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El Camino College
Industry Driven Regional Collaborative
For
Aerospace Manufacturing Engineering

Production Systems, Management, and Economics

Course Outline; Production Systems, Management, and Economics

This class is designed to introduce shop floor personnel, CAD designers, estimators, planners, purchasing agents, and low-and-mid level managers to different production systems, management ideologies, and manufacturing economics. Its' intent is to give basic data so that the individual will recognize the differences, advantages, and limitations of various production systems, management philosophies, and the business of running a manufacturing concern.

This course will assist the student in preparation for certification as a Certified Manufacturing Technologist sponsored by the Society of Manufacturing Engineers.

Suggested Time; 24 hours (8 weeks @ 3 hours per week)
Suggested Credit; 1.5 semester units

In addition to the requirement of attending classes each student will be required to submit a 5-7 page paper on a manufacturing process of interest to the individual. The instructor must approve the subject matter. The student will be required to make a five minute presentation to the class on his chosen subject.

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Course Content:

1. Traditional Production Planning and Control
2. Lean Production
3. Process Engineering
4. Materials Management
5. Management Introduction
6. Labor, Safety, and Human Factors
7. Engineering and Manufacturing Economics
8. Review



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Production Systems, Management, and Economics; Week 1

Traditional Production Planning and Control

Production Environments

- Manufacture-to-Stock
- Assemble-to-order
- Manufacture-to-order
- Engineer-to-order

Forecasting

Aggregate Planning

Master Scheduling

Requirements and Capacity Planning

Scheduling and Production Control

- First-In/First-Out Priority
- Start Date Priority
- Due Date Priority

Critical Ratio

- Examples

Material Planning

Manufacturing Resource Planning

Production Systems, Management, and Economics; Week 2

Lean Production

Mass Production

Toyota Production System

Essential Components of Lean Production

- Value Stream Analysis

- Takt Time

- Kanban

- Kaizen

- Visual Control

- Total Productive Maintenance

- One-Piece Flow

- Error Proofing

- Standardization

- Autonomation

- Production Leveling

- Problem-Solving Circles

- 5S Strategy

Just-In-Time

- Pull systems

Production Systems, Management, and Economics; Week 3

Process Engineering

Process Planning

- Process Selection
- Equipment Selection

Computer-Aided Process Planning

Jigs/Fixtures/Locating

- Locating Devices
- Clamping

Assembly Methods

- Single-Station Assembly
- Synchronous Assembly
- Non-Synchronous Assembly
- Continuous-Motion assembly
- Dial (Rotary) Assembly

Facility Layout

- Process Layout
- Product-Process (cellular) Layout
- Fixed (stationary) layout
- Layout Optimization

Maintenance

- Corrective Maintenance
- Preventative Maintenance
- Predictive maintenance

Methods Engineering and Work Measurement

- Examples

Production Systems, Management and Economics; Week 4

Materials Management

Inventory Management

Demand

Inventory Replenishment

ABC Analysis

Just-in-Time (JIT) Inventory

Supply Chain Management

Production Systems, Management, and Economics; Week 5

Management Introduction

Communication

Engineering Ethics

Manufacturing Supervision and Management

Supervision

Management

Leadership

Planning

Budgeting

Control

Centralization-Decentralization

Line-and Staff

Span of management

Project Management

Critical Path Method

Gantt Chart

PERT

Problem Solving

Organizational/Industrial Psychology

Teams

Participatory management

Goal Setting

Continuous Improvement

Deming's 14 Points

Create Constancy

Adopt new philosophy

Cease dependence on inspection

Minimize total cost, not individual price

Improve constantly

Institute training on the job

Institute Leadership

No Fear

Break Down Barriers

Eliminate targets for productivity

Eliminate work standards

Remove barriers to pride of workmanship

Institute education and self-improvement

It's everybody's job

Production Systems, Management and Economics; Week 6

Labor, Safety, and Human Factors

Labor Relations

Safety

- Hazard Awareness
- Automated Operations
- Lost-time Accidents
- Material Safety and Data Sheets (MSDS)
- Environment
- Product Liability

Human Factors

- Engineering Anthropometry
- Lighting and Workplace Effectiveness
- Noise
- Vibration
- Repetitive Motion

Production Systems, Management, and Economics; Week 7

Engineering and Manufacturing Economics

Time Value of Money

Cash Flow Patterns

P-Pattern

Examples

F-Pattern

Examples

A-Pattern

Examples

Comparison Based on Annual Cost

Examples

Cost Estimating

Fixed Costs

Variable Costs

Semi Fixed Costs

Direct Labor

Direct Material

Indirect Labor

Indirect Manufacturing Cost

General and Administrative Costs

Tooling and Test Equipment Costs

Value Engineering

Production Systems, Management, and Economics; Week 8

Review

Week 1	Traditional Production Planning and Control
Week 2	Lean Production
Week 3	Process Engineering
Week 4	Materials Management
Week 5	Management Introduction
Week 6	Labor, Safety, and Human Factors
Week 7	Engineering and Manufacturing Economics

