

# Scientific Management Techniques

Prior Learning Assessments and Skill Gap  
Analysis using Hands-On Competency  
Based Assessment Tools

# NCWE Manufacturing Skills Workshop

- Review SMT's Programs/Capabilities
- Quantifying the Changing Skill Level of the Manufacturing Workforce over the Last Four Decades
- Delivering Targeted, Data-Driven Skills Training based on Assessment Outcomes
- Measuring the Effectiveness of Mechatronics Training Programs
- Awarding Credit for Prior Learning based on Validated, Competency-Based, Hands-On Assessments

# Scientific Management Techniques

Validated, “Competency-Based”

**Manufacturing Skill Programs** Deployed by  
Fortune 500 Manufacturers Globally

Solving the Manufacturing Skills Shortage

Available in Formal Education since 2011

**Hands-On, Manufacturing Skill Assessment Programs That Identify and Measure the Skills Required to Operate, Maintain and Troubleshoot a Manufacturing Facility**

**Competency-Based Mechatronics Curriculum Training the “Hard Skills” Required to Optimize Performance / Profitability in Industry**

# Programs Deployed Globally by Fortune 500 Manufacturers

 **Actavis**

  
**ALCOA**

 **BD**

 **BIGELOW®**

 **BROWN-FORMAN**

 **BUNGE**

 **BWAY**

 **Campbell's**

 **Coca-Cola**

  
**COLGATE-PALMOLIVE**

 **COVIDIEN**

 **CROWN CORK & SEAL**

 **Cummins**

 **DENSO**

 **DENTSPLY**  
INTERNATIONAL

 **DIAGEO**

# Programs Deployed Globally by Fortune 500 Manufacturers



# Programs Deployed Globally by Fortune 500 Manufacturers



**REGENERON**



**SQUARE D**  
Schneider Electric



**tyco**

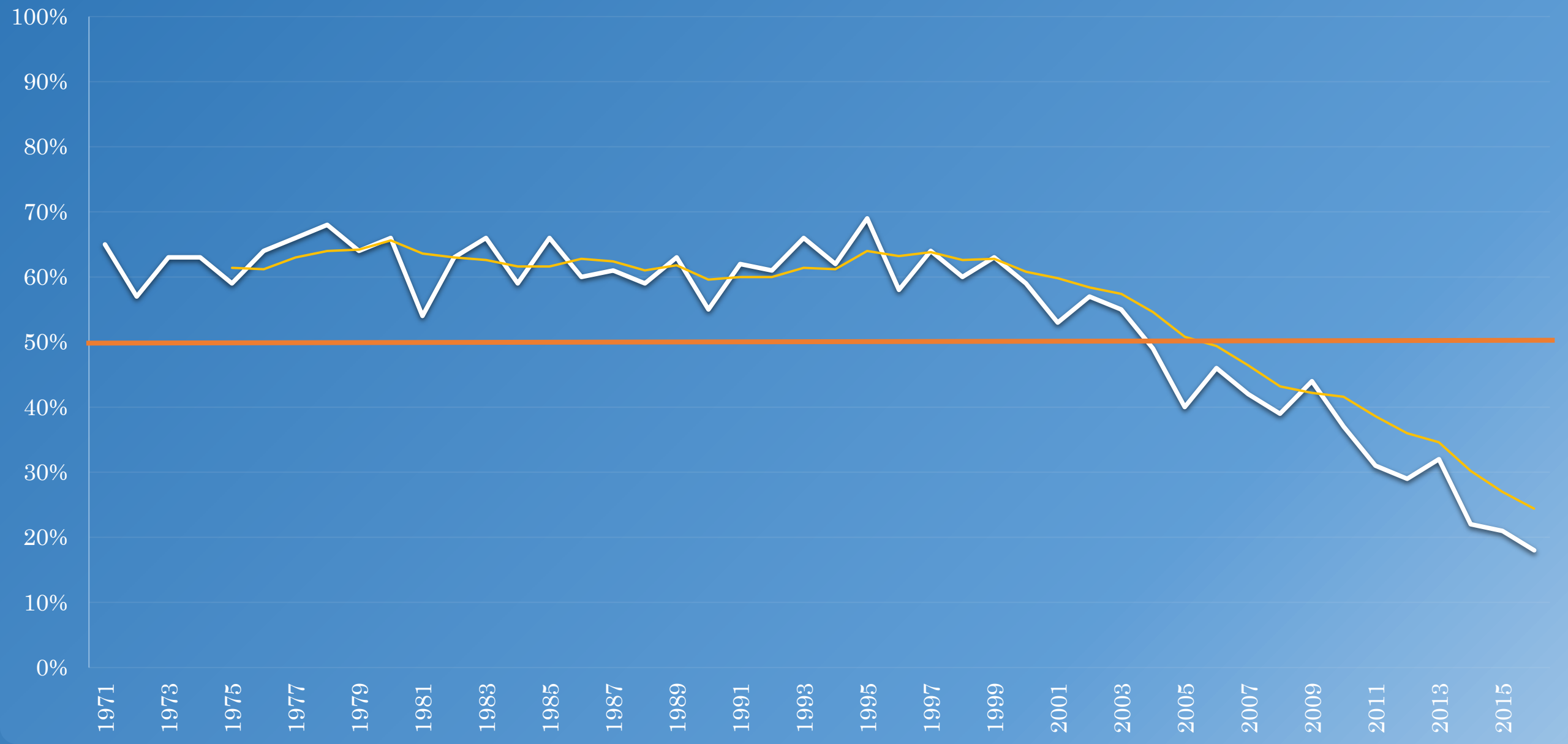


# NCWE Manufacturing Skills Workshop

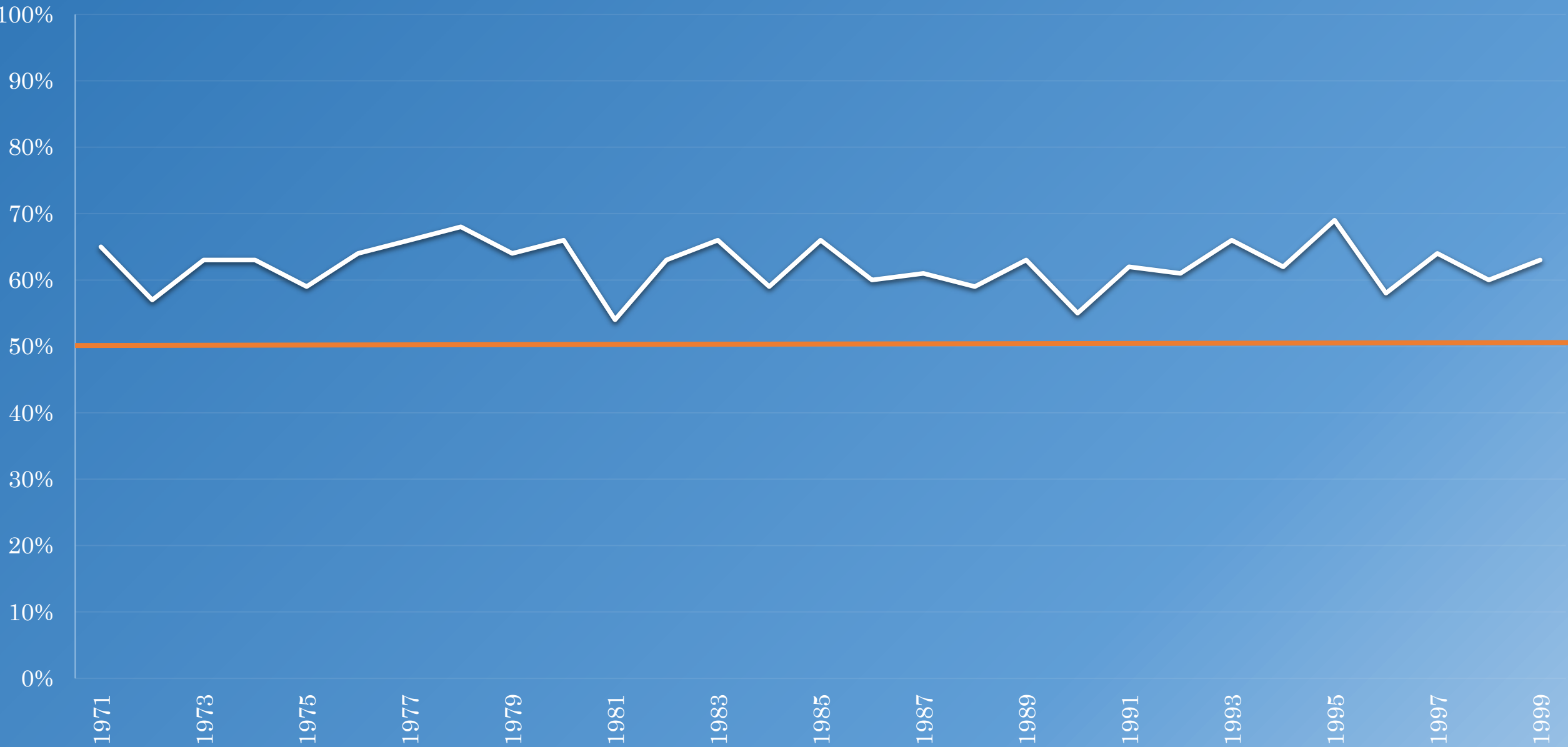
## Quantifying the Changing Skill Level of the Manufacturing Workforce over the Last Four Decades



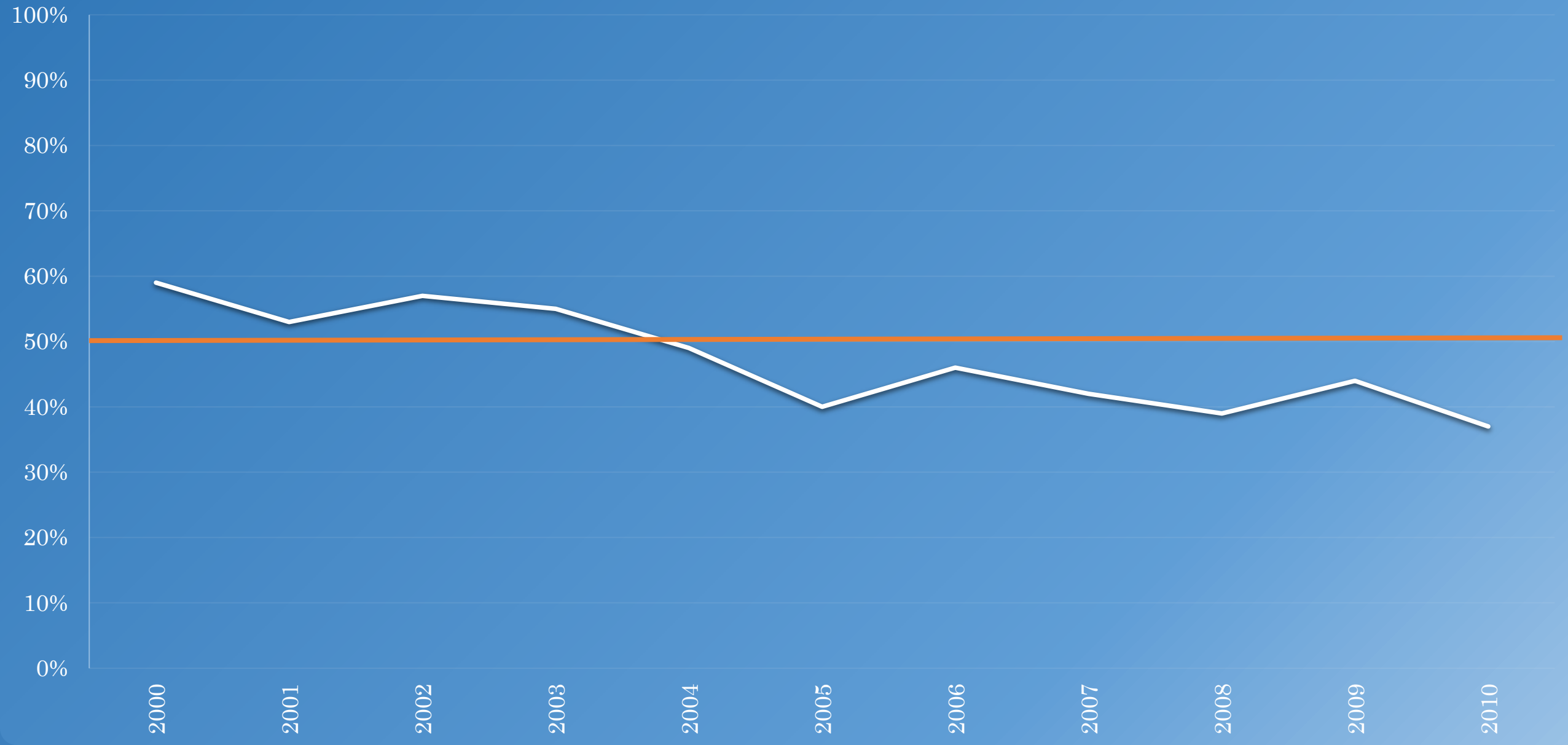
# Average Annual Maintenance Level Mechanical Skills Measured by the Standard Timing Model Assessment Program 1971 - 2016



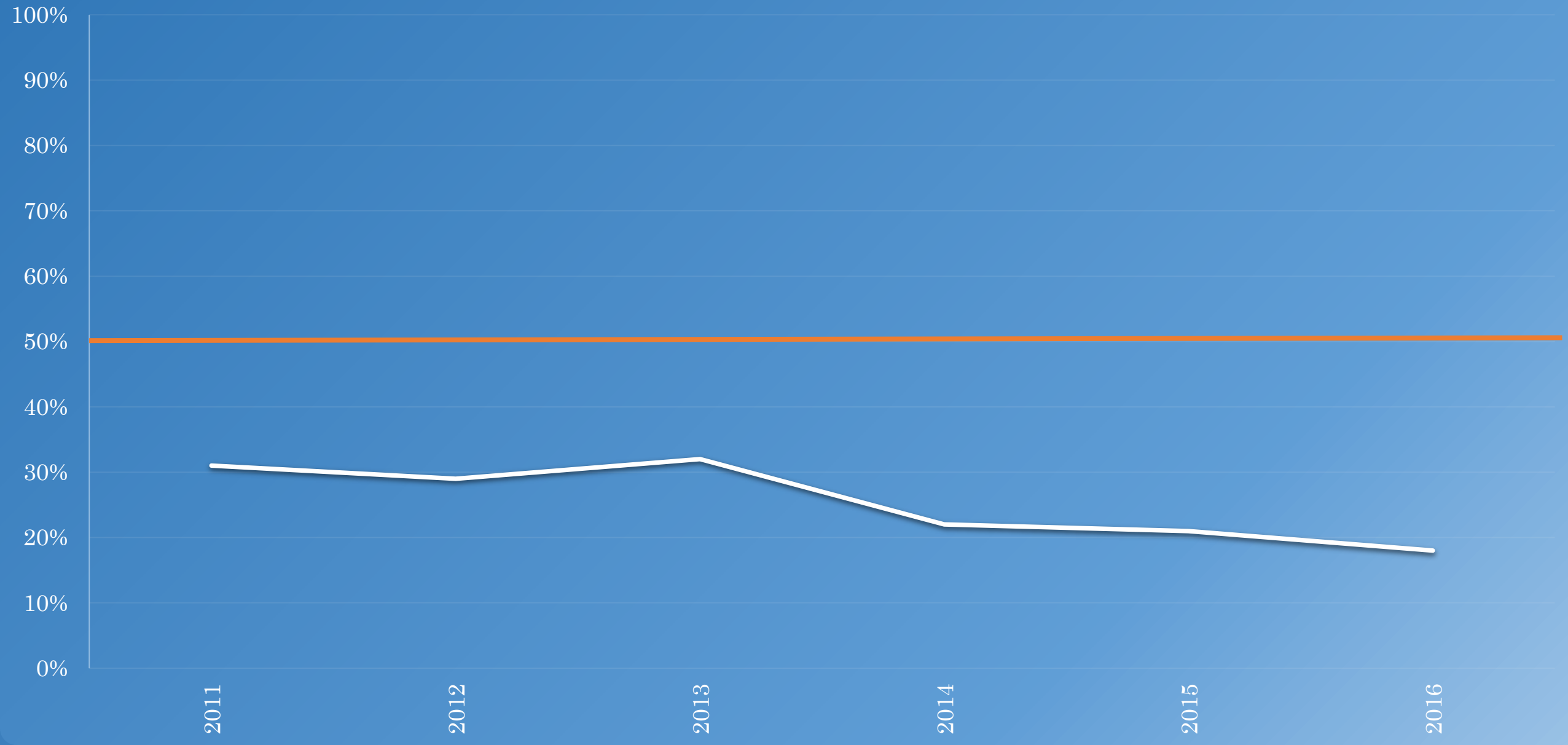
Average Annual Maintenance Level Mechanical Skills Measured by the  
Standard Timing Model Assessment Program  
1971 - 1999



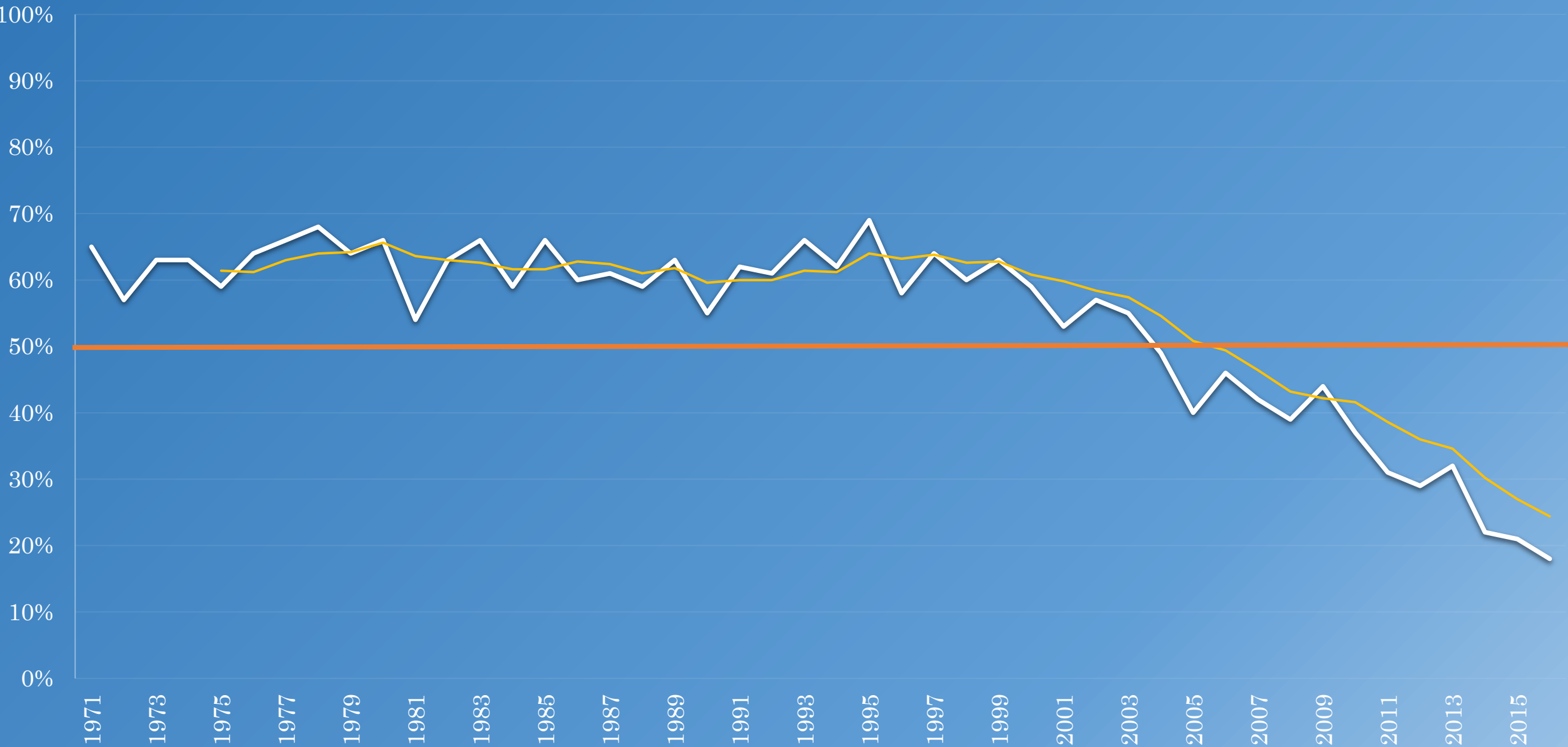
# Average Annual Maintenance Level Mechanical Skills Measured by the Standard Timing Model Assessment Program 2000-2010



# Average Annual Maintenance Level Mechanical Skills Measured by the Standard Timing Model Assessment Program 2011 - 2016



Average Annual Maintenance Level Mechanical Skills Measured by the  
Standard Timing Model Assessment Program  
1971 - 2016



# Scientific Management Techniques, INC.


[Tests](#)
[Reports](#)
[Administration](#)
[Log Off](#)

Thursday, September 29, 2016

 Machines  Total score  -  %

 Date   Best of N  -  %  

Records: 453 Page 1/1 &lt;&lt; First &lt; Previous Next &gt; Last &gt;&gt;

	Date ▼	N	Type	U	City	State	C	C	Machine	Test	N	Total Score Percentile	Best Of N Percent...	Total Score Time	Best Of N Time	
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	STM Maintenance Task Series #1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	09/27/2016	M	Candidate	M	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	M	61%	46%	14.23	9.52	
	09/27/2016	C	Incumbent	S	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	C		33%		10.80	
	09/26/2016	H	Candidate	M	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	H		91%		4.95	
	09/26/2016	R	Candidate	M	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	R	22%	24%	22.56	12.29	
	09/26/2016	Ji	Incumbent	S	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	Ji					
	09/23/2016	R	Incumbent	S	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	R	57%	45%	15.00	9.65	
	09/22/2016	S	Incumbent	S	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	S	12%	21%	26.60	13.00	
	09/20/2016	T	Candidate	Ji	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	T	1%	1%	37.47	24.47	
	09/20/2016	C	Candidate	Ji	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	C		0%		36.29	
	09/20/2016	C	Candidate	Ji	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	C	22%	35%	22.53	10.53	
	09/20/2016	L	Candidate	Ji	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	L	10%	9%	27.99	15.99	
	09/16/2016	S	Candidate	B	Yorkville	IL	V		Standard Timing Model	STM Maintenance Task Series #1	S	40%	61%	18.08	8.05	
	09/15/2016	M	Candidate	A	Yorkville	IL	V		Standard Timing Model	STM Maintenance Task Series #1	M	60%	50%	14.48	9.01	
	09/14/2016	P	Candidate	B	Yorkville	IL	V		Standard Timing Model	STM Maintenance Task Series #1	P	57%	77%	15.07	6.40	
	09/13/2016	S	Candidate	A	Yorkville	IL	V		Standard Timing Model	STM Maintenance Task Series #1	S	18%	11%	23.57	15.63	
	09/09/2016	S	Candidate	B	Yorkville	IL	V		Standard Timing Model	STM Maintenance Task Series #1	S	14%	40%	25.07	10.07	
	09/02/2016	K	Candidate	K	Yorkville	IL	V		Standard Timing Model	STM Maintenance Task Series #1	K	49%	46%	16.33	9.49	
	09/02/2016	R	Candidate	S	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	R	12%	5%	26.40	17.90	
	08/31/2016	M	Incumbent	S	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	M	75%	83%	11.85	5.95	
	08/31/2016	A	Incumbent	S	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	A	60%	58%	14.45	8.30	
	08/31/2016	M	Incumbent	B	Yorkville	IL	V		Standard Timing Model	STM Maintenance Task Series #1	M	49%	55%	16.35	8.49	
	08/30/2016	T	Incumbent	S	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	T	85%	85%	10.35	5.70	
	08/29/2016	G	Candidate	S	Flowery Branch	GA	V		Standard Timing Model	STM Maintenance Task Series #1	G	65%	77%	13.55	6.40	



Date	Type	City	State	Machine	Test	Total Score Percentile	Best Of N Percentile	Total Score Time	Best Of N Time
11-Aug-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	99%	97%	5.35	3.81
23-Aug-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	93%	87%	8.75	5.4
2-Jun-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	87%	77%	9.92	6.4
30-Aug-16	Incumbent	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	85%	85%	10.35	5.7
29-Jul-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	79%	81%	11.38	6.18
23-Aug-16	Incumbent	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	75%	77%	11.9	6.4
31-Aug-16	Incumbent	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	75%	83%	11.85	5.95
16-Jun-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	68%	73%	12.97	6.76
27-Sep-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	61%	46%	14.23	9.52
15-Sep-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	60%	50%	14.48	9.01
14-Sep-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	57%	77%	15.07	6.4
31-Aug-16	Incumbent	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	49%	55%	16.35	8.49
16-Sep-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	40%	61%	18.08	8.05
24-Aug-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	39%	23%	18.45	12.4
26-Aug-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	38%	28%	18.73	11.65
7-Jun-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	29%	26%	20.85	11.96
6-Jun-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	22%	67%	22.42	7.42
26-Sep-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	22%	24%	22.56	12.29
27-Jul-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	18%	22%	23.62	14.17
2-Sep-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	12%	5%	26.4	17.9
22-Sep-16	Incumbent	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	12%	21%	26.6	13
20-Sep-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	10%	9%	27.99	15.99
24-Aug-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	5%	6%	32.56	17.56
10-Aug-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	4%	5%	33.16	18.16
13-Jul-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	3%	1%	33.82	24.27
5-Aug-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	2%	1%	34.66	22.88
22-Jul-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	1%	1%	39.32	24.32
20-Sep-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	1%	1%	37.47	24.47
19-Aug-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	0%	0%	49.5	34.5
25-Aug-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	0%	0%		
16-Aug-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	0%	0%		
3-Aug-16	Candidate	Yorkville	IL	Standard Timing Model	STM Maintenance Task Series #1	0%	4%		19.48
16-Aug-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	0%	49%		9.1
13-Jun-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	0%	2%		22.14
10-Jun-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	0%	0%		
1-Jun-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	0%	0%		
1-Jun-16	Candidate	Flowery Branch	GA	Standard Timing Model	STM Maintenance Task Series #1	0%	0%		



# NCWE Manufacturing Skills Workshop

## Delivering Targeted, Data-Driven Skills Training based on Assessment Outcomes

Administrator: S. BARRY Candidate: TOM BRADY Date: 9-29-16  
Email: TBRADY@ABC.COM

Stroke - Cam Follower

Timing - Cam

Position - Turnbuckle (Rod)

### STANDARD TIMING MODEL

Maintenance Task Series No. 1

Record on this sheet all actual adjustments made for each task as a basis for machine correction.

Study Time: 6.70

Study Method: ☐ Poor ☒ Good ☐ Excellent

Task No.	Time	Adjustment	COMMENTS
TF #1	3.47	SD	
	4.80	TD ✓	
	6.34	PE ✓	DWN
	8.04	SE	
	11.25	PD ✓	OVER
PC #2	1.16	PC ✓	
		3.27	
PE #3 springs	2.55	SPRINGS	
	3.81	SE	
	5.60	SD ✓	
	7.06	PE ✓	TO ADJUST W.R.
		8.74	
TD #4	1.53	PD ✓	
	4.80	SD	
	6.04	TD	
		7.66	

Analysis: 1. 0 2. 5 3. 3 4. 3

Method: 1. 0 2. 4 3. 3 4. 4



**CONFIDENTIAL TEST REPORT**

**SCIENTIFIC MANAGEMENT TECHNIQUES, INC.**

**Tom Brady - Practice**

Standard Timing Model Test Results: STM Maintenance Task Series #1

Task No. 1	Task No. 2	Task No. 3	Task No. 4	Total Score	Total Best 3
Over	3.27	8.24	7.66	N/A	19.17
			Percentile Rank	N/A	4%

**POTENTIAL TRAINABILITY RANGE / MECHANICAL**

PERCENTILE RANGE	4 TASK RANGE POTENTIAL	3 TASK RANGE POTENTIAL
90th percentile and above	Outstanding	Very High
75th percentile and above	Very High	High
50th percentile to 74th	High	Very Good to High
40th percentile to 49th	Very Good to High	Good
25th percentile to 39th	Good	Fair at Best
15th percentile to 24th	Fair at Best	Low
1st percentile to 14th	Low	Poor

**Recommendations / Comments:**

- No. 1 For a candidate to qualify at the **Mechanical "A" level**, we are recommending the candidate place in the **60th** percentile or better for four tasks.
- No. 2 For a candidate to qualify at the **Mechanical "B" level**, the candidate must complete all four tasks and place in the **40th** percentile or higher.
- No. 3 **Comment:** Tom completed three of the four assigned mechanical tasks placing in the **4th** percentile for Total Best 3 Score.  
Tom displayed poor mechanical troubleshooting skills.  
Tom made several inappropriate adjustments. He displayed poor understanding of turnbuckles( position) and cams( timing).Suggest Volumes 5, 7, 8 and 21 from SMT's Mechatronics Curriculum.

# Scientific Management Techniques - Suggested Training Units

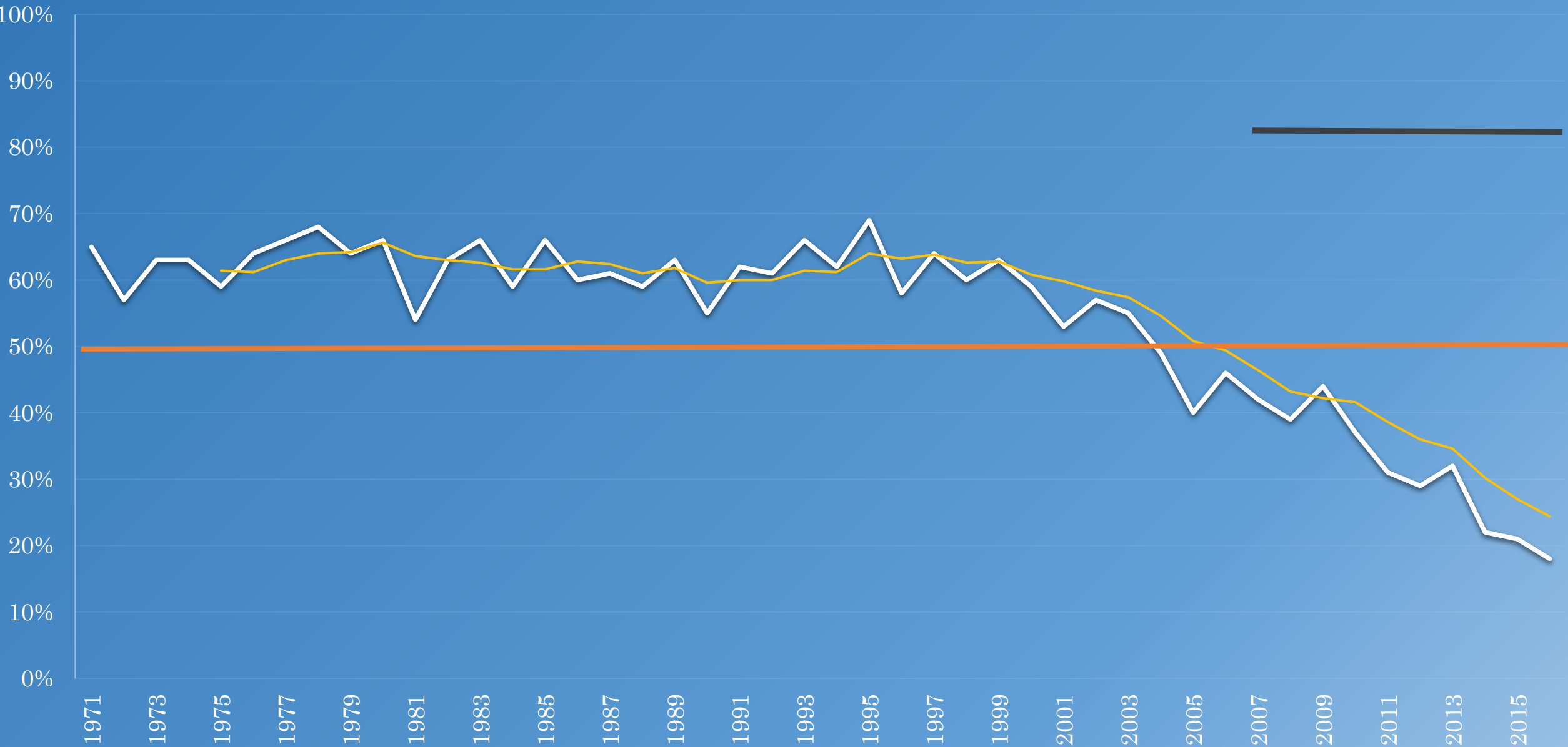
	Assessment Scores				Recommend Training Units				
	Mechanical		ESTD		V7, V8 M	V5, V7, V8 M	V9 (unit 4-8), V17 E	V9, V17 E	V22, V23 PLC
Name	Total Score %	Best Three %	Total Score %	Best Four %	15 HRS	25 HRS	25 HRS	30 HRS	40 HRS
CM	72%	64%						X	X
SL	64%	60%						X	
RD	69%	50%						X	
MG	67%	49%		50%					
MT	58%	48%	38%	43%			X		X
BG		48%		37%	X		X		X
MS	62%	44%	91%	93%					X
DD	50%	37%						X	X
JB	50%	31%						X	
MT	16%	27%			X			X	X
SM	40%	24%	76%	87%					X
LJ	31%	23%		30%			X		
DW		23%		27%	X			X	X
PT	28%	19%			X			X	
JC	28%	17%		30%	X		X		
SL	17%	15%	14%	17%	X		X		
DH	17%	14%		30%	X		X		
JM	24%	14%	76%	77%	X				
RW	7%	11%				X		X	X
JR	18%	9%			X			X	
JP	12%	9%			X			X	X
GS	15%	7%			X			X	
VG		3%				X		X	
MM	2%	1%		7%		X		X	
DS	0%	0%				X		X	
VT	1%	0%				X		X	X
ES				30%		X	X		
MS						X		X	
SB				33%		X	X		X
<b>Total Employees - 29</b>					<b>19 Employees</b>		<b>25 Employees</b>		<b>12 Employees</b>

33%/26%    25%/22%    59%/10%    42%/21%

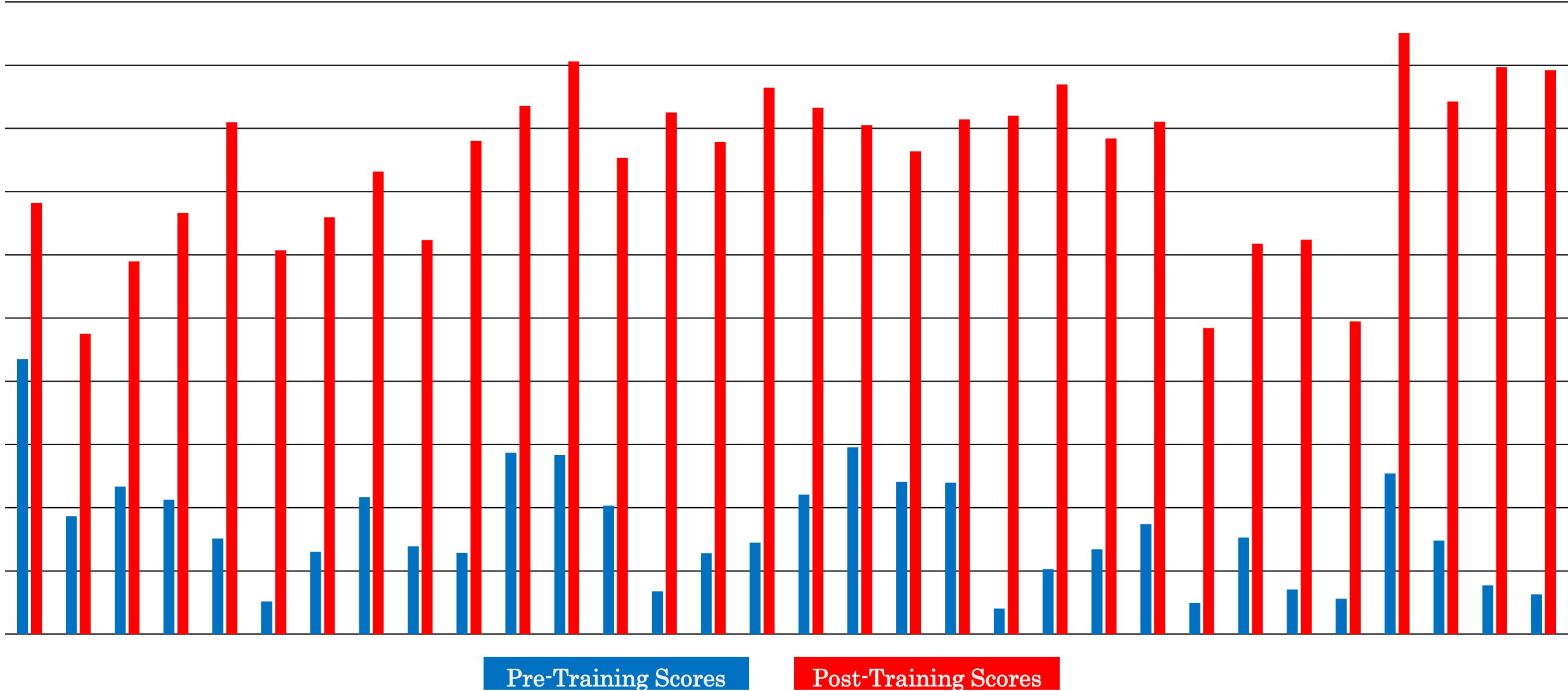
NCWE Manufacturing Skills Workshop

# Measuring the Effectiveness of Mechatronics Training Programs

Average Annual Maintenance Level Mechanical Skills Measured by the  
Standard Timing Model Assessment Program  
1971 - 2016

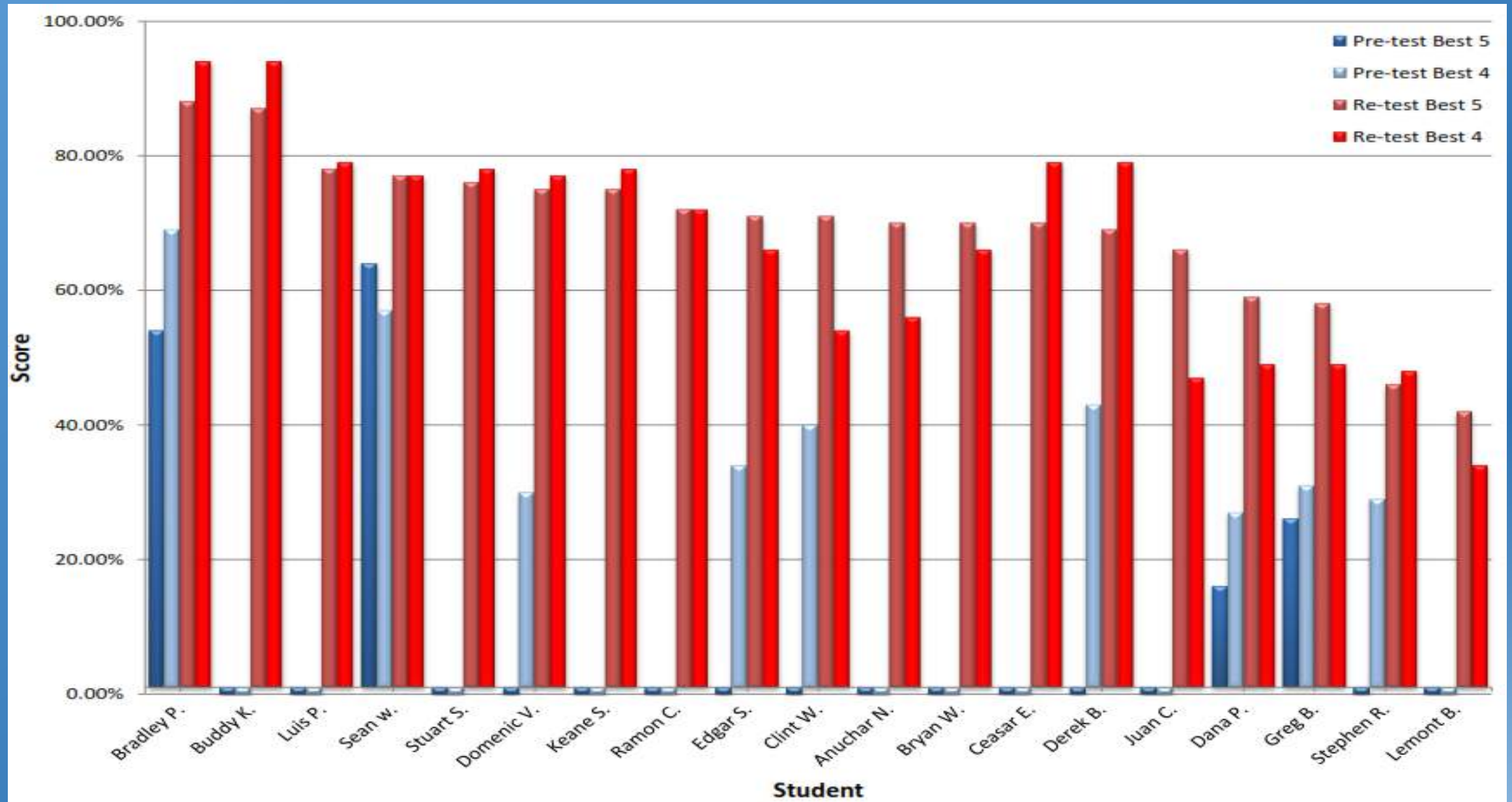


Pre Training & Post Training Mechanical Skill Assessment Scores  
32 Classes, 664 Participants  
Average Pre-Test Score 16% -- Average Post-Test Score 74%

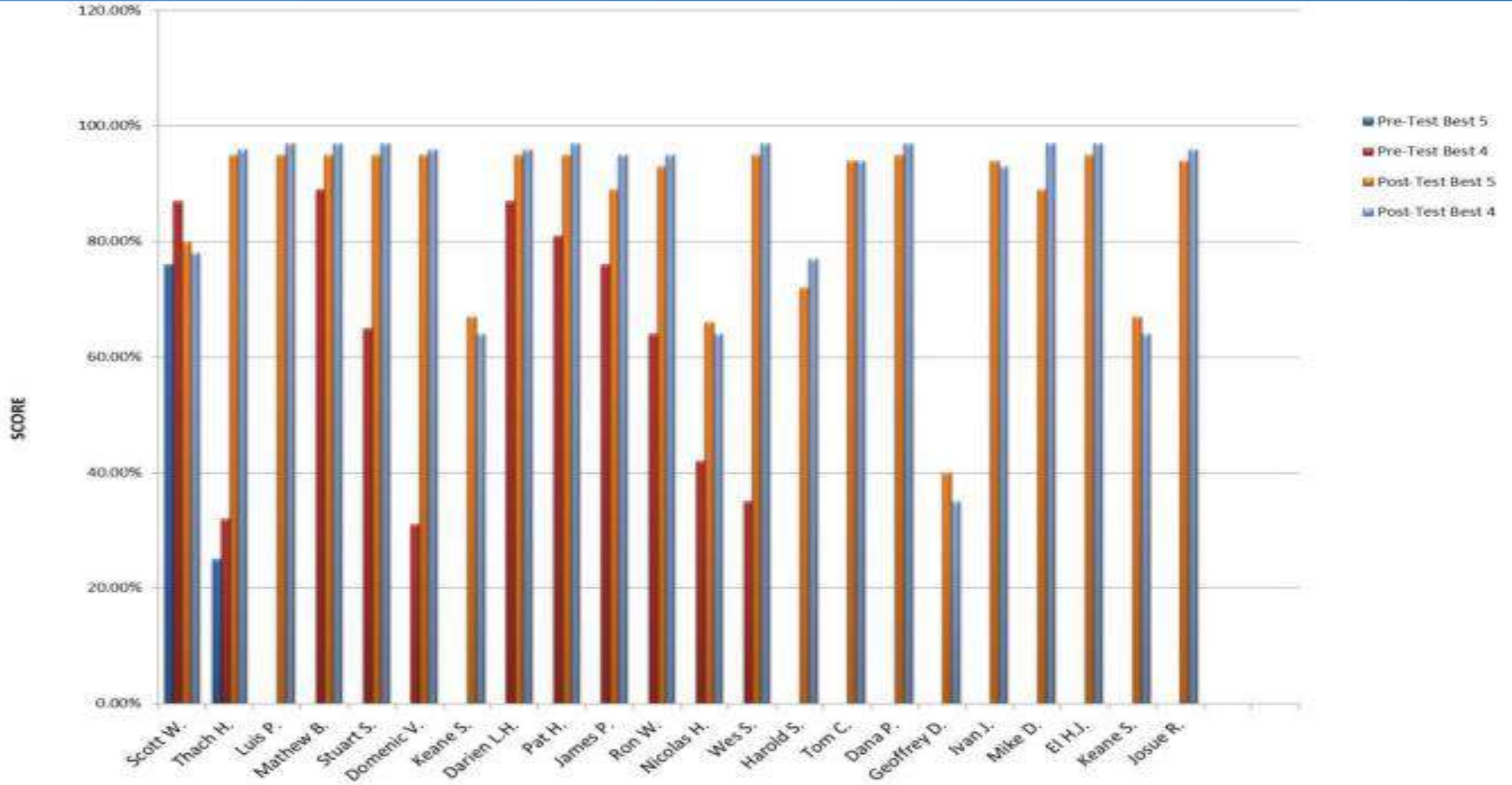






# NYPRO 2013 Electrical Skills Training



# NYPRO 2013 PLC Skills Training



# Measuring the Impact of SMT's Skill Training Program

<b>Output or Production</b> <ul style="list-style-type: none"><li>• By Employee</li><li>• By Line</li><li>• By Shift</li><li>• By Cell</li></ul> Unit: Output or production by unit of measure. (Units/Shift) Direction: Maximize	Total Output by Unit of Capacity  <b>AVG Improvement 27%</b>
	
<b>Maintenance Overtime</b> <ul style="list-style-type: none"><li>• By Employee</li><li>• By Line</li><li>• By Shift</li><li>• By Cell</li></ul> Unit: OT Hours Incurred Direction: Minimize	Total Number of Overtime Hours by Unit  <b>AVG Improvement (decrease in overtime) 59%</b>
	

# Measuring the Impact of SMT's Skill Training Program

## Quality

- By Employee
- By Line
- By Shift
- By Cell

Unit: Percentage

Direction: Maximize

$$Quality = \frac{Good\ Pieces}{Total\ Pieces}$$

**AVG Improvement 21%**



## Downtime

- By Employee
- By Line
- By Shift
- By Cell

Unit: Percentage

Direction: Minimize

$$Downtime = 1 - \frac{Availability}{100} * 365 * 24 * 60$$

**AVG Improvement (decrease in downtime) 44%**



# NCWE Manufacturing Skills Workshop

Awarding Credit for Prior Learning  
based on Validated, Competency-  
Based, Hands-On Assessments



**American Council on  
Education<sup>®</sup>, ACE CREDIT<sup>®</sup>  
Recommends College Credit for  
SMT's Assessment Program and  
Mechatronics Training Curriculum**

# ACE CREDIT<sup>®</sup>

## Prior Learning Assessments

Using SMT's Hands-On  
Validated Assessment Machines  
and Methodology



SMT's Hands-On Competency-  
Based Assessment Program  
has been Validated Thirty-  
Eight Times by Industrial/  
Organizational PhDs

# Validated Competency-Based Assessment Program

- Used in the Hiring Process
- Award credit for Prior Learning
- Internal Promotions
- Identify Skill Gaps-training needs
- Deliver Targeted Training based on skill-gap analysis
- Measure the effectiveness of training delivered

# ACE – Recommended Credit based on Assessment Performance

## **Mechanical Skills Examination, Operator Task Series #1 (MO-01)**

- 60<sup>th</sup> Percentile and above = 3 credits
- 45<sup>th</sup> – 59<sup>th</sup> Percentile = 2 credits
- 30<sup>th</sup> – 44<sup>th</sup> Percentile = 1 credit

## **Mechanical Skills Examination, Maintenance Task Series #1 (MM-01)**

- 60<sup>th</sup> Percentile and above = 3 credits
- 45<sup>th</sup> – 59<sup>th</sup> Percentile = 2 credits
- 30<sup>th</sup> – 44<sup>th</sup> Percentile = 1 credit

## **Electrical Skills Examination, Electrical Task Series #1 (EE-01)**

- 60<sup>th</sup> Percentile and above = 3 credits
- 45<sup>th</sup> – 59<sup>th</sup> Percentile = 2 credits
- 30<sup>th</sup> – 44<sup>th</sup> Percentile = 1 credit

## **Programmable Logic Control Skill Examination, PLC Task Series #1 (PLC-01)**

- 60<sup>th</sup> Percentile and above = 3 credits
- 45<sup>th</sup> – 59<sup>th</sup> Percentile = 2 credits
- 30<sup>th</sup> – 44<sup>th</sup> Percentile = 1 credit



# ACE - Mechatronics Skills Curriculum

## Mechatronics, Basic Mechanical Skills I (SMT M101-I) - 3 Credits

### Volume 1: Shop Mathematics

- Unit 1: Base 10, Decimals, Decimal Equivalents, Percentages
- Unit 2: Fractions
- Unit 3: Algebraic Expressions, Simple Equations, Ratio, Proportion
- Unit 4: Graphs, Charts, Data Handling
- Unit 5: Weights, Measures, Metric Conversion
- Unit 6: Exponents, Square Roots, Right Triangles
- Unit 7: Angles, Plane Figures, Area
- Unit 8: Measurement of Solid Figures, Volume, Intro. To Trig.
- Unit 9: Trigonometric Tables

### Volume 2: Blueprint Reading & Machine Drawing

- Unit 1: Elements of Blueprints and Machine Drawing I

### Volume 3: Measurement

- Unit 1: Linear Measurement

### Volume 4: Hand Tools

- Unit 1: Care and Use of Hand Tools
- Unit 2: Mechanical Fasteners

### Volume 5: Basic Mechanical Components I

- Unit 1: Basic Machines
- Unit 2: Shafts, Couplings, Pulleys, Belts and Chain Drives
- Unit 3: Gears and Gear Ratios
- Unit 4: Advanced Couplings
- Unit 5: Basic Alignment

## Mechatronics, Advanced Mechanical Skills I (SMT M202-I) - 1 Credit

### Volume 10: Pump Basics

- Unit 1: Pumping Basics

### Volume 11: Valve Operation & Types

- Unit 1: Valve Operation and Type

### Volume 12: Introduction to Industrial Maintenance

- Unit 1: Failure Analysis

### Volume 13: Gearbox Maintenance

- Unit 1: Gear Maintenance

### Volume 14: Bearing Maintenance

- Unit 1: Bearing Maintenance

## Mechatronics, Basic Mechanical Skills II (SMT M101-II) - 2 Credits

### Volume 6: Bearings & Lubrication

- Unit 1: Principles of Bearing Operation, Components, Bearings
- Unit 2: Principles of Friction and Lubricants

### Volume 7: Basic Mechanical Components II

- Unit 1: Levers, Cranks, Linkages, and Springs
- Unit 2: Types and Uses of Cams, Timing Adjustments
- Unit 3: Use of Elementary Timing Model in Timing Adjustments

### Volume 8: Machine Adjustment Fundamentals Using the ATM

- Unit 1: Troubleshooting, Problem Solving, and Problem Identification Techniques
- Unit 2: Set Up Machine Standards Using the ATM
- Unit 3: Problem Solving on Multiple Systems Using the ATM

### Volume 8-A: Basic Pneumatics & Hydraulics

- Unit 2A: Air Compression, Properties of Air
- Unit 2B: Basic Pneumatics, Compressors, and Air Pressure Gauges
- Unit 3A: Hydraulic Flow and Control

## Mechatronics, Advanced Mechanical Skills II (SMT M202-II) - 3 Credits

### Volume 15: Advanced Pneumatic Fundamentals

- Unit 1: Control Components, Pneumatic Drives
- Unit 2: Circuit Design

### Volume 16: Advanced Hydraulic Fundamentals

- Unit 1: Control Components, Hydraulic Drives
- Unit 2: Circuit Design

### Volume 17: Advanced Electrical

- Unit 1: Capacitors
- Unit 2: Inductors
- Unit 3: Power in AC Circuits
- Unit 4: Electrical Troubleshooting Using the ESTD
- Unit 5: Troubleshooting, AC Motors
- Unit 6: Troubleshooting, DC Motors

### Volume 21: Advanced Machine Adjustment Fundamentals Using the PMS

- Unit 1: Troubleshooting, Problem Solving, and Problem Identification Techniques
- Unit 2: Set Up Machine Standards Using the Packaging Machine Simulator
- Unit 3: Problem Solving on Multiple Systems Using the Packaging Machine Simulator

## Mechatronics, Basic Industrial Electrical Skills (SMT E101) - 3 Credits

### Volume 1: Shop Mathematics

- Unit 1: Base 10, Decimals, Decimal Equivalents, Percentages
- Unit 2: Fractions
- Unit 3: Algebraic Expressions, Simple Equations, Ratio, Proportion
- Unit 4: Graphs, Charts, Data Handling
- Unit 5: Weights, Measures, Metric Conversion
- Unit 6: Exponents, Square Roots, Right Triangles
- Unit 7: Angles, Plane Figures, Area
- Unit 8: Measurement of Solid Figures, Volume, Intro. To Trig.
- Unit 9: Trigonometric Tables

### Volume 2: Blueprint Reading & Machine Drawing

- Unit 1: Elements of Blueprints and Machine Drawing I

### Volume 9: Electrical Components

- Unit 1: Principles of Electricity, AC & DC Circuits
- Unit 2: Basic Circuit Components, Switches, and Relays
- Unit 3: Digital Multimeter, Basic Measurements
- Unit 4: Input and Output Devices
- Unit 5: Electrical Schematics
- Unit 6: Generators & Transformers
- Unit 7: DC Machines
- Unit 8: Three-Phase AC & DC Motors

## Mechatronics, Advanced Industrial Electrical Skills (SMT E202) - 3 Credits

### Volume 17: Advanced Electrical

- Unit 1: Capacitors
- Unit 2: Inductors
- Unit 3: Power in AC Circuits
- Unit 4: Electrical Troubleshooting Using the ESTD
- Unit 5: Troubleshooting, AC Motors
- Unit 6: Troubleshooting, DC Motors

## Mechatronics, Basic Process Control (SMT PC101) - 3 Credits

### Volume 22: Ladder Logic

- Unit 1: Basic Ladder Logic
- Unit 2: Planning and I/O Symbols
- Unit 3: Numbering Systems, Codes, and Logic
- Unit 4: Symbols and Ladder Logic Basics
- Unit 5: Ladder Logic Format
- Unit 6: Program Functions
- Unit 7: Program Examples
- Unit 8: Glossary of Terms

## Mechatronics, Basic Programmable Logic Control (SMT PLC101) - 3 Credits

### Vol 11A: Basic Process Control

- Unit 1: Introduction to Process Control
- Unit 2: Basic Definitions
- Unit 3: Pressure
- Unit 4: Temperature
- Unit 5: Level
- Unit 6: Flow
- Unit 7: Analytical Instruments and Terminology
- Unit 8: Transmitters
- Unit 9: Controllers, hands-on training aid kit, and an instructor guide.
- Unit 10: Process Control and Control Loops
- Unit 11: Control Schemes

# Southwest Tennessee Community College

## Memphis, TN

“SWCC uses SMT as the centerpiece of industrial skills training for continuing education classes and customized corporate training. We are most proud to say that more than 1500 entry level and incumbent employees have been trained using SMT’s curriculum. Those employees have worked for Unilever, Hershey, Electrolux, KTG, Blues City Brewery and many other manufacturers.”

# Polytech Adult Education Dover, DE

“The growing nationwide skills gap in the manufacturing field is being clearly seen and felt in Delaware. Polytech Adult Education, has been able to help meet this need through the creation of the Delaware Manufacturing Development Center (DMDC). This would not have been possible without the partnership with Scientific Management Techniques (SMT).”



# Tennessee Board of Regents Nashville, TN

“Based on the proven success to date in the locations where our schools have implemented SMT’s programs we are recommending statewide deployment. Our objective is for Tennessee to have the strongest, best trained workforce in the country and SMT’s programs will help us achieve this objective in the area of advanced manufacturing skills.”



# Lakeshore Technical College has deployed SMT's Manufacturing Skill Solutions in their Mobile Training Lab



# Scientific Management Techniques

Validated, “Competency-Based”

**Manufacturing Skill Programs** Deployed by  
Fortune 500 Manufacturers Globally

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