

CNC Wireforming (Coiling, Torsion, & Bending Techniques)

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The following schedule of work experience is intended as a guide. It need not be followed in any particular sequence, and it is understood that some adjustments may be necessary in the hours allotted for different work experience. In all cases, the apprentice is to receive sufficient experience to become fully competent and use good workmanship in all work processes that are part of the trade. The apprentice will be fully instructed in safety and OSHA requirements.

A. Machine Implementation (2012 hours)

1. Tension & Dereeling Techniques
2. Mechanical Properties & Characteristics of Wire
3. Straightening Wire
4. Standard Tool Orientation & Positioning
5. Special Tool Orientation & Positioning
6. Axis Orientation & Positioning
7. Use of Pneumatics Control
8. Lot Control & Packaging Techniques
9. Care & Machine Maintenance

B. Quality Assurance Techniques (1000 hours)

1. Interpretation of Blueprint Requirements
2. Use of Hand Held Measuring Tools
3. Load Testing Devices
4. Optical Measuring Devices
5. Heat Treat Techniques
6. Use of Gauges
7. Statistical Process Analysis Techniques
8. Sampling Plans

C. Programming (2012 hours)

1. Absolute & Incremental Positioning Techniques
2. Absolute Zero/Home Positioning For Axis Orientation
3. Wire Offset Parameters
4. Standard Program Implementation
5. Tooling Axis Sequence
6. Ground Fault & Optical Sensor Implementation
7. Feedback for Sensor Based SPC Adjustments

D. Torsion & Coiling Setup Techniques/Principles (500 hours)

1. Selecting & Orienting Proper Arbor
2. Coiling Point Orientation
3. Tool Orientation For Right & Left Hand Spring Generation
4. Pitch Tool Spreader Orientation & Techniques
5. Winding Arbor Techniques

- 6. Multiple Bending Techniques
- 7. Use of Cams & Timing Sequence
- 8. Knife Orientation & Cutoff Techniques

E. Spring Design Principles (500 hours)

- 1. Spring Terminology
- 2. Extension & Compression
- 3. Open End & Closed End
- 4. Ground Ends
- 5. Torsion & Double Torsion
- 6. Stress Relieving
- 7. Rate & Load Calculations
- 8. Index & Initial Tension
- 9. Crossover & Extended Hooks

F. Tool Building & Design Techniques (1000 hours)

- 1. Lathes
- 2. Drill Press
- 3. Milling Machines
- 4. Grinders
- 5. Band Saws
- 6. Hardening Tool Steels
- 7. Basic CAD
- 8. Carn Design
- 9. Arbor Design

G. Tool Development & Debug Techniques (400 hours)

H. Related Instruction (576 hours)

Total = 8000 hours

WAGE SCHEDULE

0 - 1000	Hours	_____
1001 - 2000	Hours	_____
2001 - 3000	Hours	_____
3001 - 4000	Hours	_____
4001 - 5000	Hours	_____
5001 - 6000	Hours	_____
6001 - 7000	Hours	_____
7001 - 8000	Hours	_____
Journeyman Rate		_____