Continuous Motion Automation
The Factory of the Future

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2014 Status

- Hardware configurations similar to 20-30 years ago
- Single head pick and place reached effective limit
- Not much new under the sun
- Need a game changing approach
- Re-examine the problem
- Products in motion may gain value
Principles of Continuous Motion Automation

Products need to Flow
• View today’s factory as a logistics problem
• Factory should be a highway
• Reduce “at rest” time for assembly/processing
• Process product in motion if possible
• Create a logical modular approach
• Implement in phases

White Paper detailing Continuous Motion Automation at www.packflowconcepts.com

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Principles of Continuous Motion Automation

1] Keep products in motion
2] Remove any return stroke
3] Avoid high speed single automation/robotic gripper
4] Process a product while in motion wherever possible
5] If not continuous motion then use net zero motion
6] Keep product linked wherever possible
7] Use continuous flexible buffer for timing differences
8] Only locate high precision actuation where needed.
9] Flow product in a straight line
10] Design to simplicity

Association for Advancing Automation

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Remove the Return Stroke

Trackbot Product Singulator
- Recirculate robot heads (or Bots)
- Double productivity
- Trackbot prototyped 2000-2002
- Pick only in line
- US Patent 6,688,451
Trackbot Multi-Head Robot

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Singulate Filled Stand Up Pouches
The Compact FlowBot

- A Multi-Head chain driven robot
- Moderate speed but high product throughput
- Distance traveled does not impact throughput rate
- Modular Design – Add more heads
- Markets – Food/CPG Packaging, Pharma
- Heads on chain can buffer pick/place timing issues

Avoid High Speed Single Head Gripper
Compact FlowBot Pick and Place Device

Prototyping Assisted by the RPI CATS Center

Patent Pending

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Modular Design – Chain Gripper Spacing
Designed & RP Prototyped in 5 weeks

Patent Pending
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Compact FlowBot
Prototype 2.0
Patent Pending
Pack Flow Concepts LLC

Patent Pending

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Keep Products Linked

Packaging Line Example
• Why make bags of snacks from roll stock and cut them?
• Keep bags together and cut before case packing
• Stream of bags ARE the accumulator
• Markets – Snacks, Cookies, Packaged Parts
• Product location always known – no Vision system
Keep Products Linked – Snack Bags

Patent Pending

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Avoid Unproductive Motions

- Don’t always go “Up, Over and Down”
- For Robotic Order Picking redefine the Totes
- Folding Side Wall increases access
- Flow products from Supply to Shipper
- Roller Thumb lets robot move heavier products
- Markets – Order Picking, 3PL, End of Aisle Packaging
- Increased Picking and Vision access
Robotic Order Picking – Flow the Product

Folding Side Wall Totes  Patent Pending

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Robotic Order Picking – UR-5 Robot Demo
Robotic Order Picking - Using AGV

Multiple Shippers Packed    Patent Pending

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Robotic Order Picking – Tilted Totes
Phase 1
• Develop the Compact FlowBot for flexible parts feeding
• Start developing Robotic Order Picking for bulk parts feeding

Phase 2
• Develop the Treadbot for high throughput assembly
• Develop the Roll Accumulator to handle motion stoppages

Phase 3
• Develop variations of the Chip Bag Case Packer
• Develop updated Docking End Effector

Phase 4
• Develop Assembly Work Table

Phase 5
• Integration

Refer to White Paper for Additional Devices
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