

Adapted from the Ohio Bureau of Workers' Compensation [Ergonomics Best Practices for Manufacturing](#)

Situation	Reasons for concern	Interventions/Best Practice	Results (° per 200,000 hours worked)
Lifting heavy loads, carrying bulky loads, frequent lifting, bending to pick up items, and pushing or pulling loads	<ul style="list-style-type: none"> • Stress on the hands, wrist, elbows, shoulders and spine • Risk of back injury 	Lifting Aid <ul style="list-style-type: none"> • powered and spring loaded lift tables 	Reduced musculoskeletal disorders (MSDs) <ul style="list-style-type: none"> • Incident rate° from 9.8 to 4.9 • Days lost from 110 days° to 36.2 days° • Restricted 102 days° to 39.5 days° • Turnover rate° 53.2 to 44.5 • Average risk factor score 33 to 19
		Lift assist devices (mechanical) <ul style="list-style-type: none"> • hoists • cranes • manipulators • vacuum lifters 	
		Transport devices <ul style="list-style-type: none"> • carts • conveyors • tugs • powered dollies • forklifts 	
Wrapping materials on pallets	<ul style="list-style-type: none"> • Awkward postures in the trunk and shoulders 	Stretch wrapping machines	Reduced MSDs <ul style="list-style-type: none"> • Incident rate° from 9.2 to 7.9 • Days lost from 369 days° to 0 • Restricted 125 days° to 39.3 days° • Turnover rate° 94.6 to 35.3

Situation	Reasons for concern	Interventions/Best Practice	Results
<p>Using hand-tools with prolonged or repetitive high force, awkward wrist postures, and contact stress</p>	<ul style="list-style-type: none"> Risk of upper extremity MSDs (e.g. tendinitis or carpal tunnel syndrome) 	<p>Hand-tools (features)</p> <p>Powered tools</p> <ul style="list-style-type: none"> Trigger design (thumb-activated is preferred, if other fingers use two or more) Isolate or dampen vibration Provide protection from exhaust and heat generated by motor or tool bit <p>Reduce force requirement</p> <ul style="list-style-type: none"> Counter balance mechanisms Spring-loaded <p>Shape, size and orientation</p> <ul style="list-style-type: none"> Handle length (min. of 4") Handle diameter (min. of 1.5") Handle span (max. of 3") <p>Handle material</p> <ul style="list-style-type: none"> Padding (non-porous) Good coefficient of friction (non-conductive) <p>Grasping force</p> <ul style="list-style-type: none"> Power grip preferred over pinch grip Properly-sized tool grips Two-handed grips to distribute force exertions <p>Posture</p> <ul style="list-style-type: none"> Wrist in line with hand and forearm 	<p>Reduced MSDs</p> <ul style="list-style-type: none"> Restricted 57.1 days^o to 44.8 days^o Turnover rate^o 28.4 to 17.3 Average risk factor score 23.5 to 20.7

Situation	Reasons for concern	Interventions/Best Practice	Results
Cleaning, assembling or packing parts at a workstation	<ul style="list-style-type: none"> • Stress on the shoulders and spine • Risk of MSDs (e.g. carpal tunnel syndrome) 	Ergonomic workstation design <ul style="list-style-type: none"> • Anti-fatigue floor mats • Chairs with lumbar support, armrest, adjustable features, padding and easy to reach and operate controls 	Reduced MSDs <ul style="list-style-type: none"> • Incident rate^o from 10.0 to 1.6 • Days lost from 24.9 days^o to 16.0 days^o • Restricted 58.5 days^o to 6.4 days^o • Average risk factor score 29.7 to 17.5
Manually involved assembling, processing, and material handling	<ul style="list-style-type: none"> • Stress on the hand, wrist, elbow, and shoulder • Risk of upper extreme MSDs (e.g. tendinitis or carpal tunnel syndrome) 	Automation <ul style="list-style-type: none"> • CNC (computer numerical control) machines • Automatic case packers and palletizers 	Reduced MSDs <ul style="list-style-type: none"> • Incident rate^o from 10.4 to 7.2 • Days lost from 123 days^o to 23.1 days^o • Restricted 239 days^o to 57.4 days^o • Turnover rate^o 103 to 43.1 • Average risk factor score 28.5 to 15.4
		Semi-automation <ul style="list-style-type: none"> • Controlled lathes • Saws • Grinders • Presses 	Reduced MSDs <ul style="list-style-type: none"> • Incident rate^o from 32.4 to 9.7 • Days lost from 215 days^o to 63.0 days^o • Restricted 197 days^o to 0 • Turnover rate^o 94.6 to 64.6 • Average risk factor score 21.4 to 10.4