Challenges of an Aging Workforce

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The Skilled Trades Crisis

The most pressing issue facing North American manufacturing is a lack of qualified technical labor.
The average age of an industrial tradesperson today is between 50 and 55.

Canada will need 400,000 new workers in the “Golden Horseshoe” area.

Automotive parts manufacturers will be unable to fill 42 percent of skilled trades positions.

A shortage of 334,000 skilled workers is projected in Michigan.

The U.S. Department of Labor projects 2.3 million new skilled trades positions.
Skilled trades are not viewed as desirable professions.

Education systems’ lack of focus on skilled trades.

Difficulty in attracting skilled workers to industry.

Effort, time and cost to train apprentices exceeds the benefits.

Source: Ontario Chamber of Commerce Business Survey
The Skill and Knowledge Gap Increasing

More Complex

System Complexity

Human Capabilities

Less Complex

1900

2000
Changes in Workforce Culture Contribute to Problem

Machinist, Millwright, Welder, Mechanic

Doctor, Lawyer, Executive, CEO
What’s more….

- U.S. educational system amplifies the problem
- The military pipeline is drying up
- Downsizing is the name of the game today
  - “Re-engineering concepts are often misapplied.
  - Across-the-board cuts typically occur, when often the size of the maintenance force needs to be increased.
  - Seniority, not capability, drives most downsizings.
What Do We Need to Do Differently?

- Recruiting
- Selection
- Training

...and job redesign
Elements of a World-Class Workforce

- Empowered workforces
- Product & process ownership
- Clearly defined top-level objectives
- Well-trained; high retention
- Compensation aligned with productivity and quality
- An understanding of improvement tools
Combating the Expected Skilled Trades Shortage

► Raising awareness of careers in skilled trades.
► Promoting the image of skilled trades.
► Offer training tax credit/financial assistance to employers.
► Develop national standards to recognize trades and promote ease of movement across the country.
► Adjust legislation to make apprenticing more efficient and effective.

Source: Ontario Chamber of Commerce Business Survey
Recruiting

- Pre-recruiting – establish “partnerships” to revitalize interest in being a craftsperson.
- The retiring workforce will be a tremendous pool of resources for expertise and specialty projects.
- Start recruiting at “non-traditional” military sites.
- School-to-work internships.
Selection

- Hire specialty skills.
  - Hydraulics
  - Industrial automation
  - High voltage electrical

- Do not lower your hiring standards.

- Be careful of antiquated nepotism rules.

- Selection standards work hand-in-hand with training needs.
Job Redesign

Traditional Operator and Maintenance Roles

Operate
Inspect Product
Quality

Preventive Maintenance
Predictive Maintenance
Corrective Maintenance
Future Operator and Maintenance Roles

Operate

Maintain

Routine Equipment Care
- Clean
- Lubricate
- Adjust
- Inspect
- Repair

High Tech Technician

Equipment Care Coach

Reliability Technician
Training

- Streamline and focus internal training programs.
- Reliability training for technicians.
- Leadership training for “hourly” employees.
- Establish operator to maintenance progression systems.
Establishing a Maintenance Training Program
85-90% of “corporate training” is deemed to be ineffective*

- Not timely
- Not job related
- No hands-on
- Inappropriate delivery mechanism
- Not tied to business needs and drivers
- Poor materials and/or instructor
- No accountability

Source: ASTD and ISPI
The Solution?
A Structured, Focused, Maintenance Training Program
Systematic Approach to Establishing a Training Program

**ANALYSIS**
- Training Needs
  - Tasks Requiring Training
  - Job/Task Performance Standards
  - Knowledge & Skills Required
  - Employee Qualifications
  - Entry Level Skills & Knowledge

**DESIGN**
- Training Setting
  - Training Plan
  - JPMs/Program
  - Test Items
  - Objectives
  - Job Aids

**DEVELOPMENT**
- Training Plans
  - Lesson Plans
  - Training Methods
  - Training Materials
  - Pilot Program

**IMPLEMENTATION**
- Training Records
  - In-Training Evaluation Data
  - Trained Employees
  - Plant Performance Indicators
  - Job Performance

**EVALUATION**
Analysis Phase
Analysis Phase – Best Practices

- Involve the workforce early, consider a joint steering committee
- Evaluate the data
- Identify both training and non-training related solutions
- Clearly identify the business drivers
- Analysis should be at the maintenance task level
Analysis Phase

Methods for Analyzing Tasks
- Observation and Interviews
- Subject Matter Experts
- Group Interviews
- Surveys

Data Analysis
- Work Orders
- Failure Analysis
Analysis Phase

► Conduct the Analysis

■ Identify key tasks to be performed

■ Determine skill and knowledge requirements for those key tasks

■ Measure the skill and knowledge gap for current employees

■ Design the training

► Explore state funding availability (especially if capital is being spent)
Design Phase

- Tasks Requiring Training
- Knowledge & Skill Requirements
- Job / Task Performance Standards
- Employee Characteristics

DESIGN

- Learning Objectives
- Training Plan
- Program
- Entry-Level S&K
- Test Items
- Training Settings
- JPM's
Training Plan Design

► Training Program Content
► Target Audience & Throughput
► Training Delivery
  ■ Instructor-led
  ■ Self-study
  ■ On-the-job
► Facilities, Tools, Equipment
► Evaluation Process
► Training Program Cost & Schedule
The Importance of “Hands-On”

- Hands-On Training
  - At least 50% of the training experience must be hands-on
  - Allows for application of the theory
  - Provides a “non-intimidating” environment for practicing newly acquired skills
  - You can do it (check your bone yards and warehouses)
Training Lab Options

- In-plant classrooms & labs
- Centers of excellence concept
- Central training facility
- Mobile training labs
- Portable training hardware
- Partnerships (non-competing companies or educational institutions)
- In-house or outsourced
Training Delivery Mechanisms

- Self-Study Manuals
- Vendor Training
- Video Tapes
- Computer-Based Training (CD-ROM)
- Internet/Intranet
- Classroom and Lab
- Structured OJT
- JIT Training
Design Phase

- Core Competencies
  - Level 1
  - Level 2
  - Level 3
  - Level 4
- Craft Fundamentals
- Advanced Craft Training
- Equipment Specific Training

Trained

Craftsmen

Entry Level Employees
Vendor Training
Structured OJT
J.I.T Training
Classroom and Labs
CD ROM
Video Tapes
Self Study Manuals
Internet/Intranet

Screening

Core Competencies
Fundamentals
Advanced Training
Equipment Specific Training

Systems Operation, Troubleshooting, Proportional and Servo Valves
Pascal's Law, Hydraulic Theory, Component Identification and Operation
Math, Reading, Print Reading

Entry Level Employees

Proficiency Model – Example Hydraulic System

Design Phase – Best Practice
Development Phase

- Training Plan
- JPMS
- Program
- Training
- Settings
- Test Items
- Entry-Level S&K's
- Objectives

- Lesson Plans
- Training Materials
- Training Methods
- Pilot Program
- Training Plan
Development Phase – Best Practice

- Provide Equipment and Process-Specific Training
- Don’t just teach the “generics,” teach the theory as it’s applied to your facility
  - Higher trainee comprehension and retention of subject material
  - Greater trainee motivation
  - Trainees learn the systems as well as the theory
- Allows rapid application of the newly acquired skills and knowledge to the job
Development Phase – Best Practice

- Vibration Analysis
- Tribology and Fluids Analysis
- Precision Shaft Alignment
- Thermography
- Motor Current Testing
- Root Cause Failure Analysis (RCFA)
- Reliability Centered Maintenance (RCM)
- Planning and Scheduling
- Project Management Techniques
- Total Productive Maintenance (TPM)
Implementation Phase
Structure Your On-the-Job Training

- “Carrying Joe’s lunchbox” is not an appropriate approach to OJT
- Create a “checklist” of tasks to be performed
- Teach your maintenance staff how to be OJT instructors
- Break down the cultural fears about passing on information
Pilot and then develop a template that can be applied to other areas

Proof-of-concept

Inch-wide; mile-deep

Validate return on investment
Evaluation Phase
Craftsman should be evaluated on knowledge (written) and skills (hands-on) performance.

Training should be viewed as an investment in people, with quantifiable return, not a line-item cost.

- Overtime costs
- Downtime
- Repetitive problems
- Safety record
- Turnover and employment costs
- Parts costs
- Total maintenance costs
Maintenance Training Phases and Timeline

Phase 1 - Definition
- Workforce Assessment
- Job and Task Analysis
- Gap Analysis
- Training Design
- Training Plan Development and Implementation
  Cost Estimates and Schedules

Phase 2 - Development
- Course Materials
- Instructional Materials
- Build/Purchase Lab Equipment and Assessments
- Lab Exercises
- Instructor Guides
  Student Guides
  Skills Verification Assessments

Phase 3 - Implementation
- Classroom Instruction
- Lab Instruction
- "Hands-On" Lab Exercises
- Skills Verification
- Course Evaluation Certification
  Course Modifications for Continuous Improvement

Analyze
Design
Develop
Evaluate

3 - 6 Months Depending on Scope
3 - 6 Months Depending on Scope
6 - 18 Months Depending on Scope
Maintenance Training – Case Studies
Parcel Handling Company

Core Competencies

- LEVEL 1
  - Core Competencies
    - A: Hydraulics & Pneumatics
    - B: PLCs & Automation
    - C: High Voltage Electricity
    - D: Drives & Alignment

- LEVEL 2
  - Fundamentals

- LEVEL 3
  - Advanced Training

- LEVEL 4
  - Equipment Specific Training

Equipment Area Training
Steel Company

- Intensive written and hands-on pre-employment testing.
- Employees are “slotted” into training based on test results.
- Operator-to-maintenance progression path.
- USWA-delivered training courses.
- 60-70% hands-on.
Training “buckets” with hands-on field application between buckets.
Significant use of retirees to deliver training (90%+)

Retirees are hand-picked
  - Technical competency
  - Credibility
  - Presentation skills

Intensive train-the-trainer
Glass Container Company

- 23 smaller plants
- Need to upgrade maintenance workforce to keep up with equipment technology
- Desire to cross-train their craft workforce
Joint labor-management steering committee evaluated various delivery options:
- Consistent delivery
- Cost of training materials
- Throughput of students based on plant production needs
- Cost of training aids and hardware

Potential delivery options included:
- Portable classrooms
- Multiple training centers
- Regional training centers
- Centralized training center

The appropriate solution consisted of 2 regional training centers.
Program design characteristics.

- 60 percent lab/hands-on and 40 percent theory
- 2 weeks of training, followed by 4 weeks back in the plant applying new learnings (Learn-Do; through the use of structured OJT checklists)
- Classroom/lab time reduced from 14 weeks to 10 weeks through the use of off-the-shelf multimedia training
- Screening tests allowed for the creation of individual training prescriptions
Recruiting, hiring, staffing, job design, and training practices need to change.

- Consider a joint steering committee.
- Don’t forget the analysis.
- Prioritize your needs.
- Maintenance training must be hands-on.
- Structure your OJT.
- Use the appropriate training delivery mechanism.
- Tie the training to business metrics.
- Performance and written evaluations are critical.
Thank you!

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