

Aspect of the work		Level 1:	Level 2:	Level 3:	Level 4:
Freedom		* Requires assistance * Requires regular technical direction * Follows a "cookbook"	* Occasional assistance * Occasional technical direction * Substitute "ingredient" in "cookbook"	* Infrequent technical direction * Gives direction * Modifies "cookbook" * Acquiring time and experience in the craft	* No tech direction reqd. * Gives direction * Writes "cookbook" * Experienced in craft
Quality	The request is satisfied without a callback. The work performed is based on sound principles, theories, codes, specifications, EHS requirements, and work practices.				
Troubleshoot & Analysis	<u>Tolerance</u>	Work is not tolerance dependant - Hand tools - Stand/riser	Work is tolerance dependant requires use of simple single point measuring device i.e. dial indicator, Voltage/Amp/Ohm meter, vacuum/pressure gage.	Component is tolerance dependant requires use of multiple and or sophisticated measuring device or technology i.e. Squares, dial bore gage, micrometers, Oscilloscope, vibration analysis, Thermography, Tribology, -Tolerance stack-up - Critical fit (i.e. spindle, gear-mesh) -Drive set-up -Feed-back loop	System is tolerance dependant. Geometric axis relationship and Positioning relationships to control -angular interpolation - Circular interpolation – dimensional integrity throughout the envelope.
	<u>Special language</u>  (Where complexity of equipment and or component determines completeness of information required, as well as knowledge of trade/trades)	Low probability of miscommunication - Loadtest hoist - Coolant pump change - Air drop - PM check	Moderate probability of miscommunication -Concepts -Single component problem - Single trade problem solving - X-shift carry over i.e. continuing an assembly/disassembly, sharing of knowledge or experience, or alerting others of a potential fault condition	Moderate to High probability of miscommunication -Concepts -Dual component or system problem - Dual trades problem solving - X-shift carry over i.e. continuing a root cause analysis	High probability of miscommunication - Concepts -Multi-component or system problem - Multi-trades problem solving - X-shift carry over i.e. continuing an assembly/disassembly on a high speed spindle or collar assembly.
	<u>Complexity</u>  ➤ # of variables ➤ # of Components ➤ Level of technology	Solve obvious, visible problems with dependent variables on simple types of Equip. such as: - Polishing jack - Water pump - Pedestal grinder - Bridgeport Problem identification and remedy on task like: - No pressure due to clogged filter element (change filter) - Light won't turn on due to burnt-out light (replace light) - Shaft not turning due to broken belt(Replace belts)	Obscure non-visible problem with dependable variables on conventional types of Equip. such as: - 185 Excello - Manual Bullard VTL - Cooling tower (transitional work) Problem identification and remedy of task like: - Single axis accuracy problem - Single system or single axis fault/failure. Where failure can be identified through a process of elimination by systematically checking the soundness of components in an assembly in a sequential order of failure probability. Working on Components and equipment such as Hydraulic pump, High pressure / high flow coolant pump (transitional work)	Obscure non-visible problem with independent variables - Dual axis positioning error - Single system fault Where failure can be identified through a process of elimination and verification, through which the technician must verify the impact of failure of a component in one assembly or system, on the function of another seemingly independent component or assembly in the same or possibly different system on types of components like - Laser - Centrifugal compressor - Roller packs - Tool changer - Axis drive - High speed spindle	Solve a hidden, non-visible problem with independent variables - Multi-axis - Multi-system To diagnose the root causes and isolate failures by a following a line of reasoning that in essence forms a failure defense plan aimed at addressing a majority of the potential failures and helps to determine impact of a components failure on the integrity of an independent component. Examples; - Vibration , - Misalignment Failure of the lube system due to mechanical or electrical malfunction may produce a stress or strain on a element or elements of a axis drive system on types of machinery like or similar to a 5-axis CNC's i.e. (ELB Grinder, 85 CNC Excello, Laser, G&L VTC)

**Troubleshoot  
& Analysis  
continued**

	<u>Root cause &amp; Corrective action</u>	<p>Remove &amp; replace; fire fight.</p> <ul style="list-style-type: none"> <li>- Pump seal</li> <li>- Air line</li> <li>-Coolant pump</li> <li>-Fuses</li> <li>-switches</li> </ul> <p>Simple problem solving models used; 4-lists; binary thinking; visual, no test data reqd.</p> <ul style="list-style-type: none"> <li>- Cavetating pump</li> <li>- No air</li> <li>- Lamp out</li> </ul>	<p>Where direct replacements are not available, Rebuild, Make, Modify, and or Substitute, suitable replacement</p> <p>Simple to Basic problem solving models used; Develop 4-lists; Analytical thinking; Testing and verification.</p> <ul style="list-style-type: none"> <li>-Pressures and Flows</li> <li>-Feeds and Speeds</li> <li>-Radial/Axial Rigidity</li> <li>-Voltage/Amps</li> <li>-I/O state</li> </ul>	<p>Perform root cause analysis.</p> <ul style="list-style-type: none"> <li>- Pump/motor bearing failure due to misalignment</li> <li>-intermittent electrical fault due to wire degradation</li> </ul> <p>Develop corrective action plan</p> <ul style="list-style-type: none"> <li>-Laser check on pump/motor alignment</li> <li>-Re-size or re-design Mechanical/Electrical components to meet increased/decreased requirements or conditions.</li> </ul>	<p>Utilize advanced problem solving techniques i.e. FMEA Fault Tree, Red X, etc.</p> <ul style="list-style-type: none"> <li>- Finish, chatter, burn</li> <li>- Repetitive failure</li> <li>- Intermittent problem</li> </ul> <p>Initiate, coordinate, track, and document completion of root cause corrective action plan requiring multi-trades and or management/financial approvals</p>
	<u>Danger potential</u>	<p>Low.</p> <ul style="list-style-type: none"> <li>-Moving arbor press</li> <li>- Moving with forklift.</li> </ul>	<p>Release of stored energy potential.</p> <ul style="list-style-type: none"> <li>- Kinetic</li> <li>- Electrical</li> </ul>	<p>High.</p> <ul style="list-style-type: none"> <li>- Moving machinery</li> <li>- Laser</li> </ul>	
	Hazard potential	<b>Knows no bounds and is not Grade or Trade Specific</b>			
	Impact of "oops"	Boundaries learned through self induced failures			No occurrences of self induced failures