ABC Inc.

Case Study

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The Team

- ABC Inc. is a distribution corporation struggling to keep up with the changing demands of their 200 Brick & Mortar retail stores and rapidly growing small stores and online orders.
  - Their current picking process is designed to handle the initial proportions of demand, 50/50 Repack to Full Case orders.
  - The current proportions of demand require the ABC's East and West distribution centers to handle 80/20 Repack to Full Case orders.
- The current system of operation can't handle multiple units of measure
  - ie. Cases, Eaches, Pallets, etc.
- The lead time of Replenishment store orders can take up to 10 days
- The East and West distribution centers are currently optimized to handle Brick & Mortar store orders and need to be optimized for Brick & Mortar, Small Store, and Online orders

The Alternatives

- **Option 1:** ⅚ order cluster picking with automated print and apply labeling.
- **Option 2:** ⅚ order cluster picking directed with voice instead of radio frequency terminals.
- **Option 3:** Batch-pick-to-put with non-automated picking. Put-to-light system is utilized at put-stations.
- **Option 4:** Batch-pick-to-put incorporating an automated goods-to-person machine with a Put-to-Light system at put-stations

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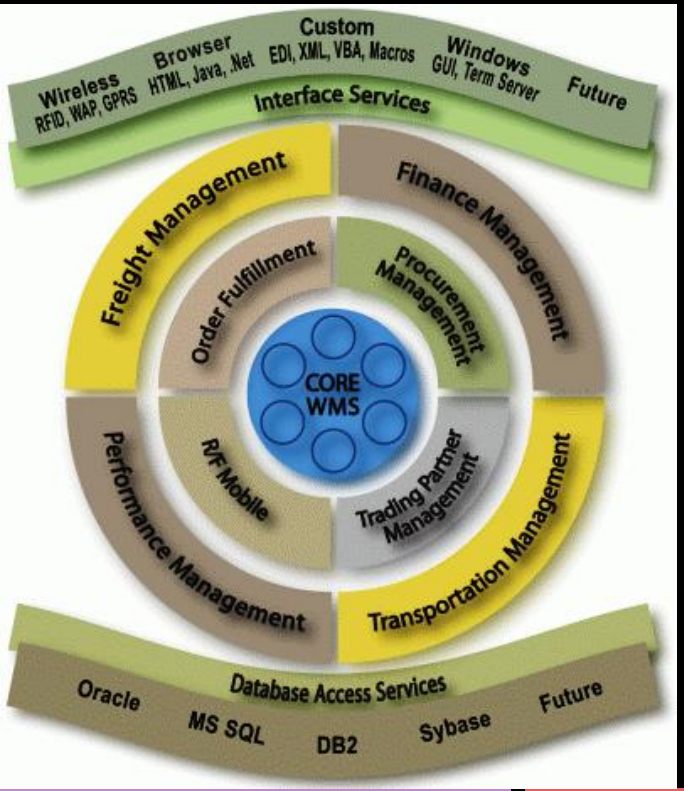
Pick-To-Light

- Locations light up that need to be picked from
- Quantity to be picked is specified
- Once quantity is picked, button is pressed to confirm pick
- Worker then moves on to next lit up location
- Increases efficiency which in turn relieves congestion of workflow
- Helps to improve lead-time

Put-To-Light

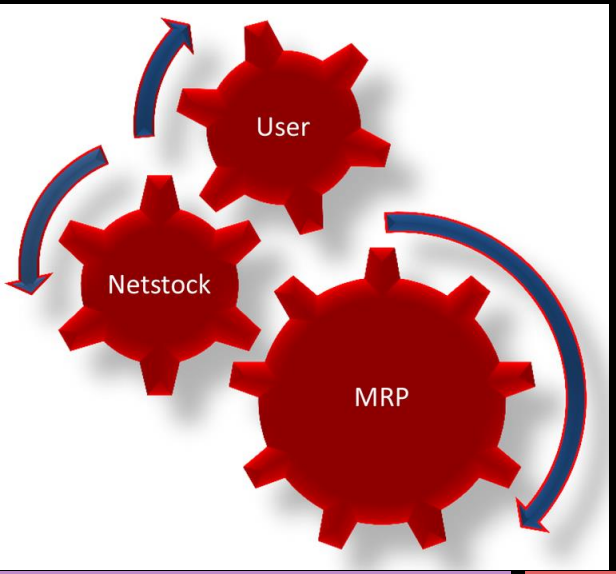
- Locations light up that house order SKUs
- Quantity to be put in order is specified
- Once quantity is put, button is pressed to confirm
- Worker then moves on to next lit up location
- Significantly increases efficiency and order accuracy
- Also helps to improve lead time

Warehouse Management System



- Identifies pickers' locations and properly allocates work to each picker based on this location
- Coordinates replenishment of pick and storage locations
- Determines optimal placement of products for storage
- Allows rush orders to be programmed and will sort orders based on priority, customer, ship to, carrier, etc.
- Recognizes problem locations and can allocate employees and available locations to pick up the extra slack to work around the problem
- Minimizes overstock and level of inventory
- Handles multiple units of measure (each, case, etc.)

Material Requirements Planning



- Monitors levels of inventory
- Signals for replenishment
- The capacity of “finger storage” won’t be an issue with efficient replenishment of storage locations.
- The MRP software will track the current inventory levels while the WMS software coordinates replenishment tasks.

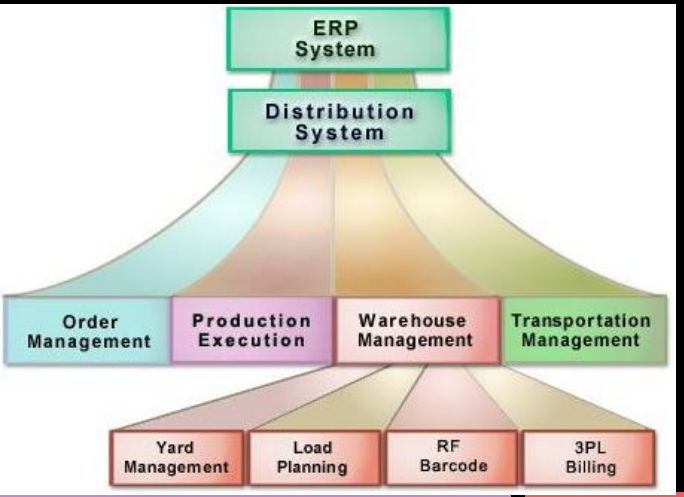
Enterprise Resource Planning

1. Manages commercial functions of the business such as planning, inventory, purchasing, finance, HR, etc.

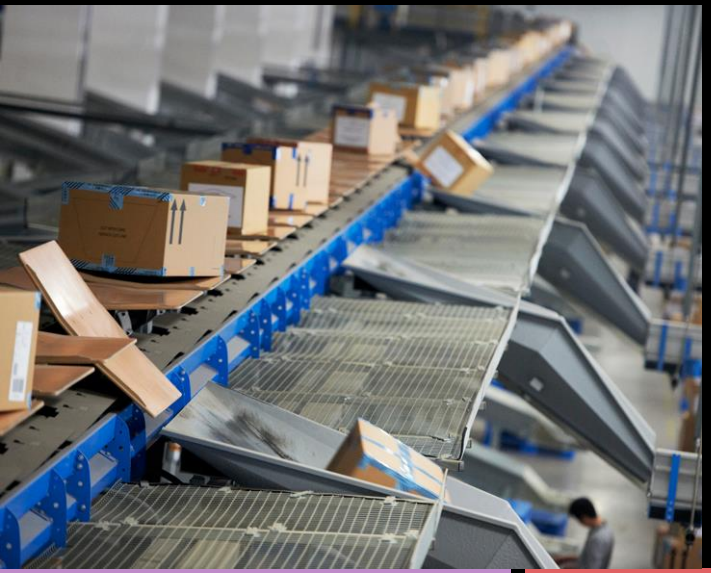
1. Automatic and coherent workflow from one department to another to ensure smooth and quicker transactions

1. Allows complete visibility of all the individual department processes

1. It monitors the transactions and sales of store, and is compatible with MRP and WMS to handle changes in order proportions.



Shipping Sorter



- Allows for various products of multiple orders in each pick zone to be put onto the conveyor system.
- Will sort and send products to the correct location of the facility to satisfy Brick & Mortar, small store, and online orders as well as orders sent to 3PL.
- Shorter lead times due to automated sortation of clustered orders.
    - Utilizes scanners and diverts.

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Profit Baseline

Product	Nov/Dec Revenue	Avg. Price	Cubic [in] (Min)	Cubic [in] (Max)
TV	$43,671,100.00	$550.00	4900	5500
Home Theatre System	$2,368,000.00	$500.00	15000	1000000
Camera	$295,628,000.00	$400.00	150	200
Car Audio Equipment	$122,371,200.00	$400.00	5500	15000
Laptop	$370,051,500.00	$700.00	500	800
Tablet	$202,769,500.00	$250.00	250	400
Cell Phone	$449,118,075.00	$175.00	30	80
Landline	$12,699,900.00	$50.00	400	500
GPS	$82,887,800.00	$200.00	200	250
Video Games	$279,020,950.00	$50.00	0	30
Office Equipment	$31,027,960.00	$40.00	800	1800
Personal Audio Equipment	$309,161,600.00	$200.00	80	150
Home Audio Equipment	$59,070,500.00	$100.00	1800	4900

Year	1	2	3	4	5
Profit Baseline	$2,372,838,389.25	$2,467,751,924.82	$2,566,462,001.81	$2,669,120,481.89	$2,775,885,301.16

The Options

Option	Efficiency Profit	Total Cost	Net Present Value
Automated Labeling	$31,774,219.49	$1,124,812.00	$26,378,813.38
Voice Terminals	$57,620,705.99	$4,236,734.00	$45,942,813.95
Put to Light	$80,028,758.32	$3,039,038.00	$65,530,970.66
Goods-to-Man Machine	$121,396,248.51	$17,729,300.00	$55,216,125.32
Solution: PTL, WMS, MRP, ERP, Sorter	$431,914,375.27	$37,956,830.00	$316,443,252.98

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Equipment Specifications

1. WMS Software:
    - Platform: Windows
    - Processor: Intel Core 2 Duo Recommended
    - Memory: 1 GB Recommended
2. MRP Software:
    - Platform: Windows
    - Form: 500 mm deep, 1000 mm long, 750 mm high
    - Material of Construction: Black Polyethylene
3. ERP Software:
    - Server : 1 GB RAM minimum
    - Processor: 1 GHz minimum
    - Network: 100 MBit state-of-the-art network
4. Sortation Conveyor:
    - Belt: High strength, tensile rating of 330 pounds per inch of belt width
    - Belt speed: 4 feet per minute minimum, 150 maximum
    - Motor: Severe duty, class F insulation for long motor life

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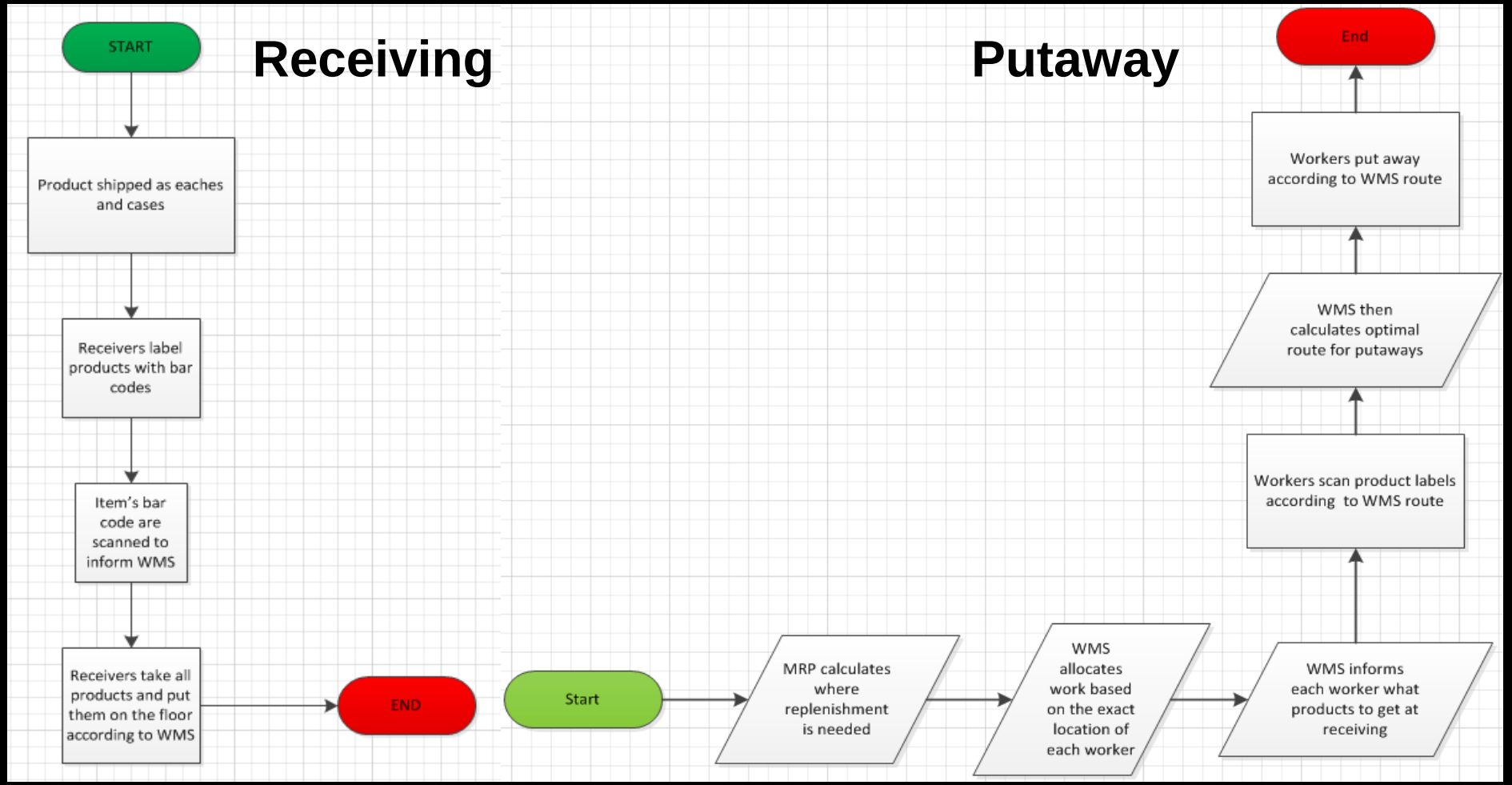
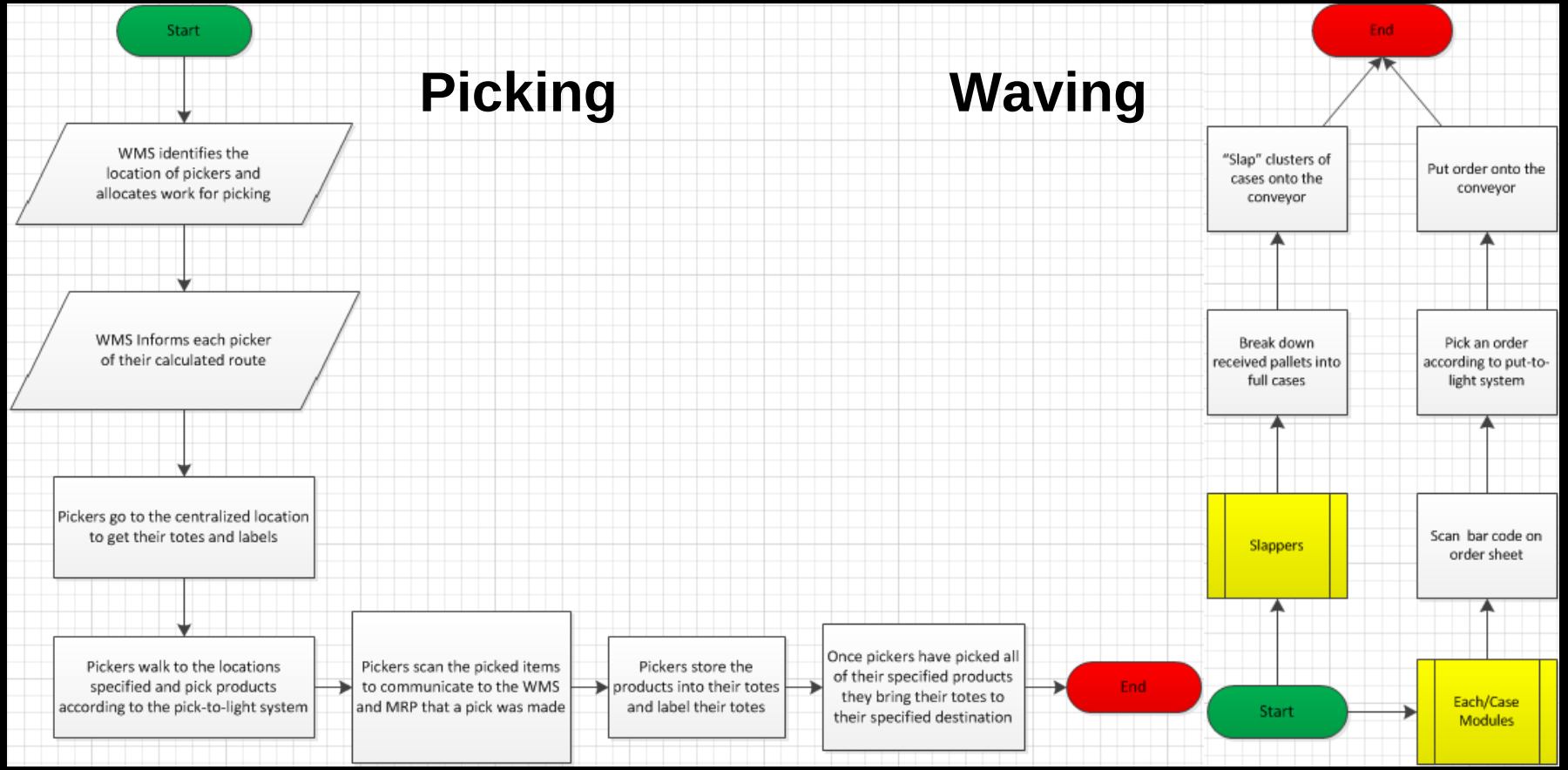

Receiving
START
Product shipped as eaches and cases
Receivers label products with bar codes
Item's bar code are scanned to inform WMS
Receivers take all products and put them on the floor according to WMS
END
Putaway
Start
MRP calculates where replenishment is needed
WMS allocates work based on the exact location of each worker
WMS informs each worker what products to get at receiving
Workers scan product labels according to WMS route
WMS then calculates optimal route for putaways
Workers put away according to WMS route
End


Picking
Start
WMS identifies the location of pickers and allocates work for picking
WMS Informs each picker of their calculated route
Pickers go to the centralized location to get their totes and labels
Pickers walk to the locations specified and pick products according to the pick-to-light system
Pickers scan the picked items to communicate to the WMS and MRP that a pick was made
Pickers store the products into their totes and label their totes
Once pickers have picked all of their specified products they bring their totes to their specified destination
End
Waving
Start
Each/Case Modules
Scan bar code on order sheet
Pick an order according to put-to-light system
Put order onto the conveyor
Slappers
Break down received pallets into full cases
"Slap" clusters of cases onto the conveyor
End

Throughput Rates

Receiving Parameters (Per Worker)		
Receiving Rate:	100	cases/hr (norm)
	118	cases/hr (peak)
Putaway Parameters (Per Worker)		
Stocking Rate:	85	cases/hr
Replenish Rate:	115	cases/hr (norm)
	150	cases/hr (peak)
Picking Parameters (Per Worker)		
Get Label:	30	seconds (tower)
	56	seconds (aisle)
Set Tote:	40	seconds/tote (tower)
	60	seconds/tote (aisle)
Walking:	2	ft/second (tower)
	1	ft/second (aisle)
Picking:	10	seconds/tote
Process:	1945	seconds/tote
	35	eaches/hr
	16	cases/hr
Waving Parameters (Per Worker)		
Slapper 1 Rate:	109	cases/hr
Slapper 2 Rate:	109	cases/hr
Slapper 3 Rate:	109	cases/hr
Each Module Rate:	210	eaches/hr
Case Module Rate:	98	cases/hr

Nov/Dec Demand (Per DC)		
61		days
22.5		hours/day
1372.5		hours
5,172		products/hr
1,963		cases/hr
4,190		eaches/hr
Peak Throughput Rates (Per DC)		
Receiving:	4058	cases/hr
Putaway:	4058	cases/hr
Picking:	4190	eaches/hr
	1963	
Waving:	4,190	eaches/hr
	1963	cases/hr
Average Throughput Rates (Per DC)		
Receiving:	2029	cases/hr
Putaway:	2029	cases/hr
Picking:	2095	eaches/hr
	981	
Waving:	2,095	eaches/hr
	981	cases/hr

Required Labor

Receiving (Per DC)		
Required Pickers:	35	(Peak Conditions)
Required Pickers:	20	(Avg Conditions)
Putaway (Per DC)		
Required Pickers:	35	(Peak Conditions)
Required Pickers:	20	(Avg Conditions)
Total Operation (Per DC)		
Required Operators:	204	(Peak Conditions)
Required Operators:	107	(Avg Conditions)

Picking (Per DC)		
Required Pickers:	119	(Peak Conditions)
Required Pickers:	60	(Avg Conditions)
Waving (Per DC)		
Each Module Workers:	20	(Peak Conditions)
Case Module Workers:	10	(Peak Conditions)
Workers per Slapper:	3	(Peak Conditions)
Each Module Workers:	10	(Avg Conditions)
Case Module Workers:	5	(Avg Conditions)
Workers per Slapper:	2	(Avg Conditions)

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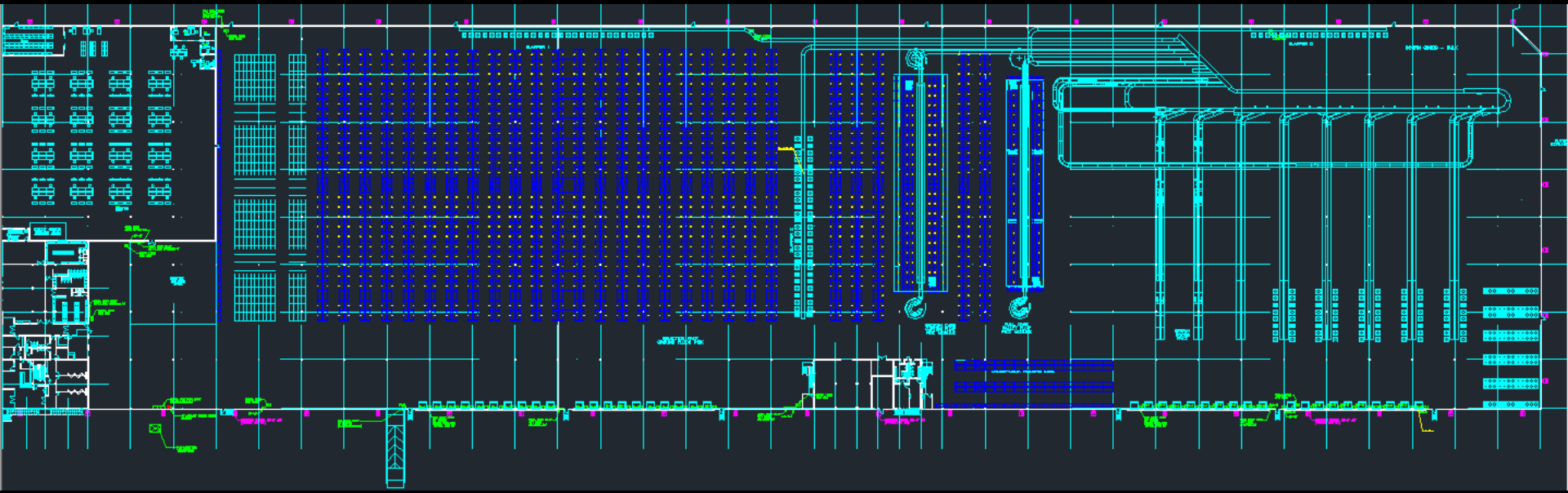
AutoCad Layout



Questions?