evaluation and guidance on the research and curriculum programs.



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