Professor Kapuscinski **OMS 701/MFG501 Course Materials** **Winter 2008**

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- "Honeywell Inc. and Global Research & Development." *Thunderbird Case A07-98-0017.*

Session #2 January 10 Corporate Strategy
- "BMG Entertainment." *HBS Case 9-701-003.*
- Porter, Michael E. "How Competitive Forces Shape Strategy." *Harvard Business Review*, March 1979.
- Porter, Michael E. "What is Strategy?" *Harvard Business Review*, November 1996.

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- "The House of Quality." *Harvard Business Review*, May-June 1988, #88307.
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- "Toyota Motor Manufacturing, U.S.A." *HBS Case 9-693-019.*
- Goodson, R. Eugene. "Read a Plant—Fast." *Harvard Business Review*, May 2002.

Session #8 February 4 Supply Chain Management

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- Cameron, Kim S. (2003) "Organizational transformation through architecture and design." *Journal of Management Inquiry*, 12:1-5.
- Iacocca, Lee (1984) *Iacocca: An Autobiography*. New York: Bantam Books. (Chapter 14).

Session #10 February 11 Communication Strategy

- "Media Training Notes"
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- Maskell, Brian. "Characteristics of the New Performance Measures." Chap. 2 of *Performance Measurement for World Class Manufacturing.* Productivity Press, 1991.
- Kaplan, Robert S., and David P. Norton. "The Balanced Scorecard—Measures That Drive Performance." *Harvard Business Review*, January-February 1992.

Session #12 February 18 Integrated Operations

- "LanServe Corporation (I)" – RSB Case.
- "LanServe Corporation (II)" – RSB Case.

OMS 701 / MFG 501: TOPICS IN MANUFACTURING

Winter 2008
University of Michigan

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Class Schedule: Mondays and Thursdays, 7:00 p.m. – 10:00 p.m.
Class will start *promptly at 7:00*, unless otherwise noted.

Location: Ann Arbor RSB, room K1310 (under Kresge Library, first floor).

Required Materials:

Course Pack: The coursepack contains the course outline, cases, teaching notes, and supporting articles. Some additional materials will be distributed in class and on the CTools Web site (see below).

Course Description:

This course provides an overview of a broad range of operations-related topics that should be of interest and importance to all Tauber students. In addition to providing background information for your future studies in operations and business-process improvement, the topics should be applicable to the Summer Team Projects that you will begin next spring. Also, you will be introduced to several instructors who engage in various Tauber activities, including teaching broadly operations-related courses and advising summer project teams.

Each session of the course deals with a different topic. There are three major groups of topics (described below), although instructor availability resulted in some deviation from the natural sequence of topics. Some sessions (e.g., the strategy sessions and Six Sigma) are fundamental to all activities in a manufacturing firm. Others (e.g., Legal Issues in Manufacturing) may provide the only coverage of a topic that you likely will have during your program. Still others (e.g., Supply Chain Management and Integrated Operations) may serve as an introduction to an area that you will later choose to explore in far more depth. The one unifying theme is that each session does relate directly to broadly defined operations, and therefore should be helpful to you in your further operations-related course studies and in your Summer Team Project.

Each session will be taught by a different faculty member. The sessions are "academic" in that they will have pre-session ("homework") assignments. Most of these are not written assignments, but rather are preparation required so as to enhance our collective learning in each classroom session, including reading articles and preparing case studies. Each guest faculty member has been instructed that the session should be taught on the premise that the students will be very well prepared. Some instructors "cold call," which I have encouraged. Thus, these sessions are *not to be regarded as a series of guest lectures.* Similarly, each professor has been asked to make the session interactive, and

not just straight lecture. Of course, as in other courses you are taking, there will be variation in the level of interactivity depending on the nature of the topic and the teaching style of the professor. There will be a paper to serve the role of an in-class final examination; details will be announced later. Class participation will also be a significant factor in determining the final course grade.

Plant Tours:

This course will serve as the administrative vehicle for arranging a small number of plant tours during the Fall and Winter semesters. These tours will expose you to operations in different types of manufacturing processes. Generally, companies limit the number of people who can be accommodated on a tour. Students in this course will be given first sign-up priority. If space remains, other Tauber students and members of the Operations Management Club can fill the remaining slots. For taking tours there will be a minimal course credit (a point for each activity). Independently, past students have found these tours to be valuable, so I expect that you will want to take advantage of this opportunity.

My Expectations:

I expect that you will
(1) attend every class and arrive early enough to permit starting promptly at 7:00,
(2) be well prepared for each session and participate in class discussions.
Both expressing your point of view and sharing illustrations from your personal experience will be welcomed. Even though there is a significant diversity in years of experience among students taking the course, in the past it did not translate into lack of opportunities for full active participation for anybody. Similarly, this year I expect all of you (undergraduate or graduate, business or engineering, older or younger) to equally participate in the classes and find the most effective ways to express yourselves and to contribute to everybody's learning.

At a risk of saying the obvious, consistent with an overriding Tauber norm, I expect you to conduct yourselves professionally in the classroom. Such conduct includes (1) paying attention to whomever is speaking, be it the professor or a classmate, (2) not demeaning an individual when expressing a viewpoint different from that person's, and (3) not distracting other students or the instructor, such as by carrying on distracting side conversations with those seated near you or using your laptop computer for anything other than class-related activities. (Some faculty will ask you to close the laptops, while at least one will require laptops during his session.) It is important to keep in mind that, for some of the instructors, teaching a module for you will be their only exposure to Tauber students; hence, we want to leave with them the best possible image of you and Tauber Institute.

Most classes will have handouts. Some instructors will give me electronic files of these, but others prefer not to. Thus, if you are going to have to miss a class, please have a classmate pick up a copy of any such handouts for you. Also, please notify me in advance that you will be missing a class.

Web Site (CTools):

The Web page is intended to supplement other means of communicating outside of class meetings. You can access the course Web page at https://ctools.umich.edu/ (click "login" in the upper-right corner and you should see this class listed on one of the tabs). Instructors occasionally provide additional material after their session and these will be posted on the Web site. In case of any changes,

here you find updated materials. In addition, this is the place to find information on administrative matters (including exam information). Finally, after each session you will be asked (see below) to provide session feedback on CTools.

Session Feedback:

You are required before the next session to provide feedback on each of the instructors in the course. A feedback form for each session will appear in the Assignments section of the course website. Instructions on how to use it are in the Resources section.

Grading:

Your grade will be based on class participation, submitting session feedback before the deadline, turning in the assignment for the legal session on time, plant tours, and a final paper. I do not have preset weights for these items, but can say that the final-paper grade will constitute no less than half of the course grade.

OMS701 / MFG 501
Detailed Daily Schedule

I. STRATEGY AND IMPORTANT INTERACTIONS

- **Session #1** (Monday, January 7)
  Global Competition Manufacturing Strategy

Prof. Aneel Karnani will conduct this session. He is a two-time teaching award winner in the Ross School's Strategy group. The session will include a background presentation of corporate strategy in a global context so that manufacturing strategy can be discussed from a global perspective.

Reading:

• Hastings, Donald F. "Lincoln Electric's Harsh Lessons Learned from International Expansion." *Harvard Business Review*, May 1999.

Assignment:

Study the case "Honeywell Inc. and Global Research & Development" and be prepared to discuss these questions:
1. What are arguments for centralizing R&D? for *de*centralizing R&D?
2. How would you recommend that Honeywell build effective global R&D capabilities?

- **Session #2** (Thursday, January 10)
  Corporate Strategy

Professor Gautam Ahuja will teach this session. He is a teaching award recipient and chair of the Business School's Strategy group. Corporate strategy provides the foundation and framework for all of a firm's activities. For a multidivisional company, each business unit also has a strategy analogous to the corporate strategy of a one-industry firm. Within the context of the overall strategy, there are functional strategies: marketing, manufacturing, financial, and human resource strategies. The functional strategies should be harmonious with one another, as well as consistent with the overall strategy.

This session will provide an overview of corporate strategy with a special focus on business strategy – the strategy for one business unit within a more diversified firm. Professor Karnani's last week session focused on global competition and manufacturing strategy. Together, these two sessions provide an overview of strategic issues, plus an introduction to the interrelated nature of corporate strategy, business strategy, and manufacturing strategy, all in a decision-making context. They constitute a basic foundation to which you should be able to relate your further manufacturing management studies.

Readings:

• Porter, Michael E. "How Competitive Forces Shape Strategy." *Harvard Business Review*, March 1979.
• Porter, Michael E. "What is Strategy?" *Harvard Business Review*, Nov. 1996.

Assignment:

Study the case, "BMG Entertainment," and be prepared to discuss these questions:
1. How does the advent of the Internet change the structure and economics of the music industry?
2. What advice would you give to the President of BMG?

- **Session #3** (Monday, January 14)
  Integrated Product Development Methods and Design for Manufacturability

This session will be taught by Sridhar Kota, professor in the Mechanical Engineering department. He is a Fellow of American Society of Mechanical Engineers and received multiple awards for his research work (many best paper awards, ASME Machine Design award, Leonardo Da Vinci award) as well as a teaching-excellence award. For a number of years he has taught a course on Design for Manufacturability.

Reading:

• "The House of Quality." *Harvard Business Review,* May-June 1988, #88307.
• "Robust Quality." *Harvard Business Review,* January-February 1990, #90114.

Optional Reading (reference):

Check CTools for optional readings for this class.

Assignment:

DFM exercise is the assignment. List of Complaints.pdf and Other_Blenders.pdf contain material relevant to the assignment.

- **Session #4** (Thursday, January 17)
  Sustainable Design and Manufacturing: Traps, Trade-Offs, and Triumphs

This session will be taught by award-winning CoE Mechanical Engineering Professor Steven Skerlos. He describes the session as follows:

Part I of this session will start with a lecture-oriented review of current environmental issues as they pertain to manufacturing activities. The urgency of shifting the current manufacturing paradigm from pollution control and remediation toward a future of environmental protection based upon pollution prevention will be highlighted. Definitions of **sustainable design and manufacturing traps, trade-offs, and triumphs** will be provided. Challenges to achieving sustainable manufacturing triumphs will be discussed in the context of **metalworking fluid systems**, and the efforts that have been made to pursue and promote sustainable metalworking fluid systems in industry over the past decade.

Part II of this session will be an instructor-facilitated group discussion of two case studies included in the pre-session readings. The **first case study** will be related to Cellular Telephone Remanufacturing, in accordance with Section 4 of the Sustainable Design reading. We will have a discussion on the environmental aspects of cellular telephone manufacturing, use, and remanufacturing. Your thoughts on this case study should be influenced by Section 1 (Introduction), Section 2 (Conditions for a Sustainability Business Case), and Section 3 (Technical Issues in Life Cycle Environmental

Assessment and Policymaking) of the reading. We will discuss the question: Is cell phone remanufacturing a sustainability triumph? The **second case study** considers purchasing a refrigerator new versus used. This example is intended to familiarize you with quantitative comparisons of environmental emissions from products and processes, definitions of environmental pollutants, and life cycle assessment. We will discuss the question: Is re-use of refrigerators a sustainability triumph?

Assignment:

1. Read Sections 1-4 of "Sustainable Design Engineering and Science: Selected Challenges and Case Studies." (Section 5 is a case study that will not be covered in class.)
2. Prepare the "Refrigerator Case Study." As part of your preparation for the class, you are asked to quantitatively consider whether manufacturing a new refrigerator can lead to less environmental impact than re-using a refrigerator. Do not spend too much time crunching numbers on this - the point is to think about the assumptions and how one might go about answering the questions posed. You are also challenged to think about the Life Cycle of a Refrigerator (production, use, and disposal) and about the various different types of pollution (air, water, and land) associated with the life cycle stages of products and processes. Does manufacturing a new refrigerator actually reduce environmental impact over the life cycle? Let us know what you think in class.

Note: There is a document ("Tear Sheet") that is part of the Session 4 assignment; please read the instructions below. Because Prof. Siedel needs this turned in before his session, **this must be completed and turned in at the beginning of this January 17 session.**

- **Session #5** (Thursday, January 24)
  Legal Issues in Manufacturing

George Siedel, Williamson Family Professor of Business Administration, will teach this session. He is the recipient of two University-wide teaching awards. The following topics will be covered: (1) A general manager's perspective on the law; (2) A framework for linking major areas of the law; (3) Two legal concepts—contracts and torts—that form the foundation for the law relating to business; (4) An application of the two foundation concepts to an area of special concern in manufacturing—product liability; and (5) A tool that is especially useful to managers when making decisions that have legal implications.

Assignment:

1. Read the Memorandum and complete the Tear Sheet (front and back). Turn in the Tear Sheet **at the beginning of class on January 17.**
2. Read:
   a. "Product Liability," excerpted from Chapter 10 of Lieberman and Siedel, *The Legal Environment of Business*. (Please skip the cases in this chapter.)
   b. "Ten Principles of Safety Management."
3. The course materials also include the following reference material from Lieberman and Siedel, *The Legal Environment of Business*. This is recommended, but not required, reading.
   a. "Contracts" b. "Torts"

II. ACHIEVING COMPETITIVE ADVANTAGE THROUGH OPERATIONS

- **Session #6** (Monday, January 28)
  Six Sigma

Pat Hammett, a Six Sigma expert who is an adjunct assistant professor in IOE, and a co-manager of the CoE Six Sigma certification program, will teach this session. Six Sigma combines some well-proven analytical concepts and techniques with applied statistics for quality and process improvement purposes. It includes structured problem-solving approaches, such as "DMAIC", "DMADV" or "IDDOV" for Design for Six Sigma. These approaches are particularly useful in manufacturing operations, but also have been successfully applied to many operations, including services, health care and administrative processes. Several TMI project sponsors have strong Six Sigma initiatives that permeate the entire company.

Dr. Hammett also serves as Manager of the Manufacturing Systems Group with the Automotive Analysis division of the University of Michigan's Transportation Research Institute. His primary areas of research are in quality engineering, product development, functional build manufacturing validation strategies, and white light measurement technology systems.

Readings:

• "Six Sigma Overview, Discussion Questions, and Case."
• "What is Six Sigma?"

Assignment:

Assignment is part of the first reading.

- **Session #7** (Thursday, January 31)
  Lean Manufacturing

This session will be led by Gene Goodson, an OMS faculty member and formerly a Group Vice President at Johnson Controls and Chairman and CEO of Oshkosh Truck Corporation. "Lean manufacturing" (or "lean production") is the more generic name given to the Toyota Production System (TPS). It has not only transformed the automotive industry, but is also now considered the system of choice for application to many other operations in both manufacturing and service companies.
The two primary tenets on which TPS is built are (1) elimination of waste throughout a business enterprise, and (2) respect for and reliance on people. This class will explore both of the tenets and their application in a case study, an article, and a plant assessment process.

Readings:

• Goodson, R. Eugene. "TPS Concepts."
• Spear, Steven, and H. Kent Bowen. "Decoding the DNA of the Toyota Production System." *Harvard Business Review*, September 1999.
• "Toyota Motor Manufacturing, U.S.A." – *HBS Case.*
• Goodson, R. Eugene. "Read a Plant—Fast." *Harvard Business Review*, May 2002. (Reprints of this article quickly became an *HBR* best seller.)

Assignment:

Form teams of 2-3 people and study the "Toyota Motor Manufacturing, U.S.A." case, the Toyota DNA paper, and the HBR paper on Read a Plant--Fast as a package and be prepared to discuss these questions:

a. For the case, what are the specific steps you recommend that Doug Friesen take on the Monday morning after the May 1 meeting to address the seating problem? What is the basis for your recommendation?
b. In analyzing the seating issue and the routine developed for handling the problems, where have the principles of the Toyota Production System been compromised or not adhered to?
c. Does the Toyota Production System apply primarily to manufacturing or would service operations benefit from its application?
d. Many companies have tried to implement the Toyota Production System over the last 25 years. Relatively few have succeeded. Why has this system been so difficult to implement outside of Toyota?
e. Do you believe that the Toyota Production System would increase the profitability of firms if implemented successfully or is it primarily for quality purposes?

- **Session #8** (Monday, February 4)
  An Overview of Supply Chain Management

Prof. Ravi Anupindi will lead this session. He is Associate Professor of Operations and Management Science and Director of Masters in SCM program. Topics to be covered include supply chain coordination, role of inventory management, and some other issues in modern supply chain management.

Readings and Assignment:

TBD

III. OVERALL PERSPECTIVES

- **Session #9** (Thursday, February 7)
  Change Management

Professor Kim Cameron served as and as department chair and director of several executive education programs at the University of Michigan. Earlier he was a Dean of the Weatherhead School of Management at Case Western. His research is in organizational downsizing, effectiveness, quality culture, and the development of management skills, with more than 100 articles and ten books. Recent interests include the virtuousness of and in organizations and their relationships to organizational performance. The session will review a common framework for leading transformational change, and students will analyze a video case study that illustrates the key processes and leadership activities required for effective organizational change.

Readings and Assignment:

• Cameron, Kim S. (2003) "Organizational transformation through architecture and design." Journal of Management Inquiry, 12:1-5.

Discussion questions:
1. What approaches to change would you have used had you been the new dean?
2. What alternatives do you see for using the building as a change tool?
3. What should be the next steps now that the building is complete?

• Iacocca, Lee (1984) Iacocca: An Autobiography. New York: Bantam Books. (Chapter 14).

Discussion questions:
1. What's wrong with Chrysler?
2. What's the first thing you would do in Iacocca's circumstances to turn around Chrysler?
3. What is your own long-term strategy for transforming this company?

- **Session #10** (Monday, February 11)
  Communication Strategy

Tony Collings will teach this session. He is a communications consultant to such clients as Google, and is also a lecturer in communication studies at U-M. As a CNN Washington correspondent he was part of a CNN team that won an Emmy for its Oklahoma City bombing coverage. Earlier he was a CNN foreign correspondent, covering Europe and the Middle East. He served as *Newsweek's* London bureau chief and was an AP Moscow correspondent and *Wall Street Journal* New York correspondent.

Using that experience, Mr. Collings will give an overview on effective communications strategy, including dealing with internal and external constituencies, in both regular and untypical situations such as crises. In his opening lecture Mr. Collings will explain the importance of communications strategy, especially media relations, and go over the techniques for effectively preparing and delivering key messages. (These are also covered in the assigned reading, *Media Training Notes* and *How to Create a Sound Bite*.)

Students will put these techniques to work in three hands-on exercises based on three scenarios (see assigned reading, *Scenarios for Exercises in Media Relations*.) There will be three teams of about 15 students each. The first team will meet separately to prepare a communication plan to deal with the first scenario, for an internal constituency. The team will select a spokesperson and create three brief talking points, while Mr. Collings and the other students prepare questions. Then the team returns and the spokesperson conducts a simulated staff meeting to announce staff changes and answer employees' questions. Similar activities will take place for the other two exercises. The session concludes with a wrap-up by Mr. Collings and suggested further study.

Readings:
:
• Media Training Notes
• How to Create a Sound Bite
• Scenarios for Exercises in Media Relations

Assignment:

Study the readings before the session and be prepared to refer to them during discussions and exercises.

- **Session #11** (Thursday, February 14)
  Performance Measurement Systems

Jim Reece will conduct this session. He is Professor of Accounting and of Operations and Management Science and a recipient of the RSB teaching leadership award. He also served as the RSB TMI co-director for 7-1/2 years. Whether explicitly designed to do so or not, performance measurement systems greatly influence the decisions made by the managers being measured. Successful implementation of project recommendations often is dependent on appropriate modifications of performance measurements in order to motivate the necessary change. This session deals with performance measures in a manufacturing firm at both a micro and macro level.

Readings:

• Maskell, Brian. "Characteristics of the New Performance Measures." Chap. 2 of *Performance Measurement for World Class Manufacturing*. Productivity Press, 1991.
• Kaplan, Robert S., and David P. Norton. "The Balanced Scorecard—Measures That Drive Performance." *Harvard Business Review*, January-February 1992.

Assignment:

Read "Analog Devices: The Half-Life System," and be prepared to answer the following questions:
1. What was Schneiderman trying to accomplish with the half-life approach?
2. What assumptions underlie the half-life system? What could limit the applicability of the method?
3. If a company wants to take this approach, how might they develop the estimated half-lives?
4. Compare Exhibit 9 with the balanced scorecard described in the article. What are the notable differences?

- **Session #12** (Monday, February 18)
  Integrated Operations

This session will be led by Bill Lovejoy, Chair of the RSB Operations and Management Science group and designer of the Integrated Product Development course. Professor Lovejoy's description of the class and assignment follows.

This class will challenge you to design a manufacturing operation paying attention to both the business and engineering aspects of that challenge. Designing an operations system requires the joint consideration of the technical system, the social system, and the information/control system. The medium for discussion will be two related cases, one building on the other. In LanServe I, you will consider what human resource, information, and quality systems are appropriate given that the firm wishes to maintain an assembly-line operation. In LanServe II, all possible flow configurations (not just an assembly line) are possible, which increases the degrees of freedom with which you can work. In each case, you will need to consider these questions:
1. How does LanServe compete? What capabilities must the operations system have?
2. What are appropriate metrics by which alternative operations systems can be assessed? That is, how would you identify a good system if you saw it? How do you measure "good"?
3. Which of the many different mosaics of physical flow, human resource, information, and quality systems is appropriate for LanServe?

Assignment for Part I of class:

Read the LanServe I case. Recommend one of the 16 possible operations system designs and be prepared to defend your answer in detail.

Assignment for Part II of class:

Read the LanServe II case. The design problem is to recommend the combination of process flow layout, human resource policy, information system, and quality control organization that is best for LanServe. You do not have to do these calculations in detail (in contrast with LanServe I, where calculations *are* expected); but be prepared to discuss how your analysis would proceed. In contrast with LanServe I, what additional considerations are needed and how would you include those in the analysis? Do you have an opinion about what LanServe should do?

February 22: Final paper due no later than 5:30 pm.