Smart Manufacturing

Smart Robotics

Presented by: Roy Vasher
Assistant Professor Purdue, Management
Technical Advisor, HDS RoboFS
CEO letter

HDS (Home Delivery Service) has developed RoboFS™, an end-to-end, hardware and software fulfillment system.

RoboFS

RoboFS combines intelligent vision and mobile and articulated robots into an integrated solution that dramatically advances supply chain capabilities while significantly reducing labor and total fulfillment costs. It’s ideal for large-scale fulfillment and kitting operations.

RoboFS was designed to meet the needs of the HDS e-commerce service – hundreds of thousands of fast-changing SKUs, orders of all sizes and all-sized items, fulfillment of any order in less than one hour, the ability to open fulfillment centers within six months of site acquisition and significantly lower total fulfillment costs than current systems.

This proprietary, patented system is an end-to-end solution from receiving to load. Order picking is highly automated. A modular design eliminates long conveyor runs and mezzanines so that equipment can be factory-built ahead of ordering and commissioned within weeks of arrival. In addition, each installation can be configured to fit your specific requirements with no custom engineering or software code.

Purchaser Program

RoboFS is now being offered to a maximum of five global leaders in distribution and manufacturing through the RoboFS Purchasing Program. Toyota is a participant in this Program.

With RoboFS you can advance your supply chain to lower costs, improve service levels and drive new strategic initiatives.

Regards

Louis H. Borders, CEO

Attached please find a set of introductory slides about RoboFS. For an executive briefing, please contact Samantha Ibarguen (sam@hdsglobal.com)
HDS RoboFS™

Purchaser Program

Louis H. Borders, CEO
Aravind Durai, Director of Automation

October 16, 2015
What RoboFS does

Inbound items arrive in many forms

Exact orders and kits are delivered in many ways
What RoboFS is

- **First end-to-end solution**
  - Integrated automation and software
- **Modular, robotic approach**
  - Articulated and mobile robots
  - Highly accurate, automated pick
  - Factory-built components
  - Configurable and scalable to fit your needs
- **Software-defined**
  - Reduced and simplified automation
  - Flexible
  - Programmable flows
  - Low cost

- Custom engineering
- Long conveyor runs
- Mezzanines
- Monolithic storage systems
- Pick-to-light/voice
RoboFS at a glance

• **Receiving** (semi-automated)
  o Containerize into trays with compartments

• **Transport** (fully automated)
  o Small mobile robots move stacks of trays
  o Mobile robots are people aware and safe

• **Storage** (fully automated)
  o Low cost, non-precision, dense shelving
  o Autonomous robots manage trays

• **Pack/kitting** (mostly automated)
  o Vision-guided robotic pick stations
  o Manual stations for select picks, value-added

• **Load** (fully-automated)
  o Orders via conveyor, mobile robot or pallet

Executive briefing includes a video of RoboFS
Benefit – unlimited SKU count

• Trays for inbound inventory
  o Product size and shape immaterial
  o Trays with compartments compress storage
  o No pick faces to constrain the number of SKUs
  o Full cases received into trays
  o Cross-dock items merged seamlessly

• Flexible outbound orders
  o Any order size
  o Orders with mixed-SKUs and cases integrated
  o Any kit in a tray with parts positioned
  o Handles non-conveyables
Benefit – flexible flows

- Mobile robots for transport
  - Easily programmed
  - No bottlenecks or single points of failure
  - New workflows created in software

- Articulated robots
  - No manual picking, storage or retrieval
  - Product size and shape handled via software
  - Add robots to increase throughput

- Versatile automation and software
  - Order flow adjusted in real-time
  - An order can be filled in under one hour
  - Reverse logistics uses same equipment
Benefit – a path to six sigma

- Robot-centric
  - Predictable, repeatable, reliable
  - Software continuously improves accuracy and speed

- Learning system
  - Issues detected in real-time
  - Data mining for root cause analysis
  - Feedback loop to operators and programmers

- Theft is an outlier event
  - Inexpensive cameras, RoboFS RFID and weight scales
  - Persistent inventory monitoring
  - No need for checkpoints
Benefit – instant fulfillment centers

• Modularity
  o Configure to meet your exact needs by location
  o Full simulation prior to build
  o Order from an inventory of pre-built components
  o Simple storage shelving (no precision fabrication)

• RoboFS software as product
  o No custom software development
  o Runs entire facility
  o Direct connection to your ERP

• Fast installation
  o Components bolt together to form system
  o No software to test when commissioning
  o No mezzanines, ceiling supports, special floors

Today - monolithic systems

HDS - roving robots, low cost
Benefit – lower costs

- Targeting a 50% cost reduction
  - Dramatic labor reduction
  - Modular components have PC-like costs
  - No special building requirements
- Smaller footprint
  - Dense storage (20’ vertical, narrow aisles)
  - Fewer human work areas
  - High speed robots
- Closer to customer
  - Shorter, lower cost routes
  - Faster service
RoboFS Demonstration
Proposal

**Program terms**
- Limited to five Global 200 market leaders
- Industry-exclusive rights to purchase RoboFS
- Controlled pricing (MFN, cost plus)
- Delivery priority in order of participation
- $2M advance payment

**Program strengths**
- Purchase decision after HDS proves RoboFS (2016)
- Participant requirements and expertise incorporated early
- Ongoing HDS investment in RoboFS, its core technology
- Competitive advantage with 10 year industry-exclusive
- Advance payment refunded if no purchase

**Next steps**
Develop proposal ➔ Complete detailed assessment ➔ Finalize agreement
Toyota Press Release
Smart Manufacturing
Smart Robotics

Thank You
Questions

Presented by: Roy Vasher
Assistant Professor Purdue, Management
Technical Advisor, HDS RoboFS