



2023 Millwright/Industrial Maintenance Mechanic Competition

FACT SHEET

Project Manager

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For questions related specifically to the millwright competition, contact Michael Leyva at mleyva@keenprojectsolutions.com. For all event questions, contact Jarrell Jackson, National Craft Championships director, at (202) 595-1789 or jackson@abc.org.

Specific Competition Eligibility

The Millwright competition has no competition-specific eligibility requirements. Please refer to overall eligibility requirements listed on page 3 of the guidebook.

Online Exam

The online exam must be completed before competitors arrive on site, at a local NCCER Accredited Training Sponsor or Assessment Center. Accommodations will be made for extreme circumstances with prior approval of the NCC director. All competitors must sit for the online exam or face disqualification from the NCC. The online exam continues to make up 25% of one's overall competition score. It is the responsibility of the sponsor organization to schedule test sessions directly with NCCER. Test registration and guidelines will be available in January 2023.

Practical Performance Test Description

Each competitor will perform eight tasks utilizing knowledge and skills applicable to the millwright trade. **Tasks 1, 2, 3, 4, 5** and **6** will have strict time limits upon them, for a total of three hours. **Tasks 7 and 8** will be completed in the remaining time allotted, for a total of six hours.

- **Task 1** will consist of a basic layout for a piece of equipment from a drawing on a base plate. One hole will be drilled and tapped.
- **Task 2** will consist of leveling a base plate utilizing a machinist's level (98).
- **Task 3** will consist of lying out and fabricating a full-face gasket from a set of directions, utilizing a scale, dividers and advanced trade math.
- **Task 4** will consist of demonstrating and taking measurement readings on a shaft alignment simulator utilizing rim and face, conventional alignment. The competitor will need to draw graphs and calculate the required shim and alignment moves.
- **Task 5** will consist of demonstrating and taking readings on a shaft alignment simulator utilizing reverse alignment. The competitor will need to draw graphs and calculate the required shim and alignment moves.
- **Task 6** will consist of demonstrating and taking readings on an alignment simulator using laser alignment. Information will be required to be entered into an alignment table.
- **Task 7** will consist of a tearing down a pump, taking specified measurements, reassembling a pump, setting impeller clearance and setting a mechanical seal.
- **Task 8** will consist of aligning a pump and motor by calculating thermal growth. The formula and constant for thermal growth will be given to the competitors, by determining alignment targets and by utilizing one of the following: rim and face indication, reverse indication or laser alignment. The alignment technique will be chosen by the competitor.

Knowledge and Skills Required

The knowledge and skills for this competition are based on all levels of the NCCER millwright and industrial maintenance mechanic curriculum. It is strongly recommended that competitors have a working knowledge equivalent to a third-year apprentice.

Tools Required

Each competitor should bring only the tools listed below to the competition. Tools will be inspected prior to the practical performance test. Points shall be deducted from the competitor's score for not having the required tools. Any additional tools will not be allowed in the competition area. Points will also be deducted from the competitor's score for any tools that are used by the competitor that are not called for in the specific task instructions. If a tool, necessary to complete the practical performance test, is not listed, the National Craft Championships Committee will provide it:

- 1/16- to 3/8-inch Allen wrenches
- 1- to 3-lb. rubber or hard plastic hammer
- ¼- to at least 15/16-inch combination wrenches
- Two indicator jigs for shaft alignment
- Two dial indicators to fit jigs
- Small ball-peen hammer
- Small pry bar
- Feeler gauges
- Telescoping (snap) gauges
- Center punch
- Non-programmable scientific calculator
- Pencil and paper
- Outside micrometers from 0- to 4-inch range, larger sets are acceptable
- 12-inch and 6-inch scales, 64th-inch graduations
- Machinists' level (98 series)
- Scribe
- One or two magnetic bases with indicators (at least one)
- Dividers
- Inspection mirror
- Non-safety prescription eyewear may only be worn under safety goggles
- Competitors may bring their own work gloves

The following is specifically **NOT PERMITTED**:

- Any millwright/industrial maintenance mechanic reference materials

Sample Score Sheet

The following sample score sheet is provided to give competitors an **example** of the criteria that may be included in the practical performance test. **However, this score sheet is only a sample and not intended to act as a study guide in preparation or to imply specific criteria that will be judged during the actual practical performance test.**

Continued on next page

ABC National Craft Championships Millwright/Industrial Maintenance Mechanic Sample Score Sheet

Judging Criteria	Competitor Identification Numbers					
	Maximum Points					
Communication skills						
Professionalism (organization, neatness)						
Disassembly of unit						
Assembly of unit						
Outside micrometers (use and knowledge)						
Total travel (bowl to backing plate)						
Feeler gauges (use and knowledge)						
Telescoping gauges (use and knowledge)						
Laser alignment setup						
Indicator setup (bar sag, graph labeling)						
Soft foot						
Mechanical seal (installed correctly and set to proper tension)						
Gasket (making of new gasket for casing)						
Keyway vs. keyway (correct alignment)						
Base plate layout (from drawing)						
Timeframe						
Mechanical aptitude						
SUBTOTAL:	160					
PPE						
Use tools properly—doesn't use wrench as hammer						
Safe procedures—proper lifting						
Housekeeping						
Behavior—Position—safe working						
Behavior—Reaction—Does person change work techniques when someone observes?						
Behavior—pace of work						
SUBTOTAL:	40					
GRAND TOTAL:	200					
Tie Breaker #1						
Tie Breaker #2						
Tie Breaker #3						
Tie Breaker #4						