

Semi-Automation

By Joseph Gray

Can't Justify Full Automation? Semi-Automate!! With Paced Assembly and Robotic Work Cells!

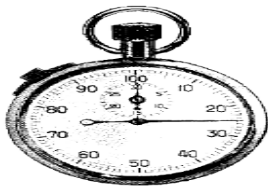
The rule of thumb for manufacturers today is that annual sales volume must exceed 1 million before a given product can be cost justified for full automation. The initial investment and payback periods are high when total automation is the goal.

Semi-automation is a cost-effective alternative. The equipment ingredients of such a system are:

- Synchronous platform conveyor
- Vibratory part feed system
- Robotics

Semi-automation addresses a segment of a given product for automation and creates special work cells to accomplish it. It combines the disciplines of materials handling, product mechanization and direct labor control systems. Labor gains of 75% are possible using this method of assembly.

The typical consulting activity sequence necessary to convert products from a bench method of assembly to a semi-automated system is:



- Phase One - Indexing Paced Conveyor System
 - Work measurement
 - Line balance
 - Final equipment specifications
 - Work station layout
 - Training
 - Paced system installation

- Phase Two - Semi-Automated Work Cells
 - Design and fabrication
 - Programming
 - Electrical and mechanical installation

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The time-balanced Phase One system prepares for Phase Two semi-automation by eliminating future time bottlenecks for operations not to be mechanized. Phase One gains include:

Improvement Comparison



From Bench or Progressive Line	To Paced Assembly Line	Labor Gain
<p>Handling:</p> <ul style="list-style-type: none"> • Excessive moves/storages • Minor operations separate • Work area scattered 	<ul style="list-style-type: none"> • Assembly where transported • Coordinated work flow • Space saving by consolidation 	5-10%
<p>Methods:</p> <ul style="list-style-type: none"> • Tooling inadequate • Balanced by sequence • Long work span • Inefficient work place • Quality separated 	<ul style="list-style-type: none"> • Tooling specialized • Balance controlled • Short station times • Optimum work place • Quality integrated 	5-10%
<p>Performance:</p> <ul style="list-style-type: none"> • High responsibility • Output pegged to slowest • Measurement late • Long training period • Poor work habits 	<ul style="list-style-type: none"> • Lower responsibility • Efficiency level created • Measurement immediate • Reduced learning curve • Controlled work atmosphere 	15-20%
Total Average Improvement		25-40%

Phase Two gains in product mechanization leads to additional savings. They include:

From Bench or Progressive Line	To Semi-Automated Cells	Labor Gains
<p>Work Cell Sub Assembly Mechanization:</p> <ul style="list-style-type: none"> • Manual part placement into container • Manual removal of part from container and alignment into fixture • Manual pneumatic/electric part fastening 	<ul style="list-style-type: none"> • Bulk hopper part feed • Precision vibratory bowl part positioning into fixture • Robotic part fastening 	25-30%
<p>Work Cell S/A to Paced Assembly F/A Line Handling:</p> <ul style="list-style-type: none"> • No precision platform • Manual placement of sub assembly to final assembly 	<ul style="list-style-type: none"> • Precision in-line paced conveyor platform positioning • Robotic pick from S/A work cell and place on fixturized paced conveyor F/A platform 	5%
Total Average Improvement		30-35%



The initial investment in the semi-automation technique is modest and a first-year return-on-investment guaranteed.