Workcell Automation of Piece Part Production

PMRC IAB Meeting
March 15, 2006

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Current Production Process

• Alcoa
• Close tolerance parts subject to handling damage
• Process involves many forming, machining and cleaning operations
• Each operation is presently performed without much consideration to the process as a whole
• Parts are stored stacked in bins between operations, carried from workstation to workstation and to the clean line manually
Weaknesses of Current Production Method

• Parts very sensitive to contact damage after finish sizing at grind thread
• Process involves large amount of worker interaction and part handling (detrimental to damage and cost)
• Parts are oriented by the operator to load each machine, then placed in an uncontrolled queue until next operation
• Cleaning operation requires transport to and from cleaning area
• Workcell automation would greatly increase productivity and part quality, this is our goal
Design Considerations

- Design must be well thought out in both a technical and logistical sense
- Downtime during implementation must be kept to an absolute minimum
- The details of each machine are not precisely known, so design must be easily adaptable
- The transport system must require minimal adjustment for changes in bolt diameter and length
- Design should be modular to allow testing of each component prior to implementation
Project Goals

- Design and implement workcell automation scheme
- Specify inline cleaning solution to work within cell
- Design and prototype transport device for moving fasteners between machines
- Interface transport device to automation already present on machines
- Supplement automation present on machines if necessary
- Predict and measure productivity increase and cost benefits
- Future tasks will also include grinding process optimization
Batch Conveying System

Initial Design

Machine 1

Unload

Moved By Operator

Machine 2

Transport Device

Intermediate Goal

Machine 1

Unload

Machine 2

Load

Transport Device

Final Goal

Automated Conveying System

Pre-Formed Parts

Automated Grind, Clean, Form Process 1, Form Process 2 & Inspection

Complete, Inspected Parts

Completely Automated Cell
Continuous Conveying System

Parts are moved continuously from machine to machine
Development Strategy

Phase 1 – To be Completed at Georgia Tech

- Track to transport system interface

Phase 2 – To be Completed during internship

- Track to machine Automation interface
Questions?