

**JD GRAY ASSOCIATES  
INDUSTRIAL ENGINEERING CONSULTANTS**

**PILOT RUN  
SEMI-AUTOMATIC  
FULL CASE PICKING SYSTEM**

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**WHY TAKE THIS FIRST STEP?**

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**Horizontal Carousels**



Eliminating unproductive travel and search time, horizontal carousels are designed for high speed order picking and parts delivery. Bins mounted to an oval track rotate horizontally to deliver stored items to an operator- saving space, reducing labor costs, speeding throughput and improving order accuracy.

Available in a variety of widths and heights, the horizontal carousel can be customized to any application. Horizontal Carousels can be double stacked to create one picking zone on the first floor and a second picking zone on a mezzanine level. Bin width and height is also variable. Location height can be adjusted post installation by easily rearranging shelves.



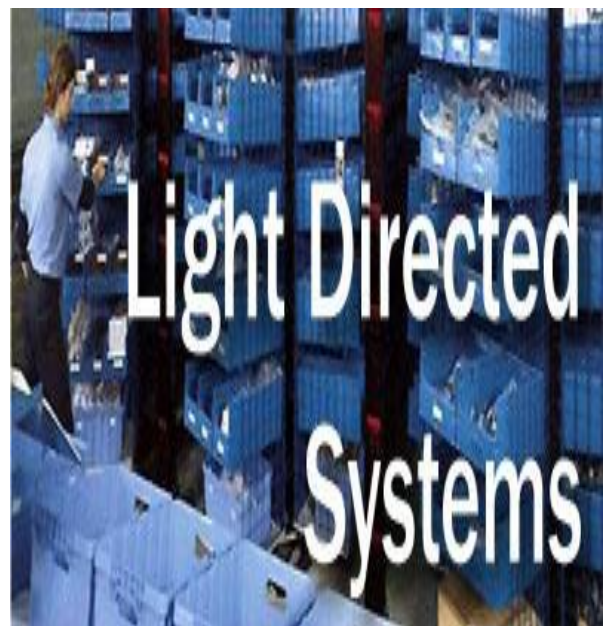
## **JD GRAY ASSOCIATES INDUSTRIAL ENGINEERING CONSULTANTS**

Combined with pick-to-light technology; the operator is directed to the exact location of each pick improving accuracy rates to 99.9%. A pick-to-light light tree is placed next to the pick face of the horizontal carousel and lights to direct the operator to the location displaying the quantity to be picked.

To speed picking times, horizontal carousels are often used in pods. A pod is two or more horizontal carousels used in an integrated workstation with software and pick to light technology. While the operator picks from one horizontal carousel in the pod the other is pre-positioning the next pick so the operator has minimal downtime. In a horizontal carousel pod a pick is always ready and the operator is rarely waiting.

Horizontal Carousels used in pods can be easily adjusted to meet peak order times. A pod of four horizontal carousels can operate as one pod with one operator. With a simple software adjustment the pod can be split into two pods (each containing two horizontal carousels) with one operator in each pod to speed picking and meet peak demand.

Batch picking is also common in horizontal carousel pods. Batch picking allows an operator to fill multiple orders at one time. Using inventory management software, an operator can create a batch of orders and fill them all at one time. When the horizontal carousel presents a SKU for picking to the operator, the operator picks the total SKU quantity for all orders, and distributes the SKU quantity among all of the orders in the batch. Using batch picking, the operator only visits a SKU location one time during picking, creating efficiencies. Batch picking multiple orders at one time can increase productivity by up to 2/3.



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Industrial Carousels – A Versatile Technology for Distribution Applications Page 3 of 14  
Document #WMC-WP-2883, Revised March 4, 2002

## Why Use Carousels for Order Selection?

Carousels can significantly improve an order selector's efficiency if they are properly applied. At first blush, you might think that this is counter-intuitive since most carousels travel at a rate of only 50-80 feet per minute (a little less than 1 MPH). Since an order selector walks at a rate of 3 MPH it would appear that carousels are just too slow to help (the order selector could walk to the location on the carousel and back faster than the carousel could move the product to the order selector). In a traditional distribution application (one where many items are being selected on a particular selection run) the order selector normally does a substantial amount of walking between locations. We'll explain why our normal intuition does not apply next.

## Coordination of Multiple Carousel Units

Carousels can actually select orders faster when they are coordinated together. While the picker selects from one of the carousel units, software allows 1 or more other units to move the next item into place. This coordination helps equalize carousel speed with the selector's travel speed, but even with 4 carousels working together, the carousels are only working effectively as fast as an order selector can walk.

## Using Software to Increase Order Pick Density

This is where the second feature of software driven carousels is applied – order batching. In a traditional picking environment, order selectors pick one or maybe two orders at a time. With carousels, using light directed order placement, as many as 40 orders can be picked with one rotation of the carousels. Given this enhancement, the slow moving carousels are able to gain a significant advantage over the traditional order selector. As more orders are picked together, the distance between pick locations on the carousel becomes smaller, and thus the carousel travel becomes smaller. Smaller travel equates to faster positioning of the next pick in very dense situations, carousels can position the next pick (on average) in just a matter of a few seconds, and by using more than one carousel, the picker has a negligible wait time between picks.

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**A RETURN-ON-INVESTMENT OF**

**16.0 MONTHS**

**9.4 MONTHS**

	<b>SINGLE CASE PICKING CELL</b>			<b>DOUBLE CASE PICKING CELL</b>		
<b>ITEM</b>	<b>DESC</b>	<b>COST</b>	<b>SAVINGS</b>	<b>DESC</b>	<b>COST</b>	<b>SAVINGS</b>
OPERATORS	2 (1 CASE PICK + 1 PUT-A-WAY)			4 (2 CASE PICK + 2 PUT-A-WAY)		
PALLET SHIFT OUTPUT	47 (Typical - 66 cases / pallet = 84" H)	N/A	\$400,000	94 (Typical - 66 cases / pallet = 84" H)	N/A	\$800,000
EQUIPMENT BUDGET COST	TWO 56 BIN UNITS With Live Roller and Software	\$512,000 (INCLUDES FREIGHT AND INSTALLATION)	N/A	FOUR 28 BIN UNITS With Live Roller and Software	\$607,000 (INCLUDES FREIGHT AND INSTALLATION)	N/A
CONSULTING FEE	IE SERVICES	\$20,000	N/A	IE SERVICES	\$20,000	N/A
TOTAL		\$532,000	\$400,000		\$627,000	\$800,000

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**B. CONFIGURATIONS**



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**GENERAL SPECIFICATION**

**TYPICAL - CASES PER BIN and CASES PER SYSTEM BASED ON  
(7) SHELVES PER BIN AND (392) 400 SHELVES (SKU'S) PER SYSTEM (FAMILY)**

	SINGLE CASE PICKING CELL	DOUBLE CASE PICKING CELL
ITEM	Two 56 Bin at 84 inch H	Four 28 Bin at 84 inch H
LIGHT	20 Cases per Bin X 2 Carousels X 56 Bins = 2240 Cases	20 Cases per Bin X 4 Carousels X 28 Bins = 2240 Cases
MEDIUM	10 Cases per Bin X 2 Carousels X 56 Bins = 1120 Cases	10 Cases per Bin X 4 Carousels X 28 Bins = 1120 Cases
HEAVY	2 Cases Per Bin X 2 Carousels X 56 Bins = 224 Cases	2 Cases per Bin X 4 Carousels X 28 Bins = 224 Cases
SUPER HEAVY	1 Case per Bin X 2 Carousels X 56 Bins = 112 Cases	1 Case per Bin X 4 Carousels X 28 Bins = 112 Cases
TOTAL	33 Cases per Bin X 2 Carousels x 56 Bins = 3696 Cases	33 Cases per Bin X 4 Carousels X 28 Bins = 3696 Cases

CAROUSEL 84 " H BIN SIZING							
CASE DESC	WIDTH	HEIGHT	DEPTH	WIDTH	WEIGHT (POUNDS)	CASES PER SHELF/ SHELVES PER BIN	CASES & BIN WEIGHT
LIGHT	24.5"	4"	20"	24.5"	0 TO 10.9	10/2 @ 6" spacing	20/200 LBS
MEDIUM	24.5"	8"	20"	24.5"	11 TO 24.9	5/2 @ 9" spacing	10/200 LBS
HEAVY	24.5"	12"	20"	24.5"	25 TO 45.9	1/2 @ 15" spacing	2/80LBS
SUPER HEAVY	24.5"	18"	20"	24.5"	46 TO 73	1/1 @ 21" spacing	1/70LBS
TOTAL						81"	550 LBS

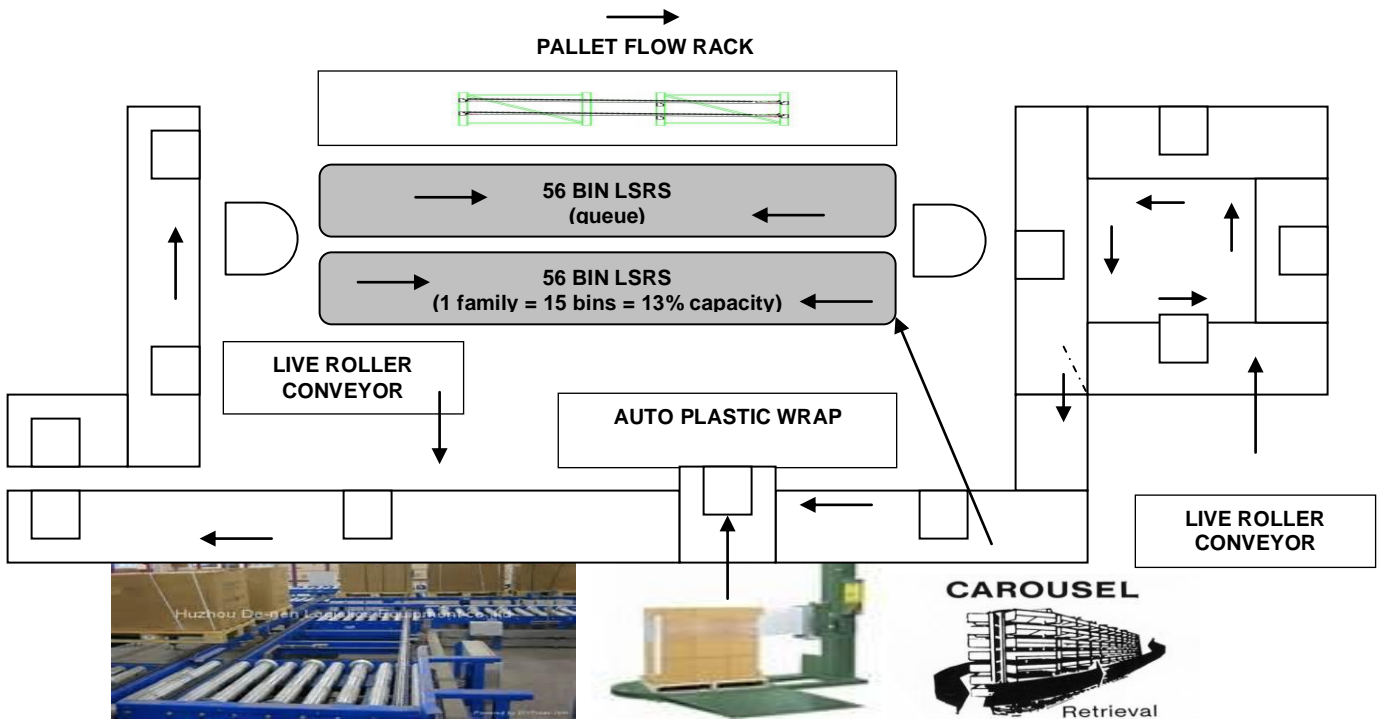
PALLET LOAD 84" H TYPICAL PICK TIME				
CASE DESC	CASES PER PALLET	PICK FULL CASE AVERAGE TIME PER CASE	PICK FULL CASE SUB TOTAL TIME (MINUTES)	TOTAL TYPICAL PICK TIME PER PALLET LOAD - MINUTES
LIGHT	30	.1145	3.44	TOTAL MIN 9.56  1 OPERATOR = 47 PER 8 HR SHIFT  (450 work minutes)  2 OPERATOR = 94 PER 8 HR SHIFT
MEDIUM	20	.1470	2.84	
HEAVY	12	.1973	2.37	
SUPER HEAVY	4	.2286	.91	
	66			

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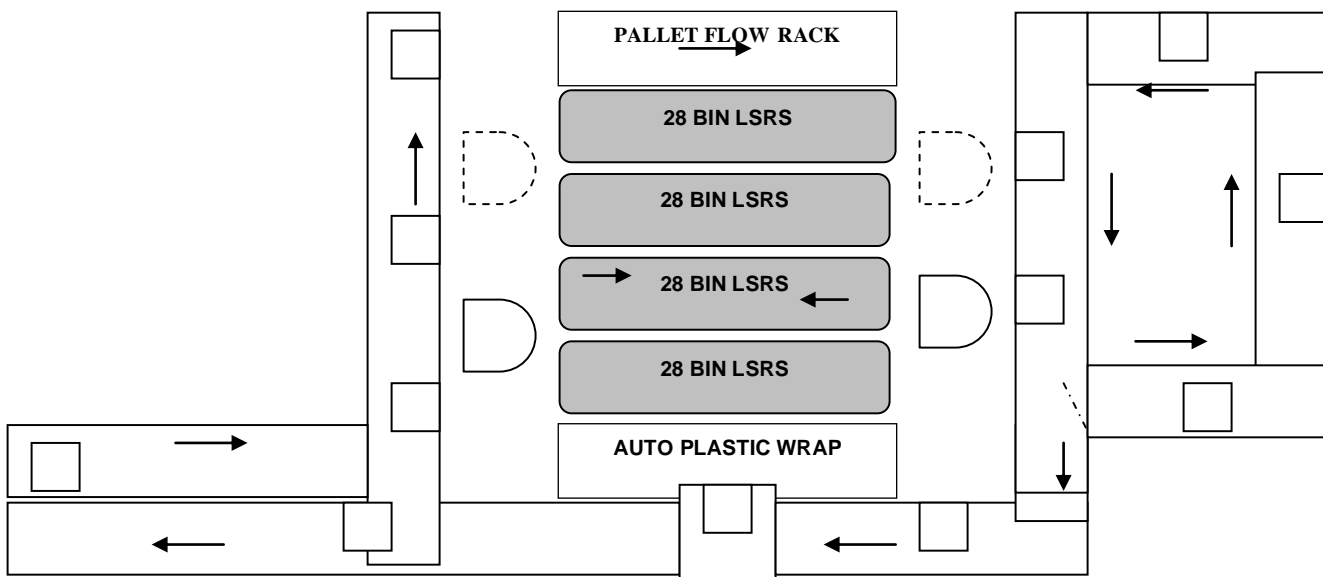
**PILOT RUN**

**SEMI-AUTOMATIC FULL CASE PICKING SYSTEM**

**SINGLE CASE PICKING CELL – EQUIPMENT**

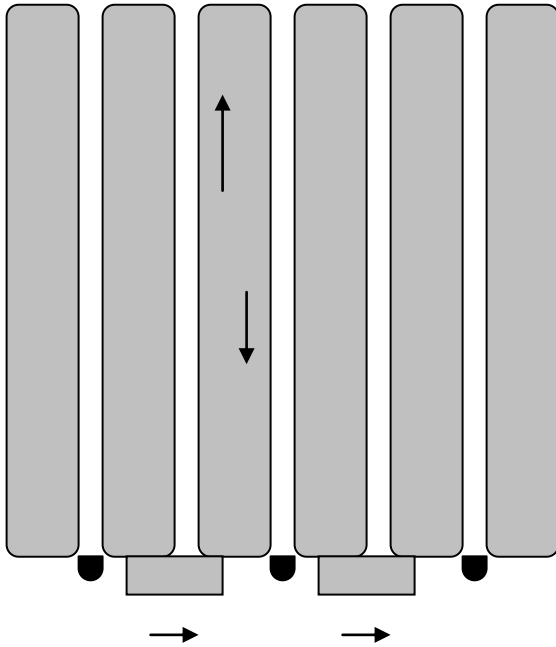


**DOUBLE CASE PICKING CELL - EQUIPMENT**

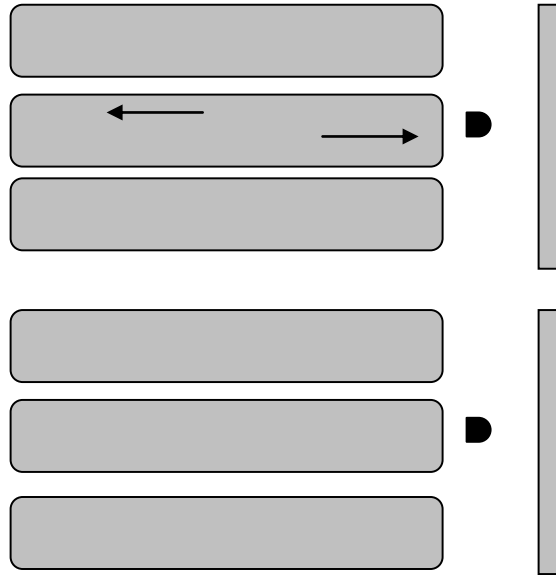


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**OTHER PICKING CONFIGURATIONS**

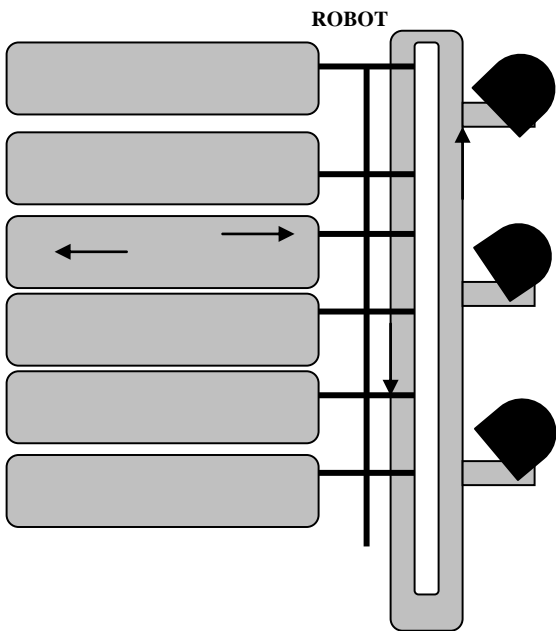
PICK AND PASS CONCEPT



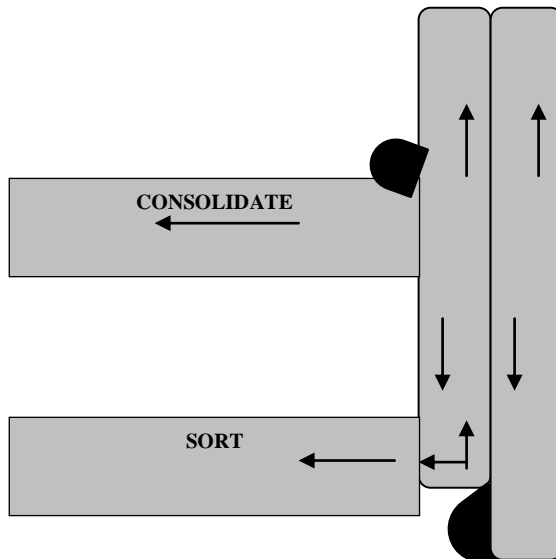
PARALLEL PICKING CONCEPT



REMOTE PICKING CONCEPT



SORTING AND CONSOLIDATION CONCEPT



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**C. SAVINGS**

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**PACED FULL CASE PICKING CAROUSEL SYSTEM  
WITH  
PALLET PLASTIC WRAP MACHINE  
USING OUR  
ATTENDANT INDUSTRIAL ENGINEERING SERVICES**

Will customize (time study, line balance, develop work station instructions/layout/visual aids/case shelf assignment, training, implementation) your full case put-a-way and picking to a semi-automated technique. JD Gray Associates utilized one family to prepare and cost our industrial engineering service proposal.

Our proposed semi-automated case put-a-way and picking paced conveyor...will incorporate the labor savings or output gain of our standards and methods program, our paced system and our semi-automated cells program.

Typical operation of a Paced Full Case Picking Carousel System – A first shift sku case breakdown operator removes pallet wrappings and corner supports from case pallet loads, groups like sku's by pallet, inputs the sku's and it's respective quantity into the lightree software system then places the pallet onto the inbound roller conveyor of the carousel. A first shift case put-a-way operator places the individual cases in the carousel location specified by the case weight type then inputs to the lightree software system the bin and shelf location of the case. When the pallet is empty it is placed on the gravity flow rack next to the carousel which takes it to an area immediate adjacent to case picking. The carousel software system recognizes the next pallet order to be picked and moves the carousel holding the correct bin of the first case to be picked to the front of the line then illuminates the shelf holding that correct case. A second shift case picker removes the empty pallet from the flow rack and places it on the live roller in front of him then picks the illuminated first case and places in on the empty pallet. While that activity is happening the carousel software system moves the second carousel holding the correct bin of the second case to be picked to the front of the line then illuminates the shelf holding that correct case. The second shift case picker removes the illuminated second case and places in on the empty pallet and the process continues until the pallet is full. The completed pallet then is moved by live roller conveyor to the automatic plastic wrap cell where the entire caseload is wrapped with plastic by an overhead-wrapping robot. An alternative to this procedure is that pallets containing orders requiring an identical sku are run sequentially allowing the second shift order picker to move the carousel one time for each sku to service multiple pallets/orders.

The wrapping time and case picking time have been line balanced. The supervisor plots setting on variable dwell timer for the length of time the pallet is to remain in a stationery position before indexing to the next station...this is the station control time we would develop during the line balancing segment of our proposal. The stationery time set on the variable dwell timer will create a pace for the case pick operator to finish his respective work task before a chime goes off indicating the dwell time has been depleted and signaling the next automatic index to the automatic plastic wrap cell.

As the requirements for pallets with picked cases changes so will the timing of the case put-a-way and picking operations as well as the number of operators...that could mean two case pickers instead of one with different picking assignments or in the case of the double case picking cell as many as four picking operators to increase the pallet output with up to four multi-shift case put-a-way operators. We will develop a work task instruction sheets and visual aids to assist in the training of new operators and temporary replacement of existing operators for each pallet requirement contingency. This "pilot" proposal develops a return-on-investment for a single case picking cell and a double case picking cell.

The "pilot " is the first step towards case picking automation. By placing the case in bar coded trays they can be put-a-way and picked using an insert/extract robot and the inventory monitored throughout the process. The I/E robot can place the tray on a precision platform where a pick and place robot would remove the case from the tray then orient and place the case on the pallet while returning the tray to the I/E robot for reuse.

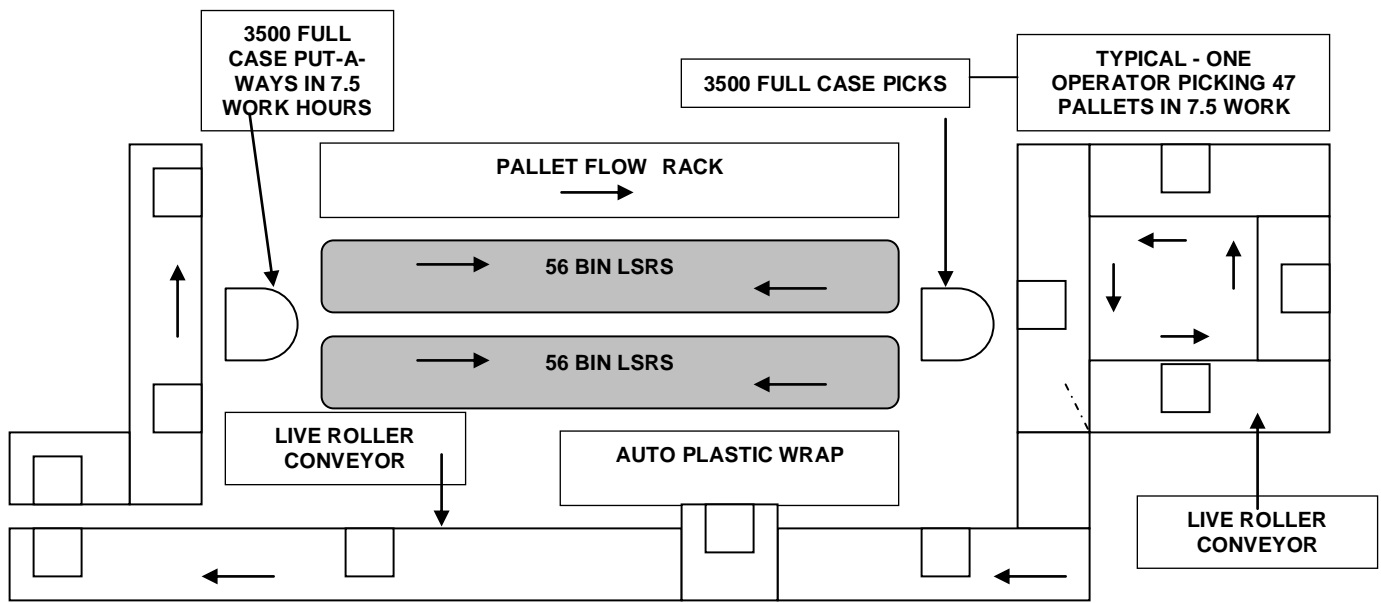
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**PILOT RUN**

**SEMI-AUTOMATIC**

**FULL CASE PICKING SYSTEM**

**SINGLE CASE PICKING CELL  
GENERIC SPECIFICATION**

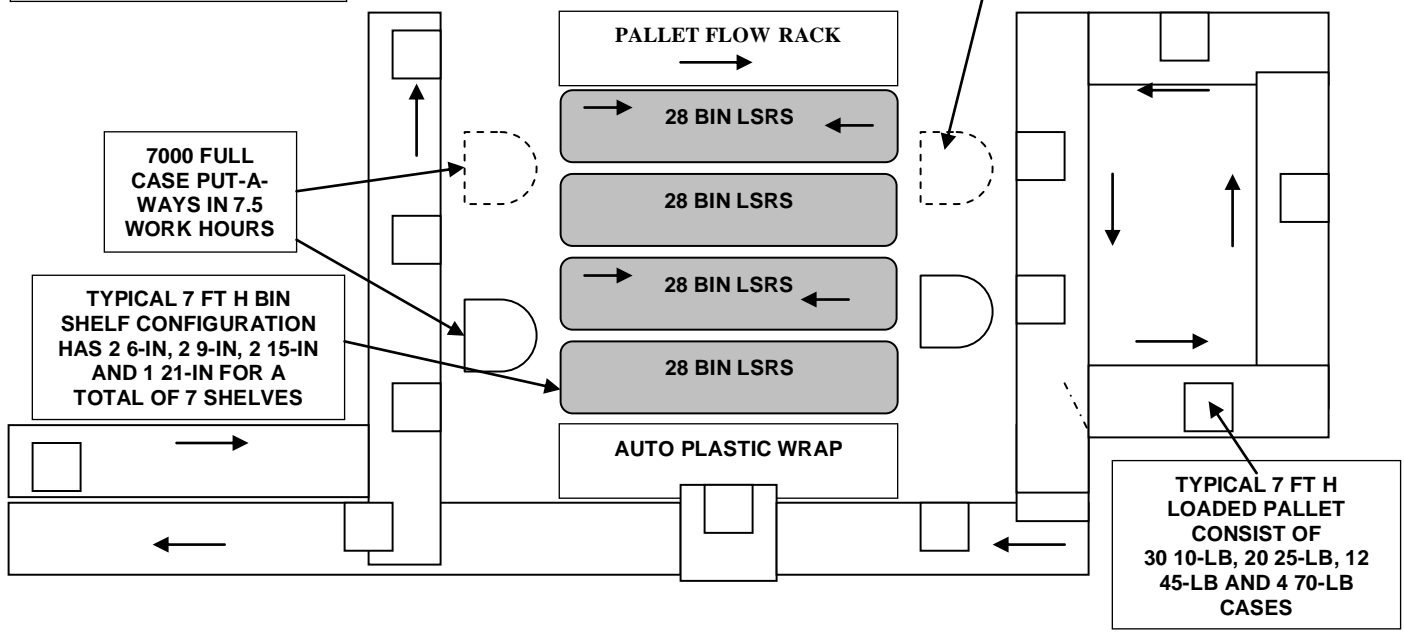


TYPICAL LSRS 7 FT H BIN CASE CONFIGURATION HAS 20 4-IN H, 10 8-IN H, 2 12-IN H AND 1 18-IN H FOR A TOTAL OF 33 CASES PER BIN OR 3696 CASES PER SYSTEM

**DOUBLE CASE PICKING CELL  
GENERIC SPECIFICATION**

TYPICAL - TWO OPERATORS PICKING 94 PALLETS IN 7.5 WORK HOURS

7000 FULL CASE PICKS



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THE LSRS (LIVE STORAGE AND RETRIEVAL SYSTEM)  
HAS THE FOLLOWING ADVANTAGES:

- Modular design permits easy installation, expansion or movement
- Unique bin design distributes shelf loads through two sides and back of bin, forming a rigid box structure
- Variable concepts to select from including pick and pass, remote picking, parallel picking and sort & consolidation
- Maximizes square & cubic foot utilization as well as storage density using double and triple deck carousel stacking
- Multiple orders picked sequentially
- Maximizes throughput – no walking, searching or lifting – up to 600% increase in picking rate
- ‘Hot Picks’ can be integrated into system without disturbing the flow of downloaded stock orders
- Insertion/extraction robot can pick from multiple carousels
- Exacting quality of the picked item that conforms fully and reliably to customer requirements
- Computer software that is upgradeable
- High security of items stored as carousels are easily enclosed
- High capacity loads up to 1,000 lbs per bin
- Centralized distribution of parts
- Eliminates need for material handling indirect labor operators
- Typical stockroom and finished goods inventory reduction is 10%

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## SAVINGS

**Labor Productivity**

*Gains up to 800% over the use of conventional shelving and racks and fork trucks are accomplished by eliminating wasted walk and search time.*

**Inventory Accuracy**

By providing accurate and timely inventory data, both the inventory levels and shortages can be reduced dramatically

**Space Reduction**

The carousels recover lost floor space by achieving the same storage capacity in *30% less space* than with static shelving.

**Fast Payback (ROI)**

Increased efficiencies allow companies to *recover their investment within 12-18 months.*

**High Throughput**

Picking rates up to 500 lines per hour, per operator allow *a single worker* to be as productive as *eight workers* picking from static shelving.

**Extended cut-off times**

Orders can be prioritized by computer based on shipping times and thus increases the ability to *ship more orders in a day.*

**Improved Service to your Customers**

Integrating inventory control software, light directed picking, and bar code scanning *assures up to 99.9% accuracy.*

**Equipment Reliability**

Durable and well engineered, carousels *provide nearly 100% uptime.*

### SAVINGS SUMMARY

#### SINGLE CASE PICKING CELL

#### OPERATORS REQUIRED TO PROCESS 3500 CASES PER 8 HOUR SHIFT

JOB CODE	CONVENTIONAL CASE OPERATIONS WITH FORK TRUCK	CAROUSEL CASE PICK WITH LIGHTREE SOFTWARE	USING A LABOR RATE OF \$20/HR (\$15/ HR + 33% FRINGE)
CASE PUT-A-WAY	0.995	0.130	
CASE PICK	0.536	0.130	
TOTAL	1.531	0.260	
MINUTES	5358	900	
OPERATORS	12	2	10 OPERATORS SAVED
SAVINGS		83%	\$400,000



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**CASE PUT-A-WAY**

WORK ELEMENT	ELEMENTAL TIME	STATUS
SCAN LABEL OF PALLET LOAD IN STAGING LANE ____ READ HAND COMPUTER FOR PALLET RACK LOCATION.	.224	AUTOMATED
TRANSPORT PALLET LOAD OF CASES TO ROOM ____ - AISLE ____ WITH PALLET JACK TO PALLET RACK LOCATION	.112 EST	AUTOMATED
SCAN LABEL OF PALLET RACK. VERIFY ITEM DESCRIPTION (PALLET ID VS HAND COMPUTER).	.254	AUTOMATED
FIND CASE LOCATON ON PALLET RACK. VERIFY ITEM DESCRIPTION (CASE ID VS HAND COMPUTER). VERIFY CASE QUANTITY.	.088	AUTOMATED
REMOVE CASE (S) FROM PALLET AND PLACE ON PALLET RACK OR BIN SHELF	.130	.130 (MANUAL)
READ HAND COMPUTER FOR PALLET LOCATION IF THERE ARE CASES REMAINING ON PALLET.	.075	AUTOMATED
SUB TOTAL	.293	.130
RETURN PALLET JACK TO STAGING LANE - ROOM ____ - AISLE ____	.112 EST	AUTOMATED
TOTAL	.995	.130
SAVINGS		87%

**CASE PICKING**

WORK ELEMENT	ELEMENTAL TIME	STATUS
READ HAND COMPUTER FOR NEW PALLET LOCATION	0.075	AUTOMATED
PALLET JACK FROM STAGING LANE TO ROOM - AISLE - PALLET RACK.	.008	AUTOMATED
SCAN LABEL OF PALLET RACK	0.003	AUTOMATED
FIND CASE ON STORAGE PALLET.	.030	AUTOMATED
VERIFY ITEM DESCRIPTION (CASE ID ON PALLET VS HAND COMPUTER).	.030	AUTOMATED
VERIFY CASE QUANTITY.	.028	AUTOMATED
REMOVE CASE (S) FROM STORAGE PALLET AND PLACE ON ORDER PALLET.	.130	.130 (MANUAL)
READ HAND COMPUTER FOR NEXT CASE LOCATION.	.075	AUTOMATED
SUB TOTAL	.293	.130
TRANSPORT PALLET TRUCK TO NEW CASE LOCATION	0.139	AUTOMATED
WRAP PLASTIC AROUND FULL PALLET LOAD	0.006	AUTOMATED
PRINT LABEL AND APPLY TO PALLET LOAD	0.004	AUTOMATED
TRANSPORT PALLET LOAD FROM (ROOM ____ & AISLE __) WITH PALLET JACK INCLUDES SCANNING ID OF STAGING LANE.	0.008	AUTOMATED
TOTAL	0.536	0.130
SAVINGS		72%

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**D. COST – FIXED  
INDUSTRIAL ENGINEERING PROPOSAL**

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**INDUSTRIAL ENGINEERING PROPOSAL - SEMI AUTOMATIC**  
**MATERIALS HANDLING SYSTEM CASE PUT-A-WAY AND PICK SYSTEM**  
**ONE FAMILY WITH REPETITIVE PICK LIST - 400 SKU (SHELVES)**  
**VS 112 SHELVES MAXIMUM = 13 % OF PILOT LSRS Capacity**  
**INVOLVING MULIPLE PICKED CASE PALLET PATTERNS**

Service Activity	Fee Per Service Activity	# of Pick Lists	Service & Fee Selection
Work Measurement of Each Sku's Case Dunage Removal and Sortation from Pallet, Sku Case Consolidation onto Pallet, Case to LSRS Shelf for Storage, Case Pick from LSRS Shelf, Pallet Label Application and Pallet Plastic Wrap	\$1,800	1	\$1,800
Line Balance of above using all LSRS configurations with variable operators to attain optimum throughput	\$1,200	1	\$1,200
Final Case Put-a-way and Pick and Storage System (LSRS) Equipment Specification/Quote	\$1,100	1	\$1,100
Pallet Utilization Determination in Existing Pallet Racks. Case and Pallet Order Demand vs. JIT Critique	\$1,200	1	\$1,200
Develop a Phased Plan and Layout to Relocate Existing Pallet Racks during the Transition Period while maintaining Order Continuity.	\$1,000	1	\$1,000
LSRS shelf layout by case size and weight	\$2,000	1	\$2,000
LSRS maximum output vs. Thru put capacity with various Job Code Line Balances	\$1,500	1	\$1,500
Work Station Detailed Layout	\$1,800	1	\$1,800
Work Station Visual Aids	\$1,500	1	\$1,500
Departmental Layout	\$ 600	1	\$ 600
Final Job Code Detailed Description	\$ 600	1	\$ 600
Work Station Instructions	\$ 900	1	\$ 900
Group Leader Training Including a Written Procedure for Sku's Case Dunage Removal and Sortation from Pallet, Sku Case Consolidation onto Pallet, Case to LSRS Shelf for Storage, Case Pick from LSRS Shelf, Pallet Label Application and Pallet Plastic Wrap	\$ 600	1	\$ 600
LSRS System Set-up	\$1,000	1	\$1,000
LSRS System Installation	\$1,700	1	\$1,700
LSRS System Follow-up	<u>\$1,500</u>	1	<u>\$1,500</u>
Industrial Engineering Fixed Price	\$20,000	1	\$20,000
Travel Expenses – Air Travel, lodging and car rental on four monthly 10 day trips on-site	Travel Expenses Prepaid by Client		Travel Expenses Prepaid by Client
Per Diem Expenses to be billed at the conclusion of each month's activity	Per Diem Expenses Reimbursed by Client		Per Diem Expenses Reimbursed by Client

# JD GRAY ASSOCIATES INDUSTRIAL ENGINEERING CONSULTANTS

## Industrial Engineering Agreement

- JD Gray Associates shall submit detailed service fee invoices to Company. Said invoices shall contain a detailed itemization of the date(s) on which services were provided and a description of tasks completed during the period with respect to which the invoice is submitted. On-site travel expenses to be prepaid with the exception of per diem that will be submitted after each trip.
- Each compensation payment made by Company to JD Gray Associates shall be within 10 days.
- Company Property – JD Gray Associates agrees that any confidential information furnished by Company to JD Gray Associates or acquired by JD Gray Associates during the period in which JD Gray Associates is retained by Company is and shall remain the sole and exclusive property of Company and shall be placed in the hands of Company by JD Gray Associates upon termination of this Agreement including any copies made thereof.
- Confidentiality – JD Gray Associates agrees that at no time, either during or after the period in which JD Gray Associates is retained by Company shall JD Gray Associates utilize or disclose to any third party any of the confidential information of Company.

Date: \_\_\_\_\_ COMPANY OFFICIAL \_\_\_\_\_ Purchase Order Number: \_\_\_\_\_

### Industrial Engineering Contract Terms:

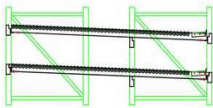
#### Payment Schedule

1. 20% upon approval and Purchase Order	\$4,000
2. 20% end of 1 <sup>st</sup> month	\$4,000
3. 20% end of 2 <sup>nd</sup> month	\$4,000
4. 20% end of 3 <sup>rd</sup> month	\$4,000
5. 20% upon implementation	\$4,000

If there are additional families desired to be added to our pick and pack paced conveyor industrial engineering service activity, an additional consulting fee of \$20,000 plus per diem travel expenses per family is required.

Five days per month on-site for five months for a total of 25 workdays.

Final Case Put-a-way and Pick and Storage System (LSRS) Equipment Specifications on



Pallet Gravity  
Flow Rack



Pallet Live Roller  
Conveyor



Automatic Pallet Shrink  
Wrap Machine



LSRS

We guarantee savings on productivity systems (LMS, *Standards and Methods*, *Paced Assembly Production Lines*, *Industrial Incentives*, *Short-Interval-Scheduling*, *Labor Reporting* and *Semi-Automated Pick/Pack Systems*) approved by your management and installed by us. Our consulting fees for lengthy projects or concurrent productivity system installations can be prorated on a **retainer** basis.

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**E. COST – BUDGET EQUIPMENT QUOTATION**

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SINGLE CASE PICKING CELL – EQUIPMENT**

A Configuration - 2- White 56 Bin Horizontal Carousel	
Configuration	1 Pod of 2
Model Number:	WH 56
Length	64.87 feet
Width	73 inches
Height:	102 inches
Available cube	21 cu ft. per bin
Per carousel cube	1187 Cu Ft
Total System Cube	2375 Cu Ft
Estimated Live Load	500 lbs. per bin
Rated Live Load	1500 lbs. per bin
Bin Dimensions	Height-85", Width-24.6", Depth-20"
Bin Style	Galvanized Sides/Back Bins
Shelf Details	10 Shelves per bin, 1120 Total shelves
Shelf Dimensions	24" Wide x 22" Deep
Shelf Capacity	125 lbs. per Shelf
Shelves adjustable:	3" centers
Speed	60 FPM
Drives	Dual 1.5 HP Drives
Access Panels	3
Track Lubricator	1
Controls:	1- Motor Controller 1- NEMA 12 Panel 1- PLC and Cabling
Voltage Requirements:	480V/3P/60C
Photo Eyes	Front and Rear
Structure	Single Tier
Foot pedal	1 at Front and End of machine
Bin/ Shelf Location Controls	Scott Tech software
Bin Numbers	1-56 both sides of bins
Light Trees	1 at Front and 1 at Rear of Carousel Pod

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**A Configuration- Lewco Pallet Live Roller Conveyor**

1- Lot of Live Roller Conveyor consisting of:  
Effective width 54"  
Roller Centers 6"  
Roller Diameter 2.5" 11ga  
Conveyor and transfer speed 30 fpm  
Elevation 18" TOR  
Support Centers 5'0"  
Drives ¾ HP 460V 3P 60 C  
Control Voltage 110V 1P 60C  
All transfers 2 Strand 36" apart

4- Transfer Assembly Mounted in Conveyor	3' L
2- Chain Driven Roller Conveyor Assembly	12' L
1- Chain Driven Roller Curve	90 degree
5- Chain Driven Roller Conveyor Assembly	5' L
2- Chain Driven Roller Conveyor Assembly	15' L
1- Chain Driven Roller Conveyor Assembly	5' L
1- Chain Driven Roller Conveyor Curve	90 degree
1- Chain Driven Roller Conveyor Assembly	22' L

**A Configuration- Lewco Gravity Flow Pallet Return Conveyor**

2 ½" Dia, 11 gauge wall roller  
1 1/16" axle  
51" between frames  
6" Roller centers  
5" x 1-1/2" 8 gauge frame with rollers set low  
3- 65' lengths of conveyor  
Guard rail both sides 2" Height  
4- Centrifugal roller brakes per section  
Pallet escapement to singulate pallets to last zone for pick up  
Fixed end stop with pallet notches  
8- Multi-Tier Support per 65' length of conveyor  
Height of support 69"  
Width of support 56"

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**A Configuration Aetna RotoPlat 3000HD Stretch Wrapper with 5 zone Pallet Live Roller Conveyor**

Rotoplat 3000HD automatic turntable stretch wrapping machine  
Maximum Load Size 53"L x 48"W x 92"H  
Standard Load Size 48"L x 40"W x 92"  
Production Speed Up to 53 Loads per hour  
Maximum Load Weight 4,400 lbs.  
Steel mesh safety fence around the machine with access by safety limit switch  
Safety Light Barriers positioned at end of conveyors  
Allen Bradley Microlgix 1400 PLC with RS232 and Ethernet communication gate  
Allen Bradley Panel View 600 Plus  
Allen Bradley Variable Speed Drive for wrapper and turntable conveyor  
SEW Eurodrive motors for machine  
SEW Eurodrive motors for conveyor  
Automatic film cut, clamp and wipe system  
Turntable with powered roller conveyor 3" rollers on 3.4" centers, 51" between frames  
81.5" powered roller on Infeed and exit

**A Configuration- Scott tech Software package with Computers and Scanners**

PicPro Software to operate 1 Pod of carousels, 1- Lot of Live Roller Conveyor for the Putaway operation and Pick operation. Including the flow of material from the pick operation through the stretch wrapper and staged at the end of the conveyor line. Pick Pro to keep inventory in carousels and will be interfaced to the host system to allow a seamless flow of material within the Carousel System. RF Scanners are included to track material for put away, picking and stretch wrapping.

**A Configuration Total Budget Price FOB Destination Installed and Debugged with Training  
\$511,764.00**



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**DOUBLE CASE PICKING CELL – EQUIPMENT**

<b>B Configuration - 2-White 28 Bin Horizontal Carousels</b>	
Configuration	2 Pod of 2
Model Number	WH 28
Length	33.82 feet
Width	73 inches
Height	102 inches
Available cube	21 cu ft. per bin
Per carousel cube	593 Cu Ft
Total System Cube	2375 Cu Ft
Estimated Live Load	500 lbs. per bin
Rated Live Load	1500 lbs. per bin
Bin Dimensions	Height-85", Width-24.6", Depth-20"
Bin Style	Galvanized Sides/Back Bins
Shelf Details	10 Shelves per bin, 684 Total Shelves
Shelf Dimensions	24" Wide x 22" Deep
Shelf Capacity	125 lbs. per shelf
Shelf Adjustability	3" centers
Speed	60 FPM
Drives	Single 1.5 HP Drive
Access Panels	2
Track Lubricator	1
Controls	1- Motor Controller 1- NEMA 12 Panel 1- PLC and Cabling
Voltage Requirements	460V/3P/60C
Photo Eyes	Front and Rear
Structure	Single Tier
Foot Pedal	1 at Front end of machine
Bin/Shelf Location Controls	Spectrum Software with Bin Location
Bin Numbers	1-28 both sides of bins on all 4 carousels
Light Trees	1 at Front and 1 at Rear of each Carousel Pod

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**B Configuration Lewco Pallet Live Roller Conveyor**

Same as specifications of the A Configuration with following listing of individual conveyors

- 4- Transfer Assembly Mounted in Conveyor 3' L
- 4- Chain Driven Roller Conveyor Assembly 12' L
- 1- Chain Driven Roller Conveyor Curve 90 degree
- 5- Chain Driven Roller Conveyor Assembly 5' L
- 4- Chain Driven Roller Conveyor Assembly 15' L
- 1- Chain Driven Roller Conveyor Assembly 18' L
- 1- Chain Driven Roller Conveyor Curve 90 degree
- 2- Chain Driven Roller Conveyor Assembly 20' L
- 1- Chain Driven Roller Conveyor Assembly 30' L

**B Configuration Lewco Gravity Flow Pallet Return Conveyor**

Same as specifications of the A Configuration except the length of the gravity conveyor is 35'

**B Configuration Aetna Rotoplat 3000HD Stretch Wrapper with 5 zone Pallet Live Roller Conveyor**

Same as specifications of the A Configuration

**B Configuration Scott tech Software Package with Computers and Scanners**

Same as specifications of the A Configuration except Putaway and Picking are accomplished with 2 pods of carousels. Rather than 1 pod of carousels. Picking may be accomplished by Parallel or Pick and Pass.

**B Configuration Total Budget Price FOB Destination Installed and Debugged with Training  
\$606,764.00**

Delivery: 14-16 weeks ARO

Installation- 3-4 weeks after receipt of material

Sales tax has not been included in this quotation.

Terms: To Be Determined