

## SCNC 2019 Halifax IMM Skill #48 Competitor Skill Sets

12hrs of total competition time.

**Challenge # 1: (6hrs – Fabrication, Welding, Turning, Layout, Stainless Steel Tube Bending and Bearing Installation)**

**Challenge # 2: (3hrs – Pump & Gearbox Disassembly, Inspection, Record and Reassembly)**

**Challenge # 3: (3hrs – Predictive Maintenance and Laser Shaft Alignment)**

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### **Challenge # 1 Skill Sets:**

#### **Machining - Centre Lathe:**

The competitor will produce the part detail/s as per supplied blueprint/s <sup>1,4,5,6,7,8</sup>

The material used for the challenge will be 1020 CRS, diameter range 1 ½” to 3 ½”, there will be no digital readouts on the Centre Lathe’s, dial indicators will be supplied for turning, all turning work will be done using a 4 Jaw Chuck.

Tasks:

- Parallel turning
- Shoulder turning
- Taper turning
- Undercutting
- Machining to tolerances of  $\pm 0.001$ ”

#### **Stainless Steel Tube Bending:**

With the given “Swagelok” tooling the competitor will produce the part detail/s as per supplied blueprint. <sup>1,4,5,6,7,8</sup>

The material used for the challenge will be stainless steel tubing with a diameter range of ¼” to 3/8”.

Tasks:

- The competitor will calculate the necessary lengths and allowances needed to produce the required part detail/s
- Preparation of given tubing for bending
- Bending of supplied Stainless Steel tubing to any the following angles: 15°, 30°, 45°, 60°, 75°, 90°, 105°, 120°, 135°, 150°, 165° or 180°

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- Perform the required hand tool operations to bend the supplied stainless steel tubing to the given specifications and tolerances
- Tolerances +/- 1/16"

### **Welding & Fabrication:**

The competitor will perform and demonstrate the required skills to fabricate and weld a mechanical assembly bedplate with supplied square tubing to required specifications and tolerances. *1,4,5,6,7,8*

#### Tasks:

- Using the supplied blueprint/s the competitor will calculate the necessary lengths and allowances needed to produce the required part detail/s
- Preparation of given 2" x 2" x .19" wall thickness tubing for welding
- Produce the welds to the required specifications
- MIG wire diameter .035"
- Tolerances +/- 1/64"

### **Bearing Installation:**

The competitor will using the installation tools supplied, mount the supplied SKF anti friction bearings, seals, and housings on the competitors manufactured bedplate and turned detail part/s. *1,2,4,5,6,7,8*

#### Tasks:

- Locate and install SKF spherical roller or rolling element bearings as per given blueprint/s
- Using the supplied SKF reference materials install the SKF anti friction bearings to the required specifications and tolerances

### **Hand Layout & Hand Tools:**

Using the supplied tools the competitor will perform the required operation to produce a machine bedplate as per given blueprint. *1,4,5,6,7,8*

#### Tasks:

- Perform a variety of hand tool operations, drilling, tapping, countersinking etc.
- Perform precision hand layout operations that may include; scribes, center punches, dividers, combination squares, hammers, layout "blue" and squares

### **Challenge # 2 Skill Sets:**

#### **Pump and Gearbox Challenge**

The competitor will; complete the required tasks to the required specifications and tolerances using the supplied tooling and measuring instruments. *1,2,4,5,6,7,8*

Tasks:

- Disassemble
- Inspect
- Record
- Reassemble

The given Reduction or Overdrive Gearbox and Centrifugal or Positive Displacement Pump

### **Challenge # 3 Skill Sets:**

#### **Predictive Maintenance & Laser Coupling / Shaft Alignment Challenge**

With a “Fixturlaser NXA Pro” and “Fixturlaser SMC Balancing Tool” the competitor will perform Vibration Analysis and do a Laser Shaft / Coupling Alignment including a Thermal Growth Offset calculation/s to the required tolerances for Rough & Precision alignment dependent on given R.P.M. *1,2,4,5,6,7,8*

Tasks:

- Vibration Analysis
- Pre-alignment checks
- Rough alignment
- Precision alignment
- Proper use of vibration analysis and alignment equipment and tools
- Thermal growth calculation/s
- Recording of required information and saving of achieved readings