ATR-218 Work Cell Integration

COURSE DESCRIPTION:

Prerequisites: ELC 128 with minimum grade C
Corequisites: None

This course introduces high technology systems which are currently being used in new automated manufacturing facilities. Topics include integration of robots and work cell components, switches, proxes, vision and photoelectric sensors, with the automated control and data gathering systems. Upon completion, students should be able to install, program, and troubleshoot an automated manufacturing cell and its associated data communications systems.
Course Hours per Week: Class, 2; Lab: 3. Semester Hours Credit, 3.

LEARNING OUTCOMES:

Upon completing requirements for this course, the student will be able to:

1. Provide a systematic procedure for planning individual manufacturing cells
2. Increase the productivity and effectiveness of those assigned to design and implement manufacturing cells
3. Help prepare for plant and company-wide implementation programs
4. Understand the strategic benefits and value of cellular manufacturing

OUTLINE OF INSTRUCTION:

I. Introduction
   A. Cellular manufacturing — definitions, meaning, clarification
   B. Real-world examples of successful cell implementations

II. Understanding Manufacturing Cells
   A. Benefits of cellular manufacturing
   B. What are the risks? Difficulties to be expected.
   C. Typical approaches to planning manufacturing cells
   D. Systematic Planning of Manufacturing Cells — SPMC

III. How to Plan A Manufacturing Cell
   A. The four phases of cell planning
   B. The three fundamentals of every cell-planning project
   C. The pattern for cell planning and design
   D. Specific procedures and techniques
   E. Walk-through examples

IV. Systematic Planning Techniques
   A. Documenting the planning environment
   B. Location and Orientation worksheet

C. Organizing the cell-planning project
D. Gathering and analyzing input data
E. Methods of classifying parts
F. Summarizing and communicating parts classifications
G. Determining equipment requirements and utilization
H. Analyzing flow through the cell
I. Interrelating parts and process
J. Visual graphics for cell-planning diagrams
K. Physical arrangement of the cell — basic choices
L. Materials handling within the cell
M. Other coupling factors: physical, procedural, people

V. Systematic Planning in Action
A. Hands-on group work for real problem (with guided application) to develop a "preliminary" cell plan

VI. Modifying, Selection and Accepting Cell Plans
A. Modify and refine overall cell alternatives
B. Ensuring viability of cell plans
C. Balancing workload and flow
D. Financial considerations
E. Evaluating intangible factors
F. Selecting the most-preferred plan
G. What management wants to know before approving cell plans

VII. Case Problem in Detailed Cell Planning
A. Levels of planning
B. Alternative approaches to detail planning
C. Enrollee teams develop a detailed plan (with guided application) for a real problem, incorporating physical, procedural, and people aspects of a cell

VIII. Principles of Motion Economy & Workplace Design
A. The role of ergonomics in detail planning
B. Normal and maximum working areas for hand motions
C. Checklist for work simplification

IX. Management Issues and Implementation
A. Organizing the physical aspects of implementation
B. Training and involving the cell operating team
C. Cell support systems — Scheduling, Quality and Maintenance
D. Performance measurement, employee incentives
E. Cross training and union consideration
F. Worker assignment and supervision of cells
G. Empowering the cell team for management and problem-solving

X. Technology and Strategic Issues in Cellular Manufacturing
   A. Automation and systems integration
   B. Technical issues and considerations
   C. The strategic role of cellular manufacturing
   D. Supply chain thinking — external coupling with suppliers, customers, sales and distribution
   E. The need for facilities and logistics strategies
   F. Sources of savings and benefits

REQUIRED TEXTBOOK AND MATERIAL:

The textbook and other instructional material will be determined by the instructor to ensure that current, relevant concepts and theories are present.