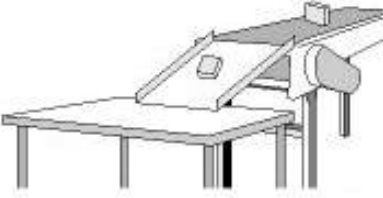



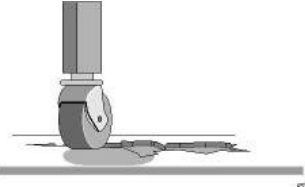





DESIGN PRINCIPLES FOR PUSHING & PULLING TASKS

(Adapted from NIOSH Elements of Ergonomics Programs – Toolbox Tray 9-E)

Modified by EWI Works – January, 2002

1. Eliminate the need to push or pull by using the following mechanical aids, when applicable:			
	<ul style="list-style-type: none"> • Conveyors • Slides or chutes 		<ul style="list-style-type: none"> • Lift tables • Power trucks
2. Reduce the force required to push or pull by:			
	<ul style="list-style-type: none"> • Using four-wheel trucks or dollies. 		<ul style="list-style-type: none"> • Reducing size and/or weight of load.
	<ul style="list-style-type: none"> • Maintaining the floors to eliminate holes and bumps. • Requiring surface treatment of floors to reduce friction. 	<ul style="list-style-type: none"> • Requiring that wheels and casters on hand trucks or dollies have: <ul style="list-style-type: none"> ○ Periodic lubrication of bearings. ○ Adequate maintenance. ○ Proper sizing (provide larger diameter wheels and casters). 	
3. Reduce the distance of the push or pull by:			
<ul style="list-style-type: none"> • Moving receiving, storage, production, or shipping areas closer to work production areas. • Improving the production process to eliminate unnecessary materials handling steps. 			
4. Optimize the technique of the push or pull by:			
	<ul style="list-style-type: none"> • Providing variable-height handles so that both short and tall employees can maintain an elbow bend of 80 to 100 degrees. 	 <ul style="list-style-type: none"> • Replacing a pull with a push whenever possible. 	 <ul style="list-style-type: none"> • Using ramps with a slope of less than 10%.