

MATERIAL HANDLING SOLUTIONS FOR THE FACTORY OF THE FUTURE

In the year 2006, the economic conditions of the automotive industry have tended towards the purchasing of simpler and less automated material handling solutions due to capital cost restrictions. Rack/Container handling suppliers have had to focus on innovative solutions to reduce cost and complexity of their standard products, and to add new offerings that address ergonomic and productivity challenges using more manual or simpler methods. For example, large automated rack conveyance systems have been replaced by more lineside carts, dollies, turntables, AGV's and Tuggers.

In our opinion this is a short-term trend. Project Lifecycle Management (PLM) purchasing vs. capital cost purchasing will highlight that savings over an automobile program-life will be realized by using more automated handling methods. The factory of the future will likely have reduced labor content as world markets grow and labor rates and benefits increase. As the cost to operate a plant and own real estate grows, and as the number of competitive automobile offerings grow, single factories will handle a greater number of models/vehicles. Thus, the complexity of parts being handled by one assembly line will increase. In addition, the trend towards outsourcing more of the sub-assembly work will lead to larger modular assemblies to linefeed with reduced pack densities. This will create material handling challenges that will have to be addressed, perhaps by the solutions shown in the attached chart.

FUTURE TREND	EFFECT ON MATERIAL HANDLING	MATERIAL HANDLING TECHNOLOGY SOLUTIONS/INNOVATIONS
1. Lights Out Manufacturing	<ul style="list-style-type: none"> • Fewer people in plant that handle parts/containers • Automated part handling • Higher level of up-time required • Preventative Maintenance critical 	<ul style="list-style-type: none"> • Ability to predict and detect component failures remotely (eg. smart valves & sensors) • On line system monitoring from remote locations • FMEA and R&M planning for all equipment must be done by suppliers • Preventative Maint. Plans must be followed – this could be subcontracted to suppliers to ensure follow through • Manual back-up stations need to be addressed and remain available in case of equipment down time • Emergency back-up or quick access plans must be in place to support the parts sequencing demands until manual back-up stations can be brought on line

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2. Robotic/ Automatic loading and unloading	<ul style="list-style-type: none"> Minimal operator safety devices required Safety devices focused on robot detection Improvement in robotic capabilities – Eg. New robots have less placement precision requirements Less downtime due to operator error 	<ul style="list-style-type: none"> Consistent rack and “parts-in-rack” placement and parts present verification required Trend to common rack fleets - Important to have automation-friendly rack condition Ability for AGV or Material Handling Machine to detect questionable rack for automatic reject or placement into back-up position to maintain sequencing as required Auto unloading will require more rack precision for auto release of dunnage bars Cost reductions due to lack of operator interface (No HMI interfaces required) Cost reduction due to reduced requirement for human protection devices such as light curtains, safety mats, PLS RALF (Rackless automated linefeed)
3. Automated Guided Conveyance	<ul style="list-style-type: none"> Decrease in fork truck traffic and interfaces (Fork-Free) Possibility to unload straight from trailer to assembly line Faster and Safer Allows for smaller machine footprint than fork truck loading 	<ul style="list-style-type: none"> Elimination of fork truck interfaces can allow for less robust load and unload ends, decreasing costs Extended machine life Elimination of load guides and chocks Programming interfaces between AGV and material handling equipment critical Point of Use Docks - Linefeed close to transport truck for low density items Common AGV can be used for multiple rack types to provide multiple equipment/rack back-up in case of AGV down time
4. Flexible Conveyance	<ul style="list-style-type: none"> Increased complexity may lead to 3 or 4 different rack sizes per linefeed device Increased sequencing requirements Display and selectivity required 	<ul style="list-style-type: none"> Roboloader type equipment Trend towards rack base standardization/ common grip point or centering point for all racks Ability to handle various rack sizes by using automated adjustable guides via RFD signals Where flexibility within the equipment is not possible, Mobility of automation may be considered, i.e. mounting the automation on an AGV and using a “die-change” type approach.
5. Vision Systems	<ul style="list-style-type: none"> Less complicated 2D vision systems allow for slight rack variance based on dunnage triangulation markers Replaces requirement for “tight” precision interface tolerances and can verify parts present in rack 	<ul style="list-style-type: none"> Improvements in robot vision systems will reduce cost and improve accuracy Allowance for rack variance in the system diminishes the requirement for extremely complicated crowding systems in the line automation, reducing cost

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6. RFID	<ul style="list-style-type: none"> • Replaces bar coding allowing for increased accuracy and reliability in parts tracking and FIS/production reporting • Sequencing verification both at supplier and customer facility • Confirmed identification and tracking of containers/racks/parts 	<ul style="list-style-type: none"> • RFID will allow for remote monitoring of equipment status • More cost effective solution in some instances • If used on individual parts, allows for parts to be placed in rack with any orientation which allows for maximum pack density • If on pallets, allows for pallets to be transported in any orientation to maximize transportation density for further cost reductions • Eliminates the needs for operator scanning
7. Safety/ Ergonomic Advances in MH	<ul style="list-style-type: none"> • Areas where people are still performing assembly tasks will require safety devices to protect them • Ergonomic advances will lead to strain-free work • Safety of the Maintenance crew will be critical due to automation 	<ul style="list-style-type: none"> • Equipment must have the ability to interface and communicate with safety devices • Ergonomic device interfaces will include turns, tilts, jogs and lifts that are readily operator adjustable for ease of use • Push/Pull forces to be minimized on Carts, Dollies and manual turntables by engineered and verified wheel, caster and bearing systems • Machines must be made safe for maintenance crews to work inside by fail safe lock out methods
8. Cost Reduction	<ul style="list-style-type: none"> • Innovative solutions required to keep equipment, operating and maintenance costs low • Life cycle (PLM) costing methods to highlight program savings 	<ul style="list-style-type: none"> • Trend should be focalized on Lean and Six Sigma integration concepts • Suppliers to be challenged to review current plant specifications to find more cost effective solutions that still meet R&M and FMEA goals • Plants to recognize innovative design solutions by using alpha sites – may lead to more flexible plant specifications • Automating the “operator” end of the MH equipment will eliminate operator/machine interface requirements and will lead to significant savings • Automating “fork truck” end of MH equipment will reduce requirement for heavy duty fork truck load end protection and lead to large savings and longer machine life
9. Outsourcing	<ul style="list-style-type: none"> • Larger sub-assemblies (modules) being handled • Reduction in pack density • Reduction in union costs realized at OEM plant • Smaller and more efficient auto plants • Modularization • FIFO/sequencing increased 	<ul style="list-style-type: none"> • Greater machine throughput will be accommodated by sizing components accordingly • Off site subassembly and sequencing systems will become more prevalent at parts suppliers

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10. Automatic Trailer Loading/ Unloading	<ul style="list-style-type: none"> • Reduction in part travel and buffer requirements • Possibility of “rack-free” part loading/unloading 	<ul style="list-style-type: none"> • Dedicated trailers designed for part handling • Sophisticated stripper type systems • Trailers with sequenced loads that can be pulled onto dockside conveyors •

SailRail Automated Systems Inc. is positioned to handle both present and future demands. Our technical core staff and software capabilities such as SolidWorks modeling, allow us to work with our customers in developing products to meet their needs. Our supplier relationships and development through our quality system keep us on the leading edge of component product innovations that we then incorporate into our R&D process. Our engineering department has developed systems that can run “on their own”, with no intervention. Both our IndexAir and IndexEr product lines can easily handle AGV loaded and robotically picked racks, and controls system innovations will reduce the cost of our products as well as the requirement for demand maintenance.

Examples of SailRail products and the modifications that can be made to handle a flexible manufacturing system or a “lights-out” factory include:

- Roboloader
- Accuturn automated turntables
- AGV loaded equipment
- Auto Load Over/Unders and Side by Sides
- Full integration of material handling equipment in FIS systems

For further information, please visit our website at www.sailrail.com or call us at 905-948-1500.