

# MTS World™ Catalog

2017



**MTS World™**  
*Because Technology Depends On People*

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First Revision. . . . . January, 1995  
Second Revision . . . . . August, 1995  
Third Revision . . . . . August, 1997  
Fourth Revision . . . . . September, 1999  
Fifth Revision. . . . . October, 2003  
Sixth Revision. . . . . March, 2008  
Seventh Revision. . . . . August, 2012  
Eighth Revision. . . . . September, 2015  
Ninth Revision. . . . . March, 2017

## MTS Training Concepts

The MTS™ Training System is based on the following four training concepts:

- Functional Training
- Inductive Learning
- Gestalt Structure
- Behavioral Objectives

**Functional Training** focuses on the work to be done, not on a subject. The essential theory and principles required to do a job well are incorporated with the practice; theory and practice are learned together and in the context of the work to be done — and this work in turn is based on the requirements imposed by the technology of the workplace. Functional training is perhaps best defined as learning the job by doing the job in the real job environment.

**Inductive Learning**, sometimes called guided discovery, is the kind of learning wherein the learner, by direct confrontation with what's being studied, literally discovers the essential principles involved. Inductive learning requires that the learner do things, compare things, postulate theories, test those theories, come to some conclusions and confirm that those conclusions are correct. In a properly designed inductive learning experience, the role of the instructor is not to “teach”, but to set up the learning experience, monitor it, manage it, keep it safe and debrief it.

**Gestalt Structure** refers to how what is to be learned is packaged: whole to part back to the whole, rather than a series of discrete pieces. Structuring the training in a gestalt fashion makes it possible to learn against a pattern — a trait of the adult learner. Gestalting a something, as well as learning it, makes it possible for parts of the whole to relate to each other as well as to the whole. This provides a more comprehensive view of the entity in question and produces a stronger ability to deal with analytical troubleshooting techniques.

**Behavioral Objectives** are the learning goals. They provide a target to shoot for and an outline of how the course is going to progress. Behavioral objectives define learning outcomes in the form of performances. They become the basis for the “testing” (better known as feedback). A fully stated behavioral objective defines, operationally, what the learner will be doing (when he/she demonstrates that he/she has learned) — where he/she will be doing it — what he/she will be using — how well it will be done — and how long it will take. Behavioral objectives take the training out of the subjective arena. They also provide the basis for connecting training to workplace performance, on the proposition that every primary training objective, when achieved by the learner and implemented by the organization, contributes in a predictable and measurable manner to the performance of the work-place.

## DESIGN PHASE

### Analysis Of The Workplace's Technology.

Divide the workplace into its natural increments (processes or steps of operation), identify the functions and equipment for each, and set down the abilities required to operate and/or maintain the workplace's processes and equipment.

### Training Needs Assessment.

Based on the analysis of the workplace's technology, an objective determination can be made of each individual's ability and knowledge to operate and/or maintain the workplace. This process, the Gap Analysis Process, can be done in one-on-one interviews, written tests, computer based tests, performance evaluation, or a combination of these techniques.

**Training Program Design.**

Based on the workplace's technology and on the training needs assessment, MTS™ designs customized and modularized training programs.

**Development Of The Training Implementation Plan.**

Combining the above with the workplace's goals and other organizational factors, MTS™ can develop a plan which uses training in order to achieve workplace objectives.

**DOCUMENTATION PHASE**

**Writing.**

MTS™ can write up in uniform and pre-defined formats the training and the procedures of the specific processes and equipment of the work-place, either from a supervision, operations, or a maintenance point of view, or all of above. MTS™ can also train your personnel to write MTS style workbooks (see Train The Writer)

**Production of Documents.**

Using the appropriate DOC System, MTS™ can convert writers' drafts (either on site or at MTS™ offices) and print those documents in the required quantities, or deliver the native files with a copy in Adobe Acrobat format. MTS™ can also train your personnel to create MTS style workbooks. For further information on MTS™ Document Creation Systems—refer to MTS™ Documentation On Call (DOC™) in the Software Systems Section of this catalog.

**TRAINING PHASE**

MTS™ can provide instructors for the on-site training of operating and/or maintenance personnel. Training can be done in groups or individual, off-the-job or at-the-job. MTS™ can also train your personnel to train your employees using MTS techniques and methods (see Train The Trainer).

**APPLY & MEASURE PHASE**

**Integration of Initiatives.**

MTS™ is able to devise a plan for the effective integration of the MTS™ training with other customer initiatives, such as: loss control, process safety management, total quality, ISO certification, participative management.

**Performance Plan.**

Working with the workplace's management, develop a plan aimed at improving workplace performance (quality, costs, safety, environmental control, etc.) using training as one of the strategies.

**Pay For Qualification.**

Using the training program as a basis MTS™ has developed a program called SKILCOMP, an administrative system for designing and maintaining a compensation program which is tied to qualification of abilities.

**Management Consultation.**

MTS™ is able to provide on-going consultation to the plant/workplace manager and/or his staff.

**Audits.**

Beyond the initial MTS™ intervention, we can provide annual (or more frequent) audits of the training system.

## MTS COURSES

### COURSES FOR TRAINERS

#### TTT – Train The Trainer

MTS™ Trainer training is aimed at getting people to do productive instructing; the kind of instructing that gets the learners able to do their job with understanding. This kind of training is called MTS™ Functional Training.

The kind of training to be learned is structured, functional, experiential training which is different from the more traditional lecture type of training. The key is on developing an understanding of why and how adults in industry learn and using that, becoming more able to make learning happen.

TTT is an action-oriented, learn by doing course. Concepts are induced via a series of exercises plus discussion. The focus is MTS™ gestalt structured, functional, inductive training defined by behavioral objectives.

Outcomes from the training are either the trainer conducting at least one group training session (TII) and/or train learners individually using At-The-Job methods (AJL).

**Manner Of Presentation.** TTT emphasizes “Learn By Doing”. Theory and practice is introduced only when it is necessary to make operational the techniques and concepts of industrial instruction. Over a five day period, 6–10 participants are given opportunities to make presentations that demonstrate the MTS™ learning principles.

#### TII – Training Industrial Instructors

The training of instructors is designed to help people become able to plan, implement and measure the effectiveness of any increment of learning.

Uses an MTS™ formatted work-book to conduct group training in the workplace by:

- determining training needs
- scheduling the session
- preparing the training room
- getting the learner(s) ready
- making learning assignments
- measuring results of learning
- answering learner’s questions

**Manner Of Presentation.** The TII course is designed for groups of 4 to 8 people, for 10 days.

#### AJL – At-the-Job Learning

AJL is a proven method of workplace learning that synergizes the best features of the informal on the job training and the formal structured training.

Uses an MTS™ formatted work-book to conduct At-The-Job Learning by:

- determining training needs
- scheduling training time
- getting the learner(s) ready
- making learning assignments
- measuring results of learning
- answering learner’s questions

**Manner Of Presentation.** The AJL session takes one week. Two days reviewing the process and its concepts, and three days of practicing installing and managing the AJL process.

At-The-Job Learning is a course that also works hand-in-hand with Managing Industrial Learning (MIL) and Learning How To Learn (LHL).

## **COURSES FOR LEARNERS**

### **LHL – Learning How to Learn**

Learning How To Learn (LHL) serves as an introduction and orientation to MTS™ functional, gestalt structured, inductive training. This session lets learners who are starting into a fairly comprehensive MTS™ designed learning program know how the training will be done, what is expected of them and some of the more basic assumptions and principles of the MTS™ approach to industrial training. LHL is a transition session used to introduce and orient learners in either group training or at-the-job learning.

**Manner Of Presentation.** Learning How To Learn is a one full day workshop for a group of up to 10 people and is led by an MTS™ instructor.

## **COURSES FOR LEARNING DOCUMENTATION**

### **TTW – Train The Writer**

Train The Writer (Operations) is a learn-by-doing session for writers of Step Of Operation (SO) and Equipment Operation (EO) workbooks. The MTS™ type SO format is used. Participants will work on assigned SO's throughout the sessions.

As a result, participants can document the technology and use it to prepare Step of Operation workbooks. This understanding equips them to perceive the technology in new and different ways and enhance their technical abilities and knowledge, as well as to help others learn.

Train The Writer (Maintenance) is a two week session conducted in the same way for getting workplace people to document equipment and systems for maintenance.

Train The Writer (SMO) is for getting people able to document machine manufacturing such as Packaging Lines using the SMO workbook format.

Custom formats and courses exist, or can be developed, for administrative, information, and other systems.

**Manner Of Presentation.** Train The Writer, a 2 week session for a group of up to 10 people, is a means of developing operators and/or supervisors and/or others in a specific technology. The writer documents data related to a given process by figuring out how it works, how it is controlled, how it is operated, what the step does and why it is important and what to do if the step is not doing what it is supposed to do.

## **MTS Equipment Operation Workbooks**

Within the following lists of Equipment Operation Workbooks are Workbooks identified as **EQUAL** Modules. **EQUAL** Modules are aimed at people not familiar with the equipment used in chemical plants, refineries and other process workplaces. The content of these **EQUAL** modules is designed to develop an understanding of the language used to describe the equipment and used to operate and maintain that equipment. We find all kinds of people, both beginners and experienced, benefit from the **EQUAL** treatment.

### **CO – INSTRUMENT AND ELECTRICAL CONTROL OPERATION WORKBOOKS:**

The “CO” workbooks cover operation of both ordinary and analytical instruments, electrical equipment and such measuring or metering devices as scales or measuring feeders.

- CO1 Control System (**EQUAL**)
- CO3 Metering Pump Operation (**EQUAL**)
- CO4 Motor Control Center Operation (**EQUAL**)
- CO5 Dial Scale Weighing (**EQUAL**)
- CO8 Rotary Valve Feeder Operation (**EQUAL**)
- CO14 Process Control Operation (**EQUAL**)
- CO15 Controlled Flow Operation (**EQUAL**)
- CO15S1 Controlled Mass Flow Operation (**EQUAL**)
- CO16 Controlled Pressure Operation (**EQUAL**)
- CO17 Controlled Level Operation (**EQUAL**)
- CO18 Controlled Temperature Operation (**EQUAL**)
- CO19 Cascade Controlled Loop Operation (**EQUAL**)
- CO20 Controlled pH Operation (**EQUAL**)
- CO22 Scale Tank Operation (**EQUAL**)
- CO28 Fluid Flow System Operation (**EQUAL**)
- CO29 Electric Motor Operation (**EQUAL**)
- CO30 Controlled Speed AC Motor Operation (**EQUAL**)
- CO31 Ratio Controlled Operation (**EQUAL**)
- CO32 Fisher PRoVOX/ProVue Control Operation (DEC Version) (**EQUAL**)
- CO33S1 ABB MOD 300 Control System (**EQUAL**)
- CO34 Honeywell TDC 3000 Control System Operation (**EQUAL**)

**MO – MECHANICAL OPERATION WORKBOOKS:**

The “MO” workbooks cover operations of all kinds of mechanical equipment, particularly equipment with moving parts, other than process equipment and mobile equipment.

- MO1 Centrifugal Pump Operation (**EQUAL**)
- MO1S1 Magnetic Drive Pump Operation (**EQUAL**)
- MO2 Reciprocating Positive Displacement Pump Operation (**EQUAL**)
- MO3 Belt Conveyor Operation (**EQUAL**)
- MO4 Screw Conveyor Operation (**EQUAL**)
- MO5 Centrifugal Compressor Operation (**EQUAL**)
- MO5S1 Motor Driven Centrifugal Compressor Operation (**EQUAL**)
- MO6 Reciprocating Compressor Operation (**EQUAL**)
- MO7 Steam Turbine Operation (**EQUAL**)
- MO9 Bucket Elevator Operation (**EQUAL**)
- MO10 Fan And Blower Operation (**EQUAL**)
- MO11 Vibratory Feeder Operation (**EQUAL**)
- MO12 Screener Operation (**EQUAL**)
- MO23 Rotary Positive Displacement Pump Operation (**EQUAL**)
- MO24 Valve Operation (**EQUAL**)
- MO32 Centrifuge Operation (**EQUAL**)
- MO33 Air Conveying Operation (**EQUAL**) (**EQUAL**)
- MO35 About Vapor Compression Refrigeration (**EQUAL**)
- MO40 Dry Electrostatic Precipitator Operation (**EQUAL**)
- MO49 Agitating Tank Operation (**EQUAL**)
- MO60 Flex-Kleen Filter Operation (**EQUAL**)
- MO90 Air Driven Diaphragm Pump Operation (**EQUAL**)
- MO211 Liquid Ring Vacuum Pump Operation (**EQUAL**)



## **PO – PROCESS EQUIPMENT OPERATION WORKBOOKS:**

The “PO” workbooks cover operating process equipment, particularly equipment without moving parts.

- PO01 About Industrial Operations (**EQUAL**)
- PO03 Baghouse Operation (**EQUAL**)
- PO08 Heat Exchanger Operation (**EQUAL**)
- PO08S1 Plate And Frame Heat Exchanger Operation
- PO09 Steam Preheater Operation (**EQUAL**)
- PO10 Steam Reboiler Operation (**EQUAL**)
- PO11 Air Dryer Operation (**EQUAL**)
- PO12 Cooling Tower Operation (**EQUAL**)
- PO13 Fin/Fan Cooler Operation (**EQUAL**)
- PO14 Fired Heater Operation (**EQUAL**)
- PO15 Steam Jet Operation (**EQUAL**)
- PO16 Separator Operation (**EQUAL**)
- PO17 Liquid Filter Operation (**EQUAL**)
- PO18S1 Fulton Hot Oil System (**EQUAL**)
- PO19S1 Jet Reactor Operation (**EQUAL**)
- PO20 Bottoms Overhead Fractionator Operation (**EQUAL**)
- PO21 Vacuum Fractionator Operation (**EQUAL**)
- PO22 Stripper Operation (**EQUAL**)
- PO23 Absorber Operation (**EQUAL**)
- PO26 Boiler Operation (**EQUAL**)
- PO27 Steam Condensate System Operation (**EQUAL**)
- PO30 Multidraw Fractionator Operation (**EQUAL**)
- PO31 Candle Filter Operation (**EQUAL**)

**TO – MOBILE EQUIPMENT OPERATION WORKBOOKS:**

The “TO” workbooks cover operation of wheeled, tracked and rail-guided mobile equipment. Sometimes, a stationary piece of equipment mounted on a mobile frame is classified as a “TO”.

TO4 Railcar Trackmobile Operation

TO32 Manlift

TO34 Lift Truck

TO35 Training Guide For Commercial Driving License (CDL)

TO36 Bridge Crane & Monorail Hoist Operation

TO158 Front End Loader Operation

**WO – TASK-ORIENTED OPERATION WORKBOOKS:**

The “WO” workbooks cover a wide range of task oriented operations. These operating workbooks may be used alone or they may support a step of operation (SO) in a process.

WO10 About Troubleshooting Operations (**EQUAL**)

WO25 Sampling Systems (**EQUAL**)

WO35 Nitrogen Purging, Testing And Blanketing (**EQUAL**)

## **MTS™ EQUIPMENT MAINTENANCE WORKBOOKS**

**The following is a list of maintenance core manuals in our library.**

**Please note that we are currently overhauling our maintenance library. During this process some titles may not be immediately available. We appreciate your interest in our library and apologize in advance for any inconvenience. Please contact us for further details.**

## **AM – ANALYZER MAINTENANCE WORKBOOKS:**

These workbooks are maintenance related workbooks on the “care and feeding” of analytical instruments. The analyzer workbook numbers are grouped by type of analyzers.

### **Analyzer Basics**

AM100 Introduction To Process Analytical Instrumentation

### **Infrared Analyzers**

AM150 Infrared Analyzer Overview

### **Chromatographs**

AM200 A First Look At A Chromatograph

AM201 Gas Chromatograph Detectors Overview

AM202 The Flame Ionization Detector

### **pH Analyzers**

AM250 Measuring pH

AM261 Foxboro Model 870 pH Transmitter and 871 pH Sensor

AM263 Foxboro 872 Electrochemical monitors pH ORP Conductivity

### **Water Analyzers**

AM300 Overview Water Quality Analysis

### **Gas Analyzers**

AM401 Bailey Gas Sampling System

AM402 Bailey Gas Analyzer

AM 403 Bacharach Combustible Gas 800 803

### **Oxygen Analyzers**

AM450 Oxygen Analyzers Overview

### **Conductivity**

AM500 About Conductivity

**CM – CIVIL MAINTENANCE WORKBOOKS:**

These workbooks are civil related workbooks and are generally associated with the various building trades required by process workplaces to maintain their physical facilities.

**Materials**

CM201 Materials Of Construction

CM202 Some Building Materials

**Concrete And Masonry Work**

CM240 Mixing And Pouring Concrete

CM241 Basic Masonry Skills

CM245 Masonry Materials

CM247 Plastering

CM250 Refractories And Refractory Repairs

**Insulation**

CM300 About Thermal Insulation And Thermal Insulation Products

CM302 Insulation Applications And Repairs

**Roofing**

CM350 Roofing Application And Repair

**Painting And Coating**

CM370 About Paintings And Coatings

**Carpenter Work**

CM400 Wooden Fabrication And Construction

CM401 Construction Of Foundation Forms

CM402 Wharf Maintenance

CM403 CC Converter Woodwork Maintenance

CM411 Industrial Door Maintenance

## **EM – ELECTRICAL MAINTENANCE WORKBOOKS:**

The “EM” workbooks cover equipment typically maintained by industrial electricians. Basic electricity, tools, and test equipment is found in the EM500 series, Motors and motor control begin at EM900. Information electricity, including programmable controllers are found beginning at EM600. High Voltage and power electricity are found at EM700 with Generation and Distribution beginning at EM800. Some related subjects may be found in the IM section.

### **Electrical Safety**

EM100 Electrical Safety Training

### **Commercial Electricity**

EM200 About Commercial Electricity In Industrial Plants

EM202 Lighting Systems

EM203 Installing Lighting Systems

EM204 Maintaining Lighting Systems

### **Planned Maintenance**

EM301 Magneto Repair And Testing

EM403 Molded Case Breaker Maintenance

EM406 Inspection And Testing Of High Tension Lines

EM407 Testing And Troubleshooting Motor Installations

### **Basic Electricity**

EM501 About DC Electricity

EM502 About AC Electricity

EM503 About Magnetism

EM510 About Electrical Test Equipment

EM511 Using A Megger Tester

EM513 Ammeters And Power Meters

EM514 Using An Oscilloscope

EM521 Wire And Insulation

EM522 Fuses And Their Uses

EM584 Power Factor And Corrections

EM584S1 Actual Power, Apparent Power, Reactive Power

### **Information Electricity**

EM620 Switching And Shutdown Systems

EM621 Switching And Shutdown Components

EM622 Process Switches

EM623 Swanson Monitor

EM624 About Photoelectric Sensors

EM625 ATC 2800 Series Timer

### **Programmable Logic Controllers**

EM631 Transistor Logic System Components

EM631S1 About Relay Logic

EM640 Programmable Logic Controller Allen-Bradley 2/30

EM644 Troubleshooting A PC Controlled Batch Process

EM645 Texas Instruments 5TI Programmable Control System

**Burner Management**

EM650 About Flame Provers

EM652 Honeywell Protecto-Glo Flame Safeguard

**Power Electricity**

EM711 Electrostatic Precipitator

EM712 Rectifiers

EM713 Batteries And Battery Chargers

**Generation And Distribution**

EM807 Vitec Vibration Monitor

EM810 About Transformers

EM810S1 Westinghouse Tap Changer Transformer

EM813 Secondary Substation Transformer

EM814 Power Distribution Substations

EM820 Distribution Systems Relays

EM820S1 ITE 27 Undervoltage Relay Series 411

EM823 Testing And Resetting Power Relays

EM830 About Generating Electricity

EM831 Generators

EM860 System Protection; Relaying And Disconnects

EM863 Molded Case Circuit Breakers Description

EM889 Typical Steam Turbine Electronic Governor (Woodward)

**About Motors, Control And Installations**

EM920 About Motor Controls

EM921 Motor Control Circuits 1

EM922 Motor Control Circuits 2

EM923 Motor Control Circuits 3

EM924 Typical AC Motor Control Circuits

EM925 Motor Overload Relays

EM926 Motors Starters/Breakers

EM927 Combination Magnetic Starter (Polyphase)

EM928 Combination Magnetic Starters For 480V AC Motors

EM929 Drawout Switchgear



EM930 Reduced Voltage Starters

**Variable Frequency Drives**

EM960 About Variable Frequency Drives

**Electrical Control Systems**

EM980 About Mine Hoist Electrical Control Systems

## **GM – GENERAL MAINTENANCE WORKBOOKS:**

The following workbooks are used in a wide variety of training programs. Often they are used by maintenance people regardless of their specialty. Frequently they are included for operators.

GM100 About Numbers

GM101 Diagramming I, E, M And P Components

GM103 Using Structural Steel Drawings

GM104 About Mathematics

GM107 Computer Basics

GM112 A First Look At Computerized Information Management

### **Using Tools**

GM129 About Pneumatic Power

GM130 Mechanic's Hand Tools

GM130S1 Woodworking Hand Tools

GM131 Pneumatic Power Tools

GM132 Powered Woodworking Tools - Part One

GM133 Powered Woodworking Tools - Part Two

GM134 Masonry Hand And Power Tools

GM136 About Power Track Tools

GM140 General Hand Tools

GM141 Machine Grinding

GM142 Hand Grinding

GM155 Arc Welding Power Sources

### **Rigging And Scaffolding**

GM280 Rigging Fundamentals

GM282 Fixed Scaffolding

GM283 Using Small Rigging Equipment

### **Troubleshooting**

GM701 Some Troubleshooting Methods

GM702 Input/Output Method Of Troubleshooting

GM703 Locate Trouble On Paper-The Troubleshooting Map

GM705 Signal Tracing And Continuity Testing

GM710 About Troubleshooting Processes

GM711 Lockout and Tagging Procedures

GM712 Blinds and Blinding Procedures

**IM – INSTRUMENT MAINTENANCE WORKBOOKS:**

Two basic instrument type workbooks are listed: *principles* and *hardware*. The principles workbooks cover concepts, principles and fundamentals. The hardware workbooks cover specific instruments and devices.

- The IM100 series workbooks are principles workbooks.
- The IM200 to IM300 series workbooks are mechanical and pneumatic hardware workbooks.
- The IM500 series are electrical instrument related workbooks. Included in this series are transducers, e.g., current to pressure devices and “converters”.
- The IM600 series starts the *electronic* series. The first ten of this series cover basics.
- The balance cover specific electronic instruments. The electronic hardware workbooks are grouped by a manufacturer’s line. Some related subjects may be found in the EM section.

**Mechanical Instruments**

IM10 About Pressure Regulators

IM20 About Positive Displacement Meters

IM21 Totalizers/Integrators

IM30 About Rotameters

IM51 Smith Geosource Metering Systems

**Instrument Principles**

IM100 Introduction To Industrial Instrumentation

IM101 Mechanisms; Components

IM102 Mechanisms; Subassemblies

IM103 Pneumatic Components And Subassemblies

IM106 Head Concept Applied To Instrumentation

IM107 Level Measurement Using The Displacer

IM108 Measuring Flow And The Orifice

IM109 Pressure Measurements (And Its Variations)

IM110 Filled System Temperature Measurements

IM111 Instruments Classified: Feedforward And Feedback

IM112 Instruments Classified: Motion Balance

IM113 Controller Alignment Principles

IM114 On/Off And Proportioning Only Mechanisms

IM115 Proportioning And Derivative Mechanisms

IM116 Proportioning And Reset Mechanisms

IM120 Tuning Controllers

IM121 Properly Tuned Loops And Typical Controller Settings

IM122 Tune A Flow Loop (Using The Three Methods)

IM123 Tune A Level Loop

IM125 A Flow Control Loop

IM126 A Temperature Control Loop

IM127 A Level Control Loop Using The D/P Cell

IM128 A Pressure Control Loop

IM129 Ratio Control

IM130 Cascade Control

IM132 Level Measurement By Bubble Pipe

### **Function Relays**

IM140 About Function Relays

### **Process Control Systems**

IM151 Controlling A Steam Generator

IM153 Automatic Boiler Control System

### **Some Transmitters And Controllers**

IM170 About Pneumatic Instruments

IM171 Fisher Governor Multi-Trol Controller

IM201 Instrument Pressure Gauges

IM206 Relays: Foxboro, Masoneilan, Bailey

### **Valves, Actuators And Positioners**

IM220 About Valves, Actuators And Positioners

IM221 Diaphragm Actuators

IM230S1 Fisher 3618J And 3620J Series Valve Positioners

### **Weigh Belts And Feeders**

IM300 Introduction To Weigh Belts And Feeders

IM303 Auto Weight Belt Feeder

IM306 Toledo Checkweighers

### **Digital Electronics**

IM401 Digital Electronic Logic Gates

IM402 Digital Electronic Flip Flops

### **Microprocessor Control Systems**

IM450 About Microprocessor Systems

### **Honeywell TDC**

IM452 Honeywell TDC2000 System Overview

IM453 Honeywell TDC2000 Basic Operator Station Operation

### **Rosemount RMV-9000 DCS**

IM480 About The Rosemount RMV-9000 System

IM481 Rosemount RMV-9000 Operator Station

### **Basic Electrical Instruments**

IM500 Introduction To Electrical Instruments

IM501 Electrical Components

IM502 Electrical Subassemblies

IM504 Potentiometers And Thermocouple Circuits

IM505 Wheatstone Bridge And Bridge Circuits

IM506 Temperature Measurement Using A Thermocouple

IM507 Resistance Measurements: Conductivity And Strain

**Transducers**

IM530 About Transducers

**Electronic Transmitters**

IM590 Rosemount Model 3044 Temperature Transmitter

IM590S1 Rosemount Model 3051 Differential Pressure Transmitter

**Electronic Basics**

IM600 Introduction To Electronic Instruments

IM601 Electronic Components

IM602 Electronic Subassemblies Using Transistors

IM603 Electronic Subassemblies Using Vacuum Tubes

IM604 Servo Amplifiers

IM605 Thermoelectric Amplifier

IM608 Field Effect Transistors And Thyristors

IM609 Operational Amplifiers

**Foxboro E Consotrol**

IM610 Foxboro Electronic Loops

**Foxboro Spec 200**

IM640 Foxboro Spec 200 Overview

**Fisher PRoVOX**

IM700 DCS Fisher PRoVOX® Instrumentation System Overview (HP Version)

IM701 Fisher PRoVOX® Instrumentation Operator Station System (HP Version)

IM702 DCS Fisher PRoVOX® Instrumentation System Overview (DEC Version)

IM703 Fisher PRoVOX® Instrumentation System Operator Interfacing (DEC Version)

IM704 Fisher PRoVOX® Instrumentation System Programmable Controller Interfacing

IM705 Fisher PRoVOX® Instrumentation System Data Collection And Process Controlling

IM708 Fisher PRoVOX® Instrumentation System Maintenance Interfacing (Configuration Station)

IM709 Fisher PRoVOX® Instrument System Configuration

## MM – MACHINERY AND MACHINE SHOP MAINTENANCE WORKBOOKS:

This group of workbooks is related to machinery and is prefixed with “MM”.

- The first group of workbooks, numbered MM100 through MM129, cover shop machines.
- The balance of the MM100 series are *principles* or *basics* workbooks, which do not cover specific machines. These basic workbooks cover subjects that repeat in the study of specific machines.
- The numbers from 170 on up, are grouped to cover similar machines. For example, MM170 through MM209 are related to conveyors. The same kind of machine is covered by an *overview* or *about* workbook followed by a series of **supplement** workbooks. Notice, for example, group MM219 About Centrifugal Pumps. This series contains many “S” workbooks denoting specific pumps.

### Shop Machines

MM100 About Shop Machines

MM101 What Is A Lathe And How Does It Work?

MM102 Straight Turning, Taper Turning And Knurling

MM103 Facing And Boring On The Lathe

MM104 Screwcutting On The Lathe

MM105 What Is A Milling Machine And How Does It Work?

MM106 Using A Milling Machine To Make Simple Parts

MM110 Opside Shaper

MM111 Radial Drill

MM112 Band Saw

MM113 Giddings and Lewis-Fraser 80 DP4-T Horizontal Boring Mill

MM114 About The Surface Grinder

MM115 Lapping Using The Lapmaster

### Industrial Machinery Basics

MM130 Introduction To Industrial Machinery

MM131S1 High Tensile Fasteners

MM132 Bearings

MM132S1 Babbitting Bearings

MM133 Mechanical Packing

MM134 Mechanical Seals

MM135 Lubrication

MM136 Coupling Alignment

MM136S1 Spacer Coupling Shaft Alignment

MM136S2 Close Coupling Shaft Alignment

MM138 Shaft Couplings

MM139 Pumping Head Concept

MM141 Machinery Drives

**Vibration Testing And Balancing**

MM160 About Vibration Testing And Dynamic Balancing

MM162 Vibration Analysis

MM163 Field Dynamic Balancing

MM164 Shop Dynamic Balancing

**Conveyors, Elevators And Feeders**

MM170 About Conveyors

MM171 About Conveyor Maintenance

MM200 About Elevators

MM201 Bucket Elevators

MM204 Belt Conveyors

MM205 Screw Conveyors

MM208 Vibrating Feeders

**Classifiers, Screeners And Separators**

MM210 Classifiers, Screeners And Separators

**Centrifugal Pumps**

MM219 About Centrifugal Pumps

**Type 2 Single Stage-Horizontal-Double Suction**

MM219T2S1 Gould Model 3416 Centrifugal Pump

**Type 5 Sump Pump**

MM219T5S1 Gould Vertical Sump Pump

**Type 8 Multi-Stage-Vertical**

MM219T8S1 Gould Vit Pump

**Vacuum Pumps**

MM222 Vacuum Pumps

**Fans And Blowers**

MM224S12 Delaval Class 4C Centrifugal Compressor

**Centrifugal Compressors**

MM225S1 Allis-Chalmers VH Barrel Type Centrifugal Compressor

MM225S4 Ingersoll-Rand Centac Air Compressor

**Rotary Positive Displacement Compressors**

MM226S1 Ingersoll-Rand Type H AXI-Compressor

MM226S4 Sullair Rotary Screw Air Compressor

**Steam Turbines**

MM230 About Steam Turbines

MM230S1 Elliott Steam Turbine YR Series

**Special Small Pumps**

- MM240 About Special Small Pumps
- MM241 Rotary Vane Pumps
- MM242 Rotary Gear Pumps
- MM242S1 Viking Rotary Gear Pump 124 And 4124 Series
- MM243 Forced Feed Lubricators And Lubrication Systems
- MM243S3 Alemite Oil Mist System
- MM245 Rotary Positive Displacement Pumps

**Filters**

- MM250 Filters
- MM250S6 Plate And Frame Filter Press
- MM250S9 Shriver Filter Press
- MM252 Larox Pressure Filter

**Speed Reducers**

- MM263 About Speed Reducers

**Hydraulic Power**

- MM300 About Hydraulic Systems
- MM301 About Hydraulic Circuits
- MM305 Hydraulic Pumps
- MM306 Hydraulic Accessories
- MM307 Troubleshooting Hydraulic Systems

**Packaging Machines**

- MM350 Introduction To Bulk Packaging

**Cranes**

- MM410 About Cranes

**Extruders And Pelletizers**

- MM430 About Extruders And Pelletizers

**Engines**

- MM500 About Diesel Engines
- MM540 About Diesel Engine Fuel Injection Systems

**Miscellaneous Machinery**

- MM551 About Soot Blowers

**Thickeners**

- MM650 About Thickeners And Clarifiers
- MM651 Thickeners

**Marine Arms**

- MM700 Marine Arm Overview



**Crushers And Mills**

MM730 About Crushers And Mills

**PM – PIPING AND VESSEL MAINTENANCE WORKBOOKS:**

This group of workbooks cover piping and vessels common in industrial installations. Piping and vessel workbooks are prefixed with a “PM”.

**Basic Piping**

- PM1 Industrial Piping
- PM3 Measuring And Sketching Pipe
- PM4 Piping Hand And Power Tools
- PM5 Valves
- PM6 Steam Traps And Piping Specialties
- PM7 Relief And Safety Valves
- PM8 Valve Repairs
- PM8S1 General Twin Seal Double Block And Bleed Valves
- PM10 Using Pipe Drawings
- PM11 Screwed, Flanged And Welded Piping Systems
- PM11S1 Threaded Piping Systems
- PM12 Sealing Flanged Joints
- PM13 Steam And Condensate Piping Systems
- PM14 Soldered And Brazed Copper Pipe System
- PM15 Instrument Tubing Systems
- PM16 Plastic Piping Systems
- PM18 Cast Iron Pipe Systems
- PM19 Pipe And Tube Bending
- PM20 Steam Tracing And Jacketing Of Pipe Lines
- PM22 Victaulic Coupled Piping
- PM23 Sprinkler Systems
- PM24 Supporting Pipe
- PM25 Developing Pattern Layouts
- PM26 Chemline Piping Systems
- PM27 Eagan Fuel Oil Heating System
- PM28 Hot Tapping
- PM29 About Hose Assemblies
- PM32 Plastic Piping System

**Burning And Welding**

- PM101 Oxy-Acetylene Cutting And Burning
- PM102 Oxy-Acetylene Welding And Brazing
- PM103 Electric Arc Welding
- PM103S1 Arc Welding Electrodes

PM105 Arc Welding Power Sources

PM109 TIG Welding

PM111 Low Hydrogen Electrodes

PM112 Introductory Welding Metallurgy

**Fabrication**

PM150 About Fabricating Metal Structures

PM152 Small Tank Fabrication

PM154 Plate And Structural Shapes Forming

**Process Vessels & Tanks**

PM9 Steam Ejectors

PM160 About Maintaining Piping And Vessels

PM161 Maintenance Of Unfired Heat Exchangers

PM162 Maintenance Of Fired Heat Exchangers

PM163 Preventive Maintenance Of Tanks And Vessels

PM164 Maintenance Of Fractionating Towers

PM166 Hydrostatic Testing

PM167 Heat Exchangers Retubing

PM200 Heat Exchangers

PM201 Maintenance Of Plate And Frame Heat Exchangers

**Boilers And Furnaces**

PM300 About Boilers

PM350 About Furnaces

**RR – REMOVE AND REPLACE WORKBOOKS:**

R & R's are specific maintenance instructions that have to do with the removing and replacement of equipments in manufacturing workplaces. To be adequately covered by an R & R the equipment itself and its removing and replacement must meet the following criteria:

- No complicated or expensive tools are needed.
- No time consuming or complex training is needed.
- There are no hazards and risks involved if the procedures are followed.
- The requirement for judgment type decisions are minimal.
- Accessible.

Remove and replace workbooks are prefixed with an "RR".

- RR08 Remove And Replace Oilers
- RR09 Remove And Replace Relamping Lighting Fixture
- RR10 Remove And Replace Air Diaphragm Pump
- RR11 Disconnect Electric Motors
- RR12 Remove And Replace Small Gear Speed Reducer Units
- RR13 Remove And Replace Vari-Speed Drive Belt
- RR21 Taking Motor Load Readings
- RR23A Remove And Replace Pressure Indicators
- RR23B Remove And Replace Temperature Indicators
- RR24 Remove And Replace Orifice Plates
- RR25 Remove And Replace Simple Control Valves
- RR26 Remove And Replace Control Valve Limit Switches
- RR27 Remove And Replace Air Pressure Regulators
- RR28 Remove And Replace Control Board Controllers
- RR29 Remove And Replace DP, Flow And Temperature Transmitters
- RR30 Instrument, Charts, Pens And Inks

**TM – MOBILE EQUIPMENT MAINTENANCE WORKBOOKS:**

This group of workbooks cover the maintenance of vehicles found in industrial workplaces. See Also the MM500 series covering engines.

- TM502 Mobile Equipment Axle Assemblies
- TM503 Mobile Equipment Brakes And Power Assists
- TM504 Mobile Equipment Transfer Cases
- TM505 Mobile Equipment Hydrostatic Transmission
- TM508 Mobile Equipment Electrical Systems
- TM542LP Antilock Brake Systems

## SOFTWARE SYSTEMS

### ***DOCUMENT CREATION SYSTEMS — MTS™ DOCUMENTATION ON CALL:***

The **MTS™ Documentation On Call (DOC™) System** packages the MTS™ way of producing up-to-date workplace documentation either page by page or publication by publication. By processing information, in and out of DOC™, your organization can maintain current, accurate training and other workplace materials using Microsoft Word And Microsoft Visio applications software and MTS™ templates.

This is a “value-added” product which packages and delivers MTS™ know-how for your workplace and gives you a strong in workplace documentation creating, editing and printing capability immediately after installation and training.

The DOC™ System can be located at your workplace and your workplace personnel are trained by MTS™ to operate the system (or it can be operated by MTS™ people).

The operator works with MTS™ trained writers to produce documentation in integrated, MTS™ standardized formats. These formats include our preformatted software “templates”. This system helps you to set up and regularly update formatted documentation. It also provides an easy, consistent way to keep information “evergreen” and delivered via your computer network, or on up to 11" x 17" paper in color. File information can be sent from DOC™ to other computers via the workplace's network utilizing Adobe Acrobat (pdf) “view only” versions.

DOC™ represents over 25 years of industrial experience. This system can help bring your workplace closer to a safer, more compliant, more cost effective, environmentally sensitive operation. The DOC™ System requires MS Word, MS Visio, and Adobe Acrobat. Training is mandatory and varies depending on the background experience of the learners.

## **MTS™ INFORMATION PUBLICATIONS**

### **REPRESENTATIVE PROGRAMS:**

HES10 A Representative Pipefitter Training Program  
HES11 A Representative Boilermaker Training Program  
HES13 A Representative Millwright Training Program  
HES14 A Representative Instrument Training Program  
HES15 A Representative Electrical Training Program  
HES16 A Representative Machinery Training Program  
HES17 A Representative Heavy-Duty Mechanic Training Program

### **THE WAY MTS™ ...:**

PA2 A Day In The Life Of Billy Bourdon — J. Warren  
PA3–91 MTS™ Contribution To EPA And Compliance  
PA1–90 Risk Analysis And Loss Control  
PA1–91 MTS™ Contribution To ISO 9002 Certification  
PA2–91 MTS™ Contribution To Compliance With OSHA Proposed Rule 29 CFR, Part 1910.119  
PA2–92 MTS™ Contribution To The ISRS 5 Star Program Of ILCI  
PA45 Train–Maintain – An Innovation To Contract Maintenance — R. Denoux  
PA62 The Way MTS™ Defines And Implements Maintenance Management — N. Blahut  
PA65 The Way MTS™ Certifies Operators — N. Blahut  
PA66 The MTS™ Way Of Certifying Maintenance Craftsman  
PA69 A Discussion Of Procedures And Training  
PA71 Criteria For Training Recordkeeping Software  
PA72 Strategies For Structured Workplace Learning  
PA73 Refresher Training: Scheduling By Performance Measurement  
PA84 MTS™ System For Risk Analysis And Loss Control  
PA85 Multi-Skill Cross Training: How Much? How Far?  
PA88 MTS™ WORLD  
PA94 The MTS™ Way Of Managing Productive Training – Learn & Work  
PA95 Measuring The Impact Of Training And Reporting Results  
PA96 Building Safety Into Operating Procedures  
PA103 MTS™ Stories

### **CASE HISTORIES AND EXPLANATIONS:**

PA7 *Hydrocarbon Processing* – “Functional Training In Industry” — V. Estrada  
PA16 *Industry Forum* – “Self-Directed Training In Safety & Quality” — V. Estrada

- PA17 *Quality Digest* – “Eight Principles Of Functional Training” — V. Estrada
- PA32 First Annual User’s Conference Report, May 1994 (also available in Spanish)
- PA34 *St. Louis Business Journal* – “MTS Provides The Tools To Help Manufacturers Help Themselves” — A. Heather Irwin
- PA36 *Chemical Processing* – “Comprehensive Training Program Strengthens Amoco Operations” — Walker Wells, Amoco Chemical, Joliet, IL
- PA37 *Wall Street Journal* – “Labor Letter”
- PA41 *Cerro Matoso’s Ventana* – “Programa Para El Desarrollo De Personal” — Rodolfo Baron
- PA42 *Engineer’s Digest* – “Seven Steps To Effective Training” — V. Estrada
- PA43 *Across The Board* – “Manual Labor”
- PA44 *Human Resource Professional* – “How Workers Became Trainers, Learners And Writers” — J. Cusimano
- PA48 *National Industrial Plant & Equipment Magazine* – “Rubber Company’s Skilled Workers Learn New Skills: Increased Flexibility Improves Production” — Keith Acland
- PA70 *Chilton’s Industrial Maintenance & Plant Operation* – “Rubber Company Uses Cross-Training To Bounce Back From Tough Times”
- PA74 *Executive Excellence* – “Turning Workers Into Learners” — V. Estrada
- PA75 *Human Resource Professional* – “Training in Manufacturing Continues to Evolve” — V. Estrada
- PA76 *The President* – “The Transformation Of The Factory Worker”.
- PA77 *Meridiano* – “Manufacturing Technologies Strategies Provedora de Sistemas Gerenciales” — V. Estrada
- PA78 *Hydrocarbon Processing* – “Chemical Plant Satisfies OSHA And ISO Standards” — Walker Wells, Ken Taylor
- PA79 *Quality Digest* – “Functional Training Builds Knowledge Workers” — V. Estrada
- PA80 *Technical & Skills Training* – “Skilled Tradesworkers Learn New Skills” — Keith Acland
- PA81 *Training & Development* – “Turning Blue Collar Workers Into Knowledge Workers” — J. Cusimano
- PA82 *Personnel Journal* — “Are Your Factory Workers Know-It- Alls?” – V. Estrada
- PA83 Second Annual International Users” Conference Report
- PA86 *Pulp & Paper* – “Abitibi’s Iroquois Falls Mill Flies Solo With New Learning System” — Jocelyne Guinard
- PA87 *Hart’s Petroleum Engineer International* – “Commitment, Planning And Money Overcome Training Obstacles” — Jennifer F. Koury
- PA89 *Fortune* – “Training Workers Better, Faster And Cheaper” — G. Bylinsky
- PA90 *Journal Of Business Strategy* – “Eastman Chemical’s Spanish Composition”
- PA91 “Missouri Highway Department Reinvents Itself: Employee Gripes Show Way; New Matrix Gives Answers” — J. Cusimano
- PA92 “Eastman Installs Training System: Pattern For Global Expansion” — J. Cusimano
- PA92-1 A “Hands-On” Approach To Process Safety Management
- PA93 Third Annual International Users’ Conference Report

PA96 *Occupational Hazards* – “Building Safety Into Operating Procedures” — Chris Ford

PA97 *Corporate University Review* – “Turnkey Technical Training System Suits Eastman Chemical’s Worldwide Needs”

PA98 “Workers At Cerro Matoso Partner With Management To Implement Employee Development System” — V. Estrada

PA99 *Hydrocarbon Processing* – “Installing Training System Provides Pattern For Global Expansion”

PA101 *Hydrocarbon Processing* – “Multi-Skilling & Cross Training” — Chris Ford