

**Issued: May 31, 2017**

**Program: Industrial Mechanic (Millwright)**

**To:** ITA Training Providers  
Articulation Chair  
System Liaison Person  
School Districts

**Subject:** **Industrial Mechanic (Millwright) – RETRACTION OF OPSN 2017 006**

**OPSN No.:** **OPSN 2017 007**

**Effective Date:** **January 1, 2018**

The content of **OPSN 2017 007** replaces **OPSN 2017 006** issued on March 31, 2017.

This OPSN reflects the revised effective date and a correction to the Work-based Training Hours.

**Summary of Change:** Please be advised that a new Program Outline has been posted to ITA's website reflecting changes to the Millwright program as a result of the Pan-Canadian Harmonization Initiative.

The following changes have been made to the Millwright program in BC:

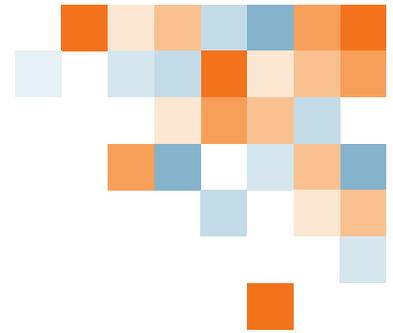
- Revision to the sequence of training topics to align with recommended Harmonized sequencing. See the revised Occupational Analysis Chart in the Program Outline.
- Reduction of Work-based Training Hours – **6,360 hours (from 6,600 hours)**

**Note:** yellow highlighting indicates the changes from original OPSN 2017 006.

**Rationale:** At the request of industry, the Canadian Council of Directors of Apprenticeship's (CCDA) Harmonization Initiative was launched in Fall 2013, and endorsed by the Forum of Labour Market Ministers (FLMM) in 2014. The goal of Harmonization is to *substantively align* apprenticeship systems across Canada by making apprenticeship training requirements more consistent in Red Seal trades.

In consultation with stakeholders, the CCDA identified four Harmonization priorities: trade name, total training hours (in-school plus on-the-job), number of training levels, and the sequencing of the training content.

Millwright is one of eight trades identified for the second phase of Harmonization. After a series of consultations and pan-Canadian webinars, the finalized priorities for the Harmonized Millwright program were as follows:



1. Use of the Red Seal **trade name** – Industrial Mechanic (Millwright)
  - BC – no change.
2. Consistent **total training hours** (in-school plus on-the-job) – 7,200 hours total
  - BC - Reduction of 240 hours. Technical training remains the same at 840 hours (28 weeks), but Work-based Training is reduced from 6,600 hours to 6,360 hours.
3. Same number of **training levels** – 4-level program
  - BC – no change.
4. Consistent **sequencing** of training content
  - BC – Significant changes required to align to the Harmonized sequencing.

**Details: Program Outline Update**

A Millwright program review was conducted in February/March 2017 to align BC's Millwright program to the Harmonized sequencing. This review resulted in significant changes to the current sequence of technical training.

ITA will work with the BCATTA Harmonization Implementation group to identify transition strategies for training providers. ITA is also working on a communication plan to inform apprentices and employer sponsors of the changes to the program.

**Attachments: Millwright Program Outline Review Details**

This attachment provides details of the revisions made to the Millwright Program Outline during the review process.

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**cc:** All Staff

**Key**

**Blue Text = Content moved to new level**

**Green Text = New content added**

### Summary - Competency Migration

**Overall:** The Occupational Analysis Chart (OAC) for Millwright has been aligned to the Red Seal Occupational Standard (RSOS). Therefore, all of the competencies have been renamed and restructured. This chart shows the finalized competency distribution for the Harmonized Millwright program. It summarizes the major changes to the competencies, specifically the level they are taught in and any new competencies that were added.

MILLWRIGHT HARMONIZED LEVEL 1		MILLWRIGHT HARMONIZED LEVEL 2		MILLWRIGHT HARMONIZED LEVEL 3		MILLWRIGHT HARMONIZED LEVEL 4	
<b>Line A</b>	<b>PERFORM SAFETY-RELATED FUNCTIONS</b>	<b>Line A</b>	<b>PERFORM SAFETY-RELATED FUNCTIONS</b>	<b>Line A</b>	<b>PERFORM SAFETY-RELATED FUNCTIONS</b>	<b>Line A</b>	<b>PERFORM SAFETY-RELATED FUNCTIONS</b>
	A1: Use codes, regulations and standards						
	A2: Use personal protective equipment (PPE) and safety equipment						
	A3: Maintain safe worksite						
	A4: Perform lock-out, tag-out and zero-energy procedures						
<b>Line B</b>	<b>USE TOOLS AND EQUIPMENT</b>	<b>Line B</b>	<b>USE TOOLS AND EQUIPMENT</b>	<b>Line B</b>	<b>USE TOOLS AND EQUIPMENT</b>	<b>Line B</b>	<b>USE TOOLS AND EQUIPMENT</b>
	B1: Use hand and portable power tools						
	B2: Use shop machines						
	B3: Use access equipment						
<b>Line C</b>	<b>PERFORM ROUTINE TRADE ACTIVITIES</b>	<b>Line C</b>	<b>PERFORM ROUTINE TRADE ACTIVITIES</b>	<b>Line C</b>	<b>PERFORM ROUTINE TRADE ACTIVITIES</b>	<b>Line C</b>	<b>PERFORM ROUTINE TRADE ACTIVITIES</b>
	C1: Use mathematics and science		C1: Use mathematics and science	L3 ← L4	C1: Use <span style="color: blue;">mathematics and science</span>		C1: Use mathematics and science
							C2: Plan work
L1 ← L2	C3: <span style="color: blue;">Lubricate systems and components</span>		C3: Lubricate systems and components				
L1 ← L2	C4: <span style="color: blue;">Perform leveling of components and systems</span>	Enhanced	C4: <span style="color: green;">Perform leveling of components and systems</span>	Enhanced	C4: <span style="color: green;">Perform leveling of components and systems</span>	Enhanced	C4: <span style="color: green;">Perform leveling of components and systems</span>

### Millwright Program Outline Review Details

MILLWRIGHT HARMONIZED LEVEL 1		MILLWRIGHT HARMONIZED LEVEL 2		MILLWRIGHT HARMONIZED LEVEL 3		MILLWRIGHT HARMONIZED LEVEL 4	
	C5: Use fastening and retaining devices						
	C6: Use manufacturer, supplier and reference documentation						
		L1 → L2	C7: Perform material identification				
		L1 → L2	C8: Perform heat treatment of metal				
	C9: Use mechanical drawings and specifications	Enhanced content	C9: Use mechanical drawings and specifications	L2 → L3 & L3 ← L4	C9: Use mechanical drawings and specifications		C9: Use mechanical drawings and specifications
<b>Line D</b>	<b>DIAGNOSE AND REPAIR ENGINE SYSTEMS</b>	<b>Line D</b>	<b>DIAGNOSE AND REPAIR ENGINE SYSTEMS</b>	<b>Line D</b>	<b>DIAGNOSE AND REPAIR ENGINE SYSTEMS</b>	<b>Line D</b>	<b>DIAGNOSE AND REPAIR ENGINE SYSTEMS</b>
	D1: Use communication techniques						D1: Use communication techniques
							D2: Use mentoring techniques
<b>Line E</b>	<b>PERFORM MEASURING AND LAYOUT OF WORK PIECE</b>	<b>Line E</b>	<b>PERFORM MEASURING AND LAYOUT OF WORK PIECE</b>	<b>Line E</b>	<b>PERFORM MEASURING AND LAYOUT OF WORK PIECE</b>	<b>Line E</b>	<b>PERFORM MEASURING AND LAYOUT OF WORK PIECE</b>
	E1: Prepare work area, tools and equipment						
	E2: Layout and fabricate work piece						
<b>Line F</b>	<b>PERFORM CUTTING AND WELDING OPERATIONS</b>	<b>Line F</b>	<b>PERFORM CUTTING AND WELDING OPERATIONS</b>	<b>Line F</b>	<b>PERFORM CUTTING AND WELDING OPERATIONS</b>	<b>Line F</b>	<b>PERFORM CUTTING AND WELDING OPERATIONS</b>
	F1: Cut material with oxy-fuel and plasma arc cutting equipment						
			F2: Weld material using arc welding equipment (SMAW)				
			F3: Weld material using gas metal arc welding equipment (GMAW)				
			F4: Weld material with gas tungsten arc welding equipment (GTAW)				



Millwright Program Outline Review Details

MILLWRIGHT HARMONIZED LEVEL 1		MILLWRIGHT HARMONIZED LEVEL 2		MILLWRIGHT HARMONIZED LEVEL 3		MILLWRIGHT HARMONIZED LEVEL 4	
Line G	PERFORM RIGGING, HOISTING/LIFTING AND MOVING	Line G	PERFORM RIGGING, HOISTING/LIFTING AND MOVING	Line G	PERFORM RIGGING, HOISTING/LIFTING AND MOVING	Line G	PERFORM RIGGING, HOISTING/LIFTING AND MOVING
L1 ← L2	G1: Select and use sling and rigging attachments						
L1 ← L2	G2: Select and use hoisting and lifting equipment						
L1 ← L2	G3: Create a rigging plan						
Line H	SERVICE SHAFTS, BEARINGS AND SEALS	Line H	SERVICE SHAFTS, BEARINGS AND SEALS	Line H	SERVICE SHAFTS, BEARINGS AND SEALS	Line H	SERVICE SHAFTS, BEARINGS AND SEALS
			H1: Select, install and maintain shafts				
			H2: Select, install and maintain bearings				
			H3: Select, install and maintain seals				
Line I	SERVICE COUPLINGS, CLUTCHES AND BRAKES	Line I	SERVICE COUPLINGS, CLUTCHES AND BRAKES	Line I	SERVICE COUPLINGS, CLUTCHES AND BRAKES	Line I	SERVICE COUPLINGS, CLUTCHES AND BRAKES
		L2 ← L3	I1: Select, install and maintain couplings				
		L2 ← L3	I2: Select, install and maintain clutches and brakes				
Line J	SERVICE CHAIN AND BELT DRIVE SYSTEMS	Line J	SERVICE CHAIN AND BELT DRIVE SYSTEMS	Line J	SERVICE CHAIN AND BELT DRIVE SYSTEMS	Line J	SERVICE CHAIN AND BELT DRIVE SYSTEMS
		L2 ← L3	J1: Select, install and maintain chain drive systems				
		L2 ← L3	J2: Select, install and maintain belt drive systems				
Line K	SERVICE GEAR SYSTEMS	Line K	SERVICE GEAR SYSTEMS	Line K	SERVICE GEAR SYSTEMS	Line K	SERVICE GEAR SYSTEMS
		L2 ← L3	K1: Select and install gear systems				



### Millwright Program Outline Review Details

MILLWRIGHT HARMONIZED LEVEL 1		MILLWRIGHT HARMONIZED LEVEL 2		MILLWRIGHT HARMONIZED LEVEL 3		MILLWRIGHT HARMONIZED LEVEL 4	
		L2 ← L3	K2: Diagnose, maintain and repair gear systems				
Line L	PERFORM SHAFT ALIGNMENT PROCEDURES	Line L	PERFORM SHAFT ALIGNMENT PROCEDURES	Line L	PERFORM SHAFT ALIGNMENT PROCEDURES	Line L	PERFORM SHAFT ALIGNMENT PROCEDURES
		L2 ← L3	L1: Perform rough alignment				
		L2 ← L3	L2: Perform dial alignment procedures	Enhanced	L2: Perform dial alignment procedures		
				Enhanced	L3: Perform laser alignment		
Line M	SERVICE FANS AND BLOWERS	Line M	SERVICE FANS AND BLOWERS	Line M	SERVICE FANS AND BLOWERS	Line M	SERVICE FANS AND BLOWERS
					M1: Select, install and maintain fans		
					M2: Select, install and maintain blowers		
Line N	SERVICE PUMPS	Line N	SERVICE PUMPS	Line N	SERVICE PUMPS	Line N	SERVICE PUMPS
					N1: Identify and select positive displacement pumps N2: Install, maintain and repair positive displacement pumps N3: Identify and select non-positive displacement pumps N4: Install, maintain and repair non-positive displacement pumps		
Line O	SERVICE COMPRESSORS	Line O	SERVICE COMPRESSORS	Line O	SERVICE COMPRESSORS	Line O	SERVICE COMPRESSORS
				L3 ← L4	O1: Identify and select compressors		
				L3 ← L4	O2: Install, maintain and repair compressors		
Line P	SERVICE PIPING, TANKS AND CONTAINERS	Line P	SERVICE PIPING, TANKS AND CONTAINERS	Line P	SERVICE PIPING, TANKS AND CONTAINERS	Line P	SERVICE PIPING, TANKS AND CONTAINERS
					P1: Select, install and maintain		

### Millwright Program Outline Review Details

MILLWRIGHT HARMONIZED LEVEL 1		MILLWRIGHT HARMONIZED LEVEL 2		MILLWRIGHT HARMONIZED LEVEL 3		MILLWRIGHT HARMONIZED LEVEL 4	
				New	process tanks and containers P2: Select, install and maintain piping		
Line Q	SERVICE HYDRAULIC SYSTEMS	Line Q	SERVICE HYDRAULIC SYSTEMS	Line Q	SERVICE HYDRAULIC SYSTEMS	Line Q	SERVICE HYDRAULIC SYSTEMS
				L2 → L3 L2 → L3	Q1: Identify hydraulic components Q2: Assemble hydraulic circuits Q3: Maintain and repair hydraulic systems		
Line R	SERVICE PNEUMATIC AND VACUUM SYSTEMS	Line R	SERVICE PNEUMATIC AND VACUUM SYSTEMS	Line R	SERVICE PNEUMATIC AND VACUUM SYSTEMS	Line R	SERVICE PNEUMATIC AND VACUUM SYSTEMS
				L3 ← L4 L3 ← L4 L3 ← L4	R1: Identify pneumatic and vacuum components R2: Assemble pneumatic and vacuum circuits R3: Maintain and repair pneumatic and vacuum systems		
Line S	SERVICE CONVEYING SYSTEMS	Line S	SERVICE CONVEYING SYSTEMS	Line S	SERVICE CONVEYING SYSTEMS	Line S	SERVICE CONVEYING SYSTEMS
						L3 → L4 L3 → L4 L3 → L4	S1: Identify conveying system components S2: Assemble conveying systems S3: Maintain and repair conveying systems
Line T	SERVICE PRIME MOVERS	Line T	SERVICE PRIME MOVERS	Line T	SERVICE PRIME MOVERS	Line T	SERVICE PRIME MOVERS
							T1: Service electric motors T2: Service internal combustion engines T3: Service turbines
Line U	PERFORM PREVENTATIVE AND PREDICTIVE MAINTENANCE	Line U	PERFORM PREVENTATIVE AND PREDICTIVE MAINTENANCE	Line U	PERFORM PREVENTATIVE AND PREDICTIVE MAINTENANCE	Line U	PERFORM PREVENTATIVE AND PREDICTIVE MAINTENANCE
							U1: Perform preventative and predictive maintenance activities U2: Perform vibration analysis procedures



Millwright Program Outline Review Details

MILLWRIGHT HARMONIZED LEVEL 1		MILLWRIGHT HARMONIZED LEVEL 2		MILLWRIGHT HARMONIZED LEVEL 3		MILLWRIGHT HARMONIZED LEVEL 4	
							U3: Perform balancing procedures U4: Perform non-destructive evaluation (NDE) procedures
Line V	PERFORM COMMISSIONING AND DECOMMISSIONING OF EQUIPMENT	Line V	PERFORM COMMISSIONING AND DECOMMISSIONING OF EQUIPMENT	Line V	PERFORM COMMISSIONING AND DECOMMISSIONING OF EQUIPMENT	Line V	<b>PERFORM COMMISSIONING AND DECOMMISSIONING OF EQUIPMENT</b>
						New	V1: Commission systems and components V2: Decommission systems and components
Line W	SERVICE ROBOTICS AND AUTOMATED EQUIPMENT	Line W	SERVICE ROBOTICS AND AUTOMATED EQUIPMENT	Line W	SERVICE ROBOTICS AND AUTOMATED EQUIPMENT	Line W	<b>SERVICE ROBOTICS AND AUTOMATED EQUIPMENT</b>
						New	W1: Service robotics and automated equipment

### Key

- Blue Text** = Content moved between levels
- Green Text** = New content added
- Red Text** = Content removed from Outline

### Details of Changes

**Overall: All of the competencies have been renamed and restructured.** The following provides a side by side comparison with notes of major changes.

	Current Level 1		Harmonized Level 1	Description of Changes
<b>Line A</b>	<b>WORK PRACTICES</b>	<b>Line A</b>	<b>PERFORM SAFETY RELATED FUNCTIONS</b>	
A1	Explain Federal/Provincial occupational Health & safety regulations	A1	Use codes, regulations and standards	Restructured and renamed
A2	Explain & apply environmental regulations	A2	Use personal protective equipment (PPE) and safety equipment	Restructured and renamed
A3	Use personal protective equipment	A3	Maintain safe worksite	Restructured and renamed
A4	Follow safe working practices	A4	Perform lock-out, tag-out and zero-energy procedures	Restructured and renamed
A5	Use communication and teamwork skills			Moved to Line D
A6	Interpret plans and sketches			Moved to Line C
A7	Use reference resources			Moved to Line C
<b>Line B</b>	<b>TRADE SCIENCE</b>			
B1	Use trade math			Moved to Line C
B3	Describe materials			Moved to Line C in Level 2
B6	Use fasteners			Moved to Line C
		<b>Line B</b>	<b>USE TOOLS AND EQUIPMENT</b>	
		B1	Use hand and portable power tools	Moved from Line C
		B2	Use shop machines	Moved from Line C
		B3	Use access equipment	Moved from Line C
<b>Line C</b>	<b>USE TOOLS</b>			

### Millwright Program Outline Review Details

	Current Level 1		Harmonized Level 1	Description of Changes
C1	Use hand tools			Moved to Line B
C2	Use measuring and layout tools and instruments			Moved to Line E
C3	Use portable power tools			Moved to Line B
C4	Use fixed shop machines and equipment			Moved to Line B
C5	Use mobile access equipment			Moved to Line B
		<b>Line C</b>	<b>PERFORM ROUTINE TRADE ACTIVITIES</b>	
		C1	Use mathematics and science	Moved from Line B
		C3	Lubricate systems and components	Moved from Line D in Level 2 (content split between levels 1 & 2)
		C4	Perform leveling of components and systems	Moved from Line E in Level 2
		C5	Use fastening and retaining devices	Moved from Line B
		C6	Use manufacturer, supplier and reference documentation	Moved from Line A
		C9	Use mechanical drawings and specifications	Moved from Line A
		<b>Line D</b>	<b>USE COMMUNICATION AND MENTORING TECHNIQUES</b>	
		D1	Use communication techniques	Moved from Line A
		<b>Line E</b>	<b>PERFORM MEASURING AND LAYOUT OF WORK PIECE</b>	
		E1	Prepare work area, tools and equipment	Moved from Line C
		E2	Layout and fabricate work piece	Moved from Line C
<b>Line F</b>	<b>CUT, FIT AND FABRICATE</b>	<b>Line F</b>	<b>PERFORM CUTTING AND WELDING OPERATIONS</b>	
F1	Describe welding practices	F1	Cut material with oxy-fuel and plasma arc cutting equipment	Restructured and renamed
F2	Use and maintain oxy-fuel cutting, welding and heating equipment			Restructured and renamed
F3	Use and maintain shielded metal arc welding (SMAW) equipment			Moved to Line F in Level 2
F4	Use and maintain plasma arc cutting equipment			Restructured and renamed



### Millwright Program Outline Review Details

	Current Level 1		Harmonized Level 1	Description of Changes
		<b>Line G</b>	<b>PERFORM RIGGING, HOISTING/LIFTING AND MOVING</b>	
		G1	Select and use sling and rigging attachments	Moved from Line E in Level 2
		G2	Select and use hoisting and lifting equipment	Moved from Line E in Level 2
		G3	Create a rigging plan	Moved from Line E in Level 2

### Millwright Program Outline Review Details

	Current Level 2		Harmonized Level 2	Description of Changes
<b>Line B</b>	<b>TRADE SCIENCE</b>			
B2	Use trade science			Moved to Line C
B4	Explain simple machines			Moved to Line C
B5	Use fits and tolerances			Moved to Line C
		<b>Line C</b>	<b>PERFORM ROUTINE TRADE ACTIVITIES</b>	
		C1	Use mathematics and science	Moved from Line B
		C3	Lubricate systems and components	Moved from Line D (content split between levels 1 & 2)
		C4	Perform leveling of components and systems	Enhanced content (from Line E in level 2)
		C7	Perform material identification	Moved from Line B in Level 1
		C8	Perform heat treatment of metal	Moved from Line B in Level 1
		C9	Use mechanical drawings and specifications	Enhanced content (from Line A in Level 1)
<b>Line D</b>	<b>LUBRICANTS, SEALS AND BEARINGS</b>			
D1	Select lubricants			Moved to Line C (content split between levels 1 & 2)
D2	Maintain lubricating systems			Moved to Line C (content split between levels 1 & 2)
D3	Select seals, gaskets and packing			Moved to Line H
D4	Install and maintain seals			Moved to Line H
D5	Select bearings			Moved to Line H
D6	Install and maintain bearings			Moved to Line H
<b>Line E</b>	<b>INSTALL EQUIPMENT</b>			
E1	Use safe rigging practices			Moved to Line G in Level 1
E2	Describe layout and securing of equipment			Moved to Line C in Level 1
E3	Describe equipment foundations			Moved to Line C in Level 1
E4	Explain leveling and alignment procedures			Moved to Line C in Level 1

### Millwright Program Outline Review Details

	Current Level 2		Harmonized Level 2	Description of Changes
<b>Line F</b>	<b>CUT, FIT AND FABRICATE</b>	<b>Line F</b>	<b>PERFORM CUTTING AND WELDING OPERATIONS</b>	
F3	Use and maintain shielded metal arc welding (SMAW) equipment	F2	Weld material using arc welding equipment (SMAW)	Restructured and renamed; <a href="#">some content from Line F in Level 1</a>
F5	Use and maintain gas metal arc welding (GMAW) and gas tungsten arc welding (GTAW) equipment	F3	Weld material with gas metal arc welding equipment (GMAW)	Restructured and renamed
		F4	Weld material with gas tungsten arc welding equipment (GTAW)	Restructured and renamed
<b>Line H</b>	<b>SERVICE POWER TRANSMISSIONS</b>	<b>Line H</b>	<b>SERVICE SHAFTS, BEARINGS AND SEALS</b>	
H7	Service drive shafts	H1	Select, install and maintain shafts	Restructured and renamed
		H2	Select, install and maintain bearings	Moved from Line D
		H3	Select, install and maintain seals	Moved from Line D
<b>Line I</b>	<b>SERVICE FLUID POWER</b>			
I1	<a href="#">Explain hydraulic theory</a>			<a href="#">Moved to Line C in Level 3</a>
I2	<a href="#">Interpret hydraulic schematics</a>			<a href="#">Moved to Line C in Level 3</a>
I3	<a href="#">Describe hydraulic components</a>			<a href="#">Moved to Line Q in Level 3</a>
I4	<a href="#">Identify hydraulic pumps</a>			<a href="#">Moved to Line Q in Level 3</a>
		<b>Line I</b>	<b>SERVICE COUPLINGS, CLUTCHES AND BRAKES</b>	
		I1	<a href="#">Select, install and maintain couplings</a>	<a href="#">Moved from Line H in Level 3</a>
		I2	<a href="#">Select, install and maintain clutches and brakes</a>	<a href="#">Moved from Line H in Level 3</a>
		<b>Line J</b>	<b>SERVICE CHAIN AND BELT DRIVE SYSTEMS</b>	
		J1	<a href="#">Select, install and maintain chain drive systems</a>	<a href="#">Moved from Line H in Level 3</a>
		J2	<a href="#">Select, install and maintain belt drive systems</a>	<a href="#">Moved from Line H in Level 3</a>
		<b>Line K</b>	<b>SERVICE GEAR SYSTEMS</b>	
		K1	<a href="#">Select and install gear systems</a>	<a href="#">Moved from Line H in Level 3</a>
		K2	<a href="#">Diagnose, maintain and repair gear systems</a>	<a href="#">Moved from Line H in Level 3</a>



### Millwright Program Outline Review Details

	Current Level 2		Harmonized Level 2	Description of Changes
		Line L	PERFORM SHAFT ALIGNMENT PROCEDURES	
		L1	Perform rough alignment	Moved from Line E in Level 3
		L2	Perform dial alignment	Moved from Line E in Level 3

## Millwright Program Outline Review Details

	Current Level 3		Harmonized Level 3	Description of Changes
		<b>Line C</b>	<b>PERFORM ROUTINE TRADE ACTIVITIES</b>	
		C1	Use mathematics and science	Moved from Line J in Level 4
		C4	Perform leveling of components and systems	Enhanced content
		C9	Use mechanical drawings and specifications	Moved from Line I in Levels 2 & 4
<b>Line E</b>	<b>INSTALL EQUIPMENT</b>			
E5	Level, align and secure equipment			Moved to Line L in Levels 2 & 3
<b>Line H</b>	<b>SERVICE POWER TRANSMISSIONS</b>			
H1	Describe power transmission theory			Moved to Line C in Level 2
H2	Service couplings			Moved to Line I in Level 2
H3	Service gear drives			Moved to Line K in Level 2
H4	Service belt drives			Moved to Line J in Level 2
H5	Service clutches and brakes			Moved to Line I in Level 2
H6	Service chain drives			Moved to Line J in Level 2
<b>Line I</b>	<b>SERVICE FLUID POWER</b>			
I5	Describe, assemble and maintain hydraulic circuits			Moved to Line Q
<b>Line K</b>	<b>SERVICE PUMPS</b>			
K1	Explain pump theory			Moved to Line N
K2	Identify types of pumps			Moved to Line N
K3	Install, maintain and troubleshoot positive displacement pumps			Moved to Line N
K4	Install, maintain and troubleshoot non-positive displacement pumps			Moved to Line N

### Millwright Program Outline Review Details

	Current Level 3		Harmonized Level 3	Description of Changes
<b>Line L</b>	<b>SERVICE MATERIAL HANDLING SYSTEMS</b>			
L1	Explain material handling theory			Moved to Line S in Level 4
L2	Maintain fans and blowers			Moved to Line M
L3	Identify types of conveyors			Moved to Line S in Level 4
L4	Describe methods of conveyor loading and unloading, and types of process tanks and storage containers			Moved to Line P
L5	Maintain conveyor systems			Moved to Line S in Level 4
		<b>Line L</b>	<b>PERFORM SHAFT ALIGNMENT PROCEDURES</b>	
		L2	Perform dial alignment procedures	Moved from Line E (split between levels 2 & 3) and enhanced content
		L3	Perform laser alignment	Moved from Line E and enhanced content
		<b>Line M</b>	<b>SERVICE FANS AND BLOWERS</b>	
		M1	Select, install and maintain fans	Moved from Line L
		M2	Select, install and maintain blowers	Moved from Line L
		<b>Line N</b>	<b>SERVICE PUMPS</b>	
		N1	Identify and select positive displacement pumps	Moved from Line K
		N2	Install, maintain and repair positive displacement pumps	Moved from Line K
		N3	Identify and select non-positive displacement pumps	Moved from Line K
		N4	Install, maintain and repair non-positive displacement pumps	Moved from Line K
		<b>Line O</b>	<b>SERVICE COMPRESSORS</b>	
		O1	Identify and select compressors	Moved from Line J in Level 4
		O2	Install, maintain and repair compressors	Moved from Line J in Level 4
		<b>Line P</b>	<b>SERVICE PIPING, TANKS AND CONTAINERS</b>	
		P1	Select, install and maintain process tanks and containers	Moved from Line L

### Millwright Program Outline Review Details

	Current Level 3		Harmonized Level 3	Description of Changes
		P2	Select, install and maintain piping	Moved from Line L & new content from RSOS
		<b>Line Q</b>	<b>SERVICE HYDRAULIC SYSTEMS</b>	
		Q1	Identify hydraulic components	Moved from Line I in Level 2
		Q2	Assemble hydraulic circuits	Moved from Line I in Level 2
		Q3	Maintain and repair hydraulic systems	Moved from Line I
		<b>Line R</b>	<b>SERVICE PNEUMATIC AND VACUUM SYSTEMS</b>	
		R1	Identify pneumatic and vacuum components	Moved from Line I in Level 4
		R2	Assemble pneumatic and vacuum circuits	Moved from Line I in Level 4
		R3	Maintain and repair pneumatic and vacuum systems	Moved from Line I in Level 4

### Millwright Program Outline Review Details

	Current Level 4		Harmonized Level 4	Description of Changes
<b>Line A</b>	<b>WORK PRACTICES</b>			
A5	Use communication and teamwork skills			Moved to Line D
A8	Plan job requirements			Moved to Line C
<b>Line B</b>	<b>MANUAL TRANSMISSIONS</b>			
B7	Describe theory of electricity and electronics			Moved to Line C
		<b>Line C</b>	<b>PERFORM ROUTINE TRADE ACTIVITIES</b>	
		C1	Use mathematics and science	Moved from Lines B & G
		C2	Plan work	Moved from Line A
		C4	Perform leveling of components and systems	Enhanced content
		C9	Use mechanical drawings and specifications	Moved from Line B
		<b>Line D</b>	<b>USE COMMUNICATION AND MENTORING TECHNIQUES</b>	
		D1	Use communication techniques	Moved from Line A
		D2	Use mentoring techniques	Moved from Line A
<b>Line E</b>	<b>INSTALL EQUIPMENT</b>			
E6	Describe procedures for commissioning equipment			Moved to Line V
E7	Commission equipment			Moved to Line V
<b>Line G</b>	<b>MAINTAIN PRIME MOVERS</b>			
G1	Explain prime mover theory			Moved to Line C
G2	Describe electric motors			Moved to Line T
G3	Maintain electric motors			Moved to Line T
G4	Describe internal combustion engines			Moved to Line T
G5	Describe the maintenance of internal combustion engines			Moved to Line T
G6	Describe turbines			Moved to Line T

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	Current Level 4		Harmonized Level 4	Description of Changes
G7	Describe the maintenance of turbines			Moved to Line T
G8	Describe power turbines			Moved to Line T
<b>Line I</b>	<b>SERVICE FLUID POWER</b>			
I6	Explain pneumatic theory			Moved to Line C in Level 3
I7	Describe pneumatic components			Moved to Line R in Level 3
I8	Interpret pneumatic schematics			Moved to Line C in Level 3
I9	Identify pneumatic pumps			Moved to Line R in Level 3
I10	Assemble, maintain and troubleshoot pneumatic circuits			Moved to Line R in Level 3
I11	Explain the theory of vacuum and vacuum systems			Moved to Line C in Level 3
I12	Interpret vacuum symbols			Moved to Line C in Level 3
I13	Identify vacuum systems components			Moved to Line R in Level 3
I14	Describe vacuum systems			Moved to Line R in Level 3
I15	Maintain and troubleshoot vacuum systems			Moved to Line R in Level 3
<b>Line J</b>	<b>SERVICE COMPRESSORS</b>			
J1	Explain compressor theory			Moved to Line C in Level 3
J2	Identify and describe types of compressors			Moved to Line O in Level 3
J3	Service compressors			Moved to Line O in Level 3
<b>Line M</b>	<b>OPERATIONAL EQUIPMENT EFFECTIVENESS</b>			
M1	Describe operational equipment effectiveness processes			Moved to Line U
M2	Describe use of predictive maintenance tools			Moved to Line U
M3	Identify equipment and process deficiencies			Moved to Line U
M4	Perform vibration analysis and rotating equipment balancing			Moved to Line U
		<b>Line S</b>	<b>SERVICE CONVEYING SYSTEMS</b>	

### Millwright Program Outline Review Details

Current Level 4		Harmonized Level 4	Description of Changes
	S1	Identify conveying system components	Moved from Line L in Level 3
	S2	Assemble conveying systems	Moved from Line L in Level 3
	S3	Maintain and repair conveying systems	Moved from Line L in Level 3
	<b>Line T</b>	<b>SERVICE PRIME MOVERS</b>	
	T1	Service electric motors	Moved from Line G
	T2	Service internal combustion engines	Moved from Line G
	T3	Service turbines	Moved from Line G
	<b>Line U</b>	<b>PERFORM PREVENTATIVE AND PREDICTIVE MAINTENANCE</b>	
	U1	Perform preventative and predictive maintenance activities	Moved from Line M
	U2	Perform vibration analysis procedures	Moved from Line M
	U3	Perform balancing procedures	Moved from Line M
	U4	Perform non-destructive evaluation (NDE) procedures	Moved from Line M
	<b>Line V</b>	<b>PERFORM COMMISSIONING AND DECOMMISSIONING OF EQUIPMENT</b>	
	V1	Commission systems and components	Moved from Line E
	V2	Decommission systems and components	New content for BC
	<b>Line W</b>	<b>SERVICE ROBOTICS AND AUTOMATED EQUIPMENT</b>	
	W1	Service robotics and automated equipment	New to RSOS; enhanced content for BC