Horizontal Carousel Basics

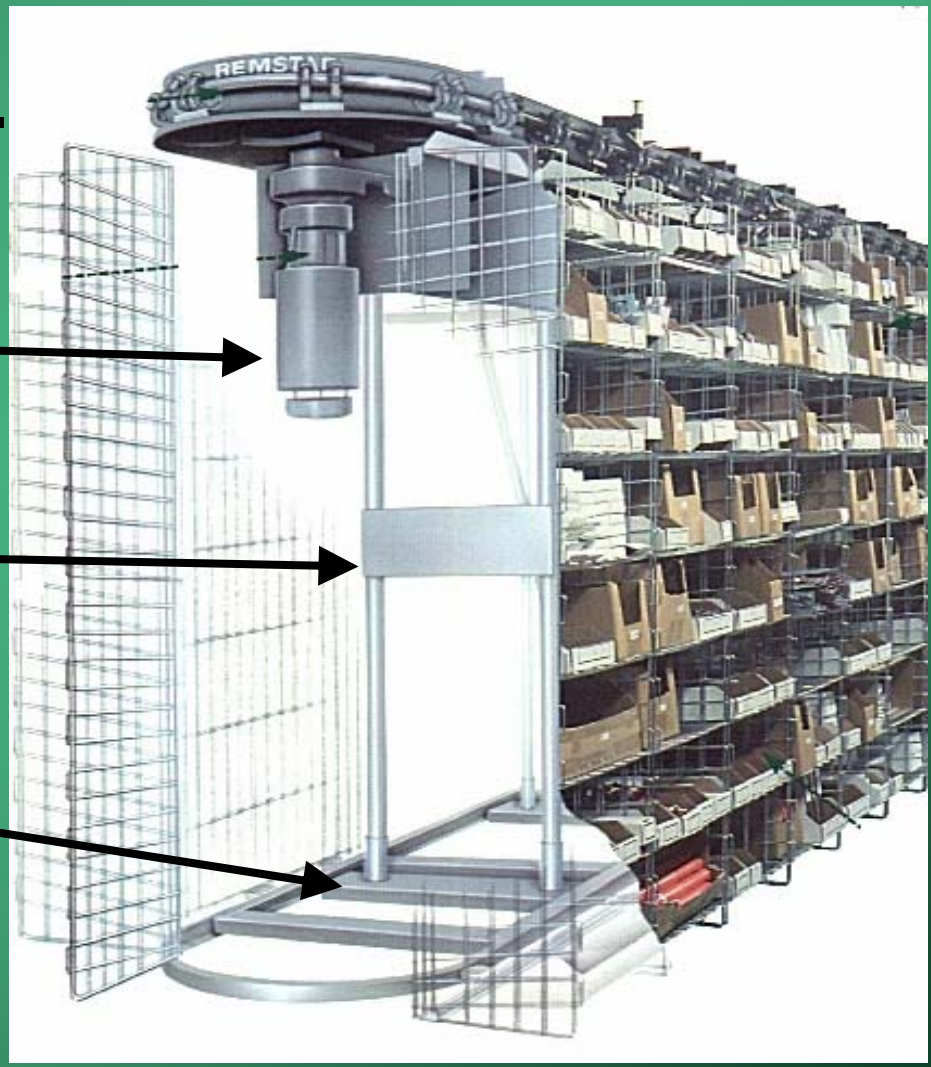
Horizontal Carousels

- What Are They?
  - Moving Shelving
  - Oval Track
  - Bring Product to Operator
  - Space Efficient – No Aisles

MEGASTAR SYSTEMS

Machine Parts

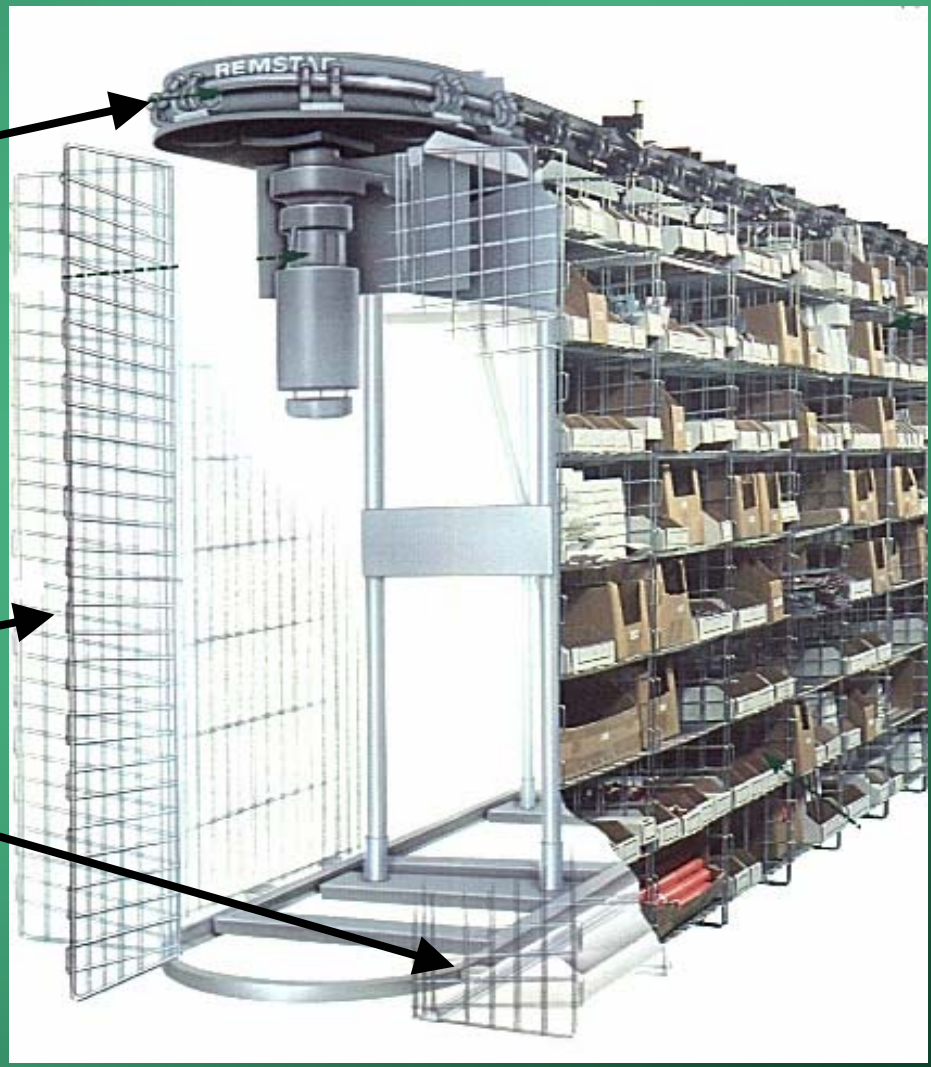
- Non-Moving Parts -
- Gearmotor
  - Inside Machine
- Frame
  - Structural Steel
- Feet



MEGASTAR SYSTEMS

Machine Parts

- Moving Parts -
- Upper Chain
  - Drives
  - Supports Load
  - Guides
- Bin
  - Carries Load
- Lower Chain
  - Guide Only



MEGASTAR SYSTEMS

Upper Chain

- Support in 8 Places
- Low Wheel Load for Less Track Wear
- High Capacity Components

MEGASTAR SYSTEMS

Drive

- Direct Drive
- Few Parts to Wear & Maintain
- Cycloid Gearmotor
  - 200% overload capacity
  - 500% shock load capacity
  - Occasional Inspection

MEGASTAR SYSTEMS

Maintenance

- Drives – Occasional Inspection
- Upper wheels
  - No lubrication required
- Lower wheels
  - Glass-filled polypropylene
  - No lubrication required
- No zerk fittings, anywhere

MEGASTAR SYSTEMS

Controls

- 3 Tiers
  - Portable Handheld Controller
    - Operator Interface Keypad
  - Machine Control Unit (MCU)
    - Accelerate, Brakes, etc.
  - RCC
    - Interface to Software
    - Additional Keypad Functions
- ANSI MH24.1 E-Stops & Eyes

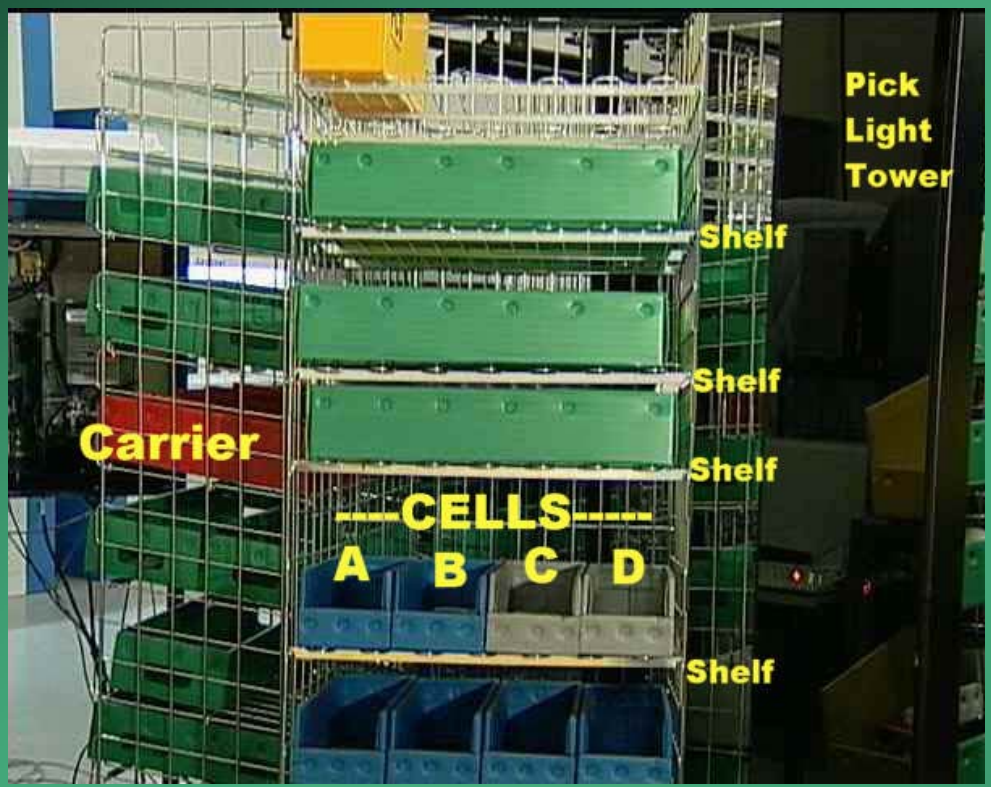
MEGASTAR SYSTEMS

How Are They Organized?

- 1 Moves While 2 Is Picked From
- Light Guided
- Pick By Software or PHC

MEGASTAR SYSTEMS

How Are They Organized?



- Cell Sizes to Suit Storage Need
- Each Cell Pointed To By Pick Light Tower

MEGASTAR SYSTEMS

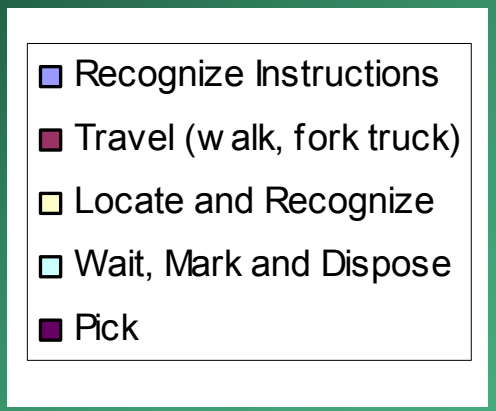
Benefits Summary

- Quicker Picking
  - Reduce Travel Time
  - Bring the Product to the Operator
  - Sequence Picks
- Pick Light Advantage
  - Reduce Search Time
  - Increase Accuracy
- Save Floor Space

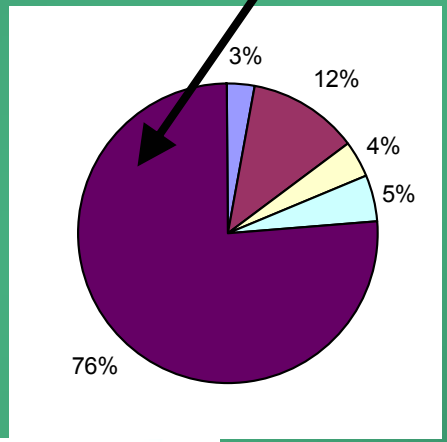
MEGASTAR SYSTEMS

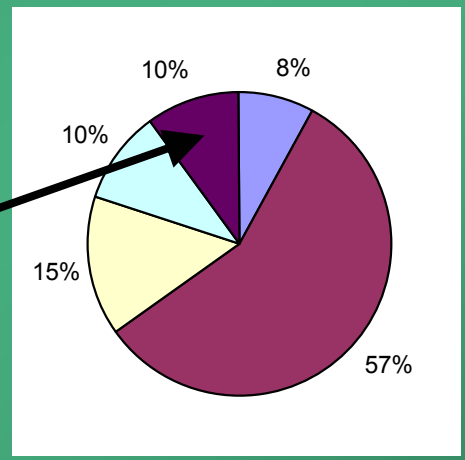
Quicker Picking ..... The Missouri Advantage

Shelf Picking



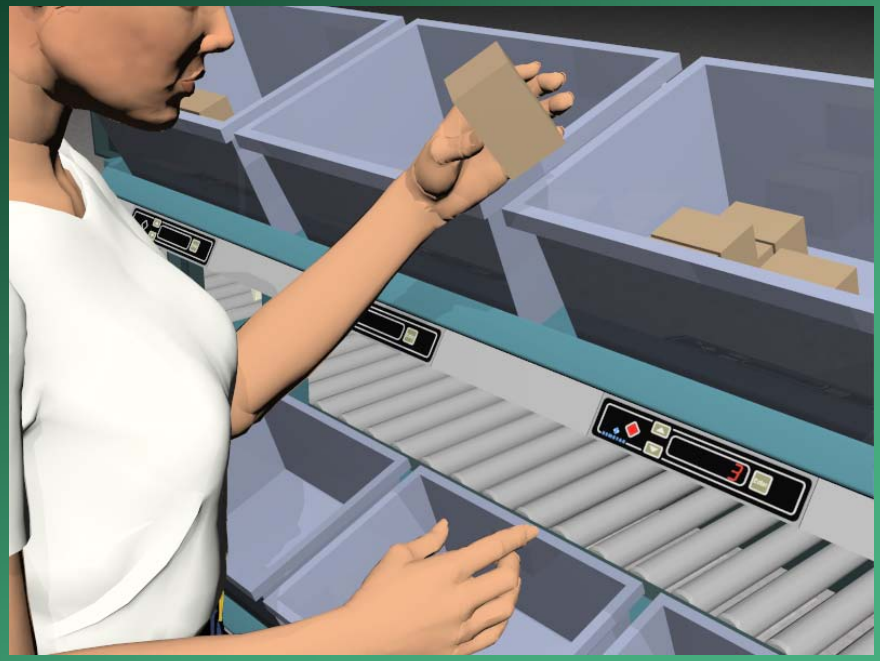
The Important Bit





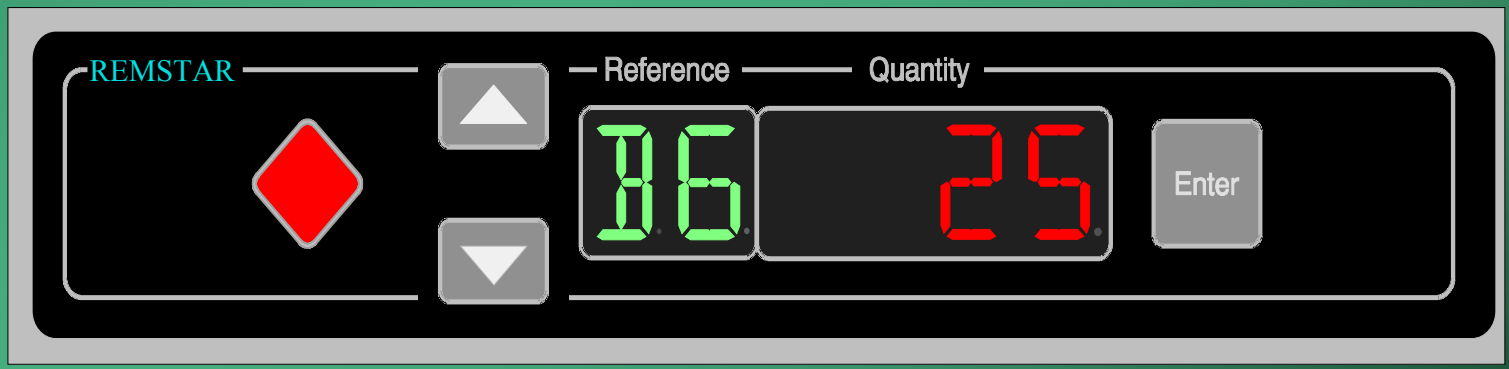
MEGASTAR SYSTEMS

Carousel Picking



Pick-To-Light

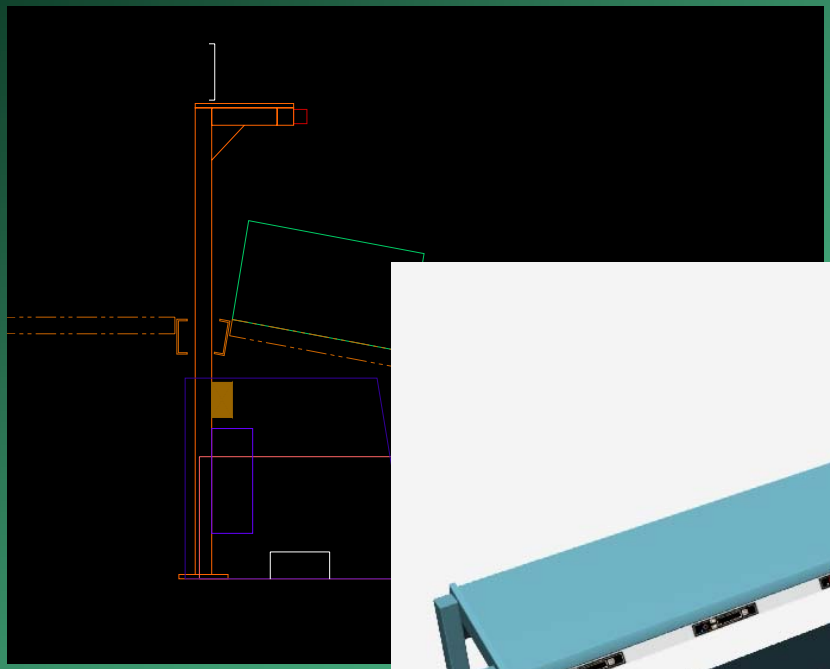
- Towers for Carousel Locations
- Batches for Orders

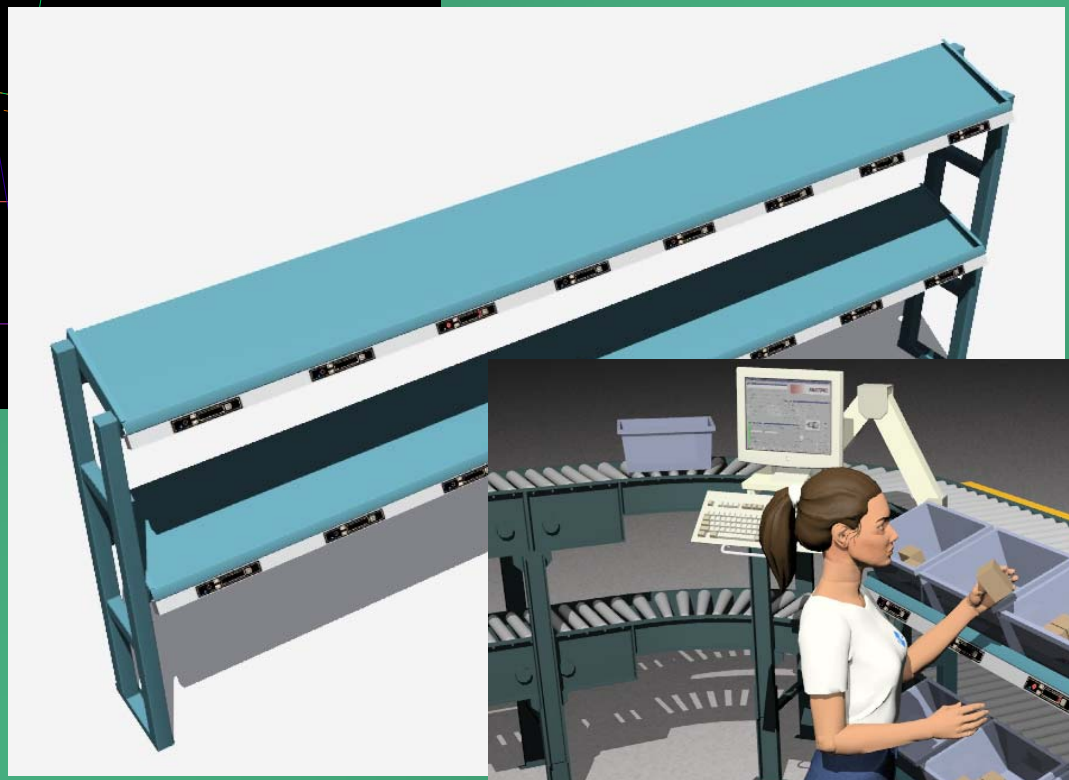


MEGASTAR SYSTEMS

Batch Station

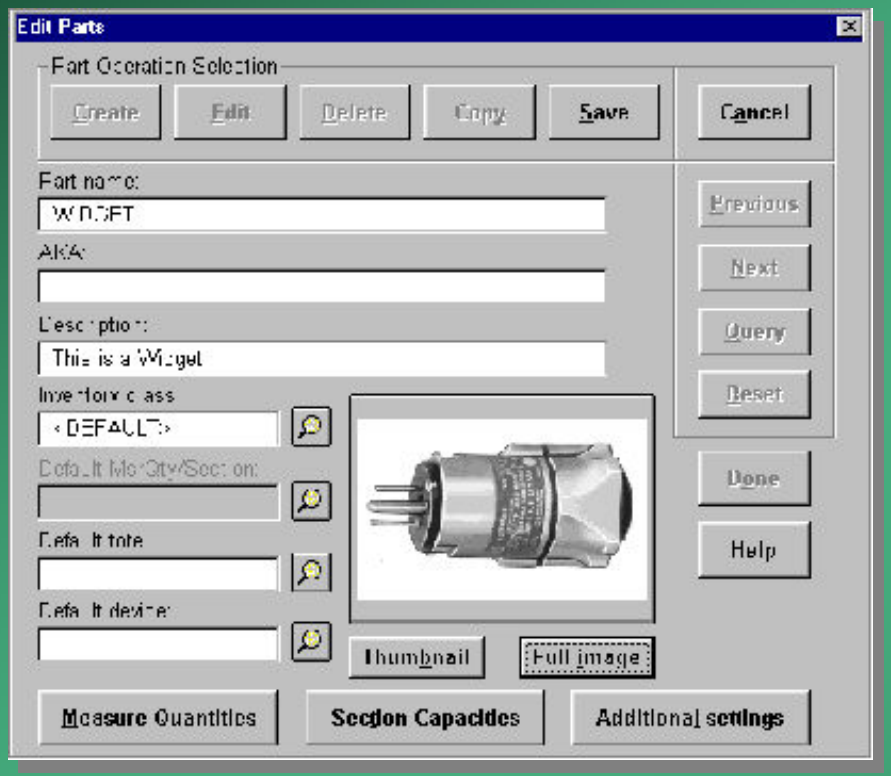
- Standard Configurations





MEGASTAR SYSTEMS

Software



- Fastpic 4
- Others

MEGASTAR SYSTEMS

How Does Batching Work?

- Group Orders
- Software Selects Shortest Path for All Picks
- No Confusion – Use Lights

MEGASTAR SYSTEMS

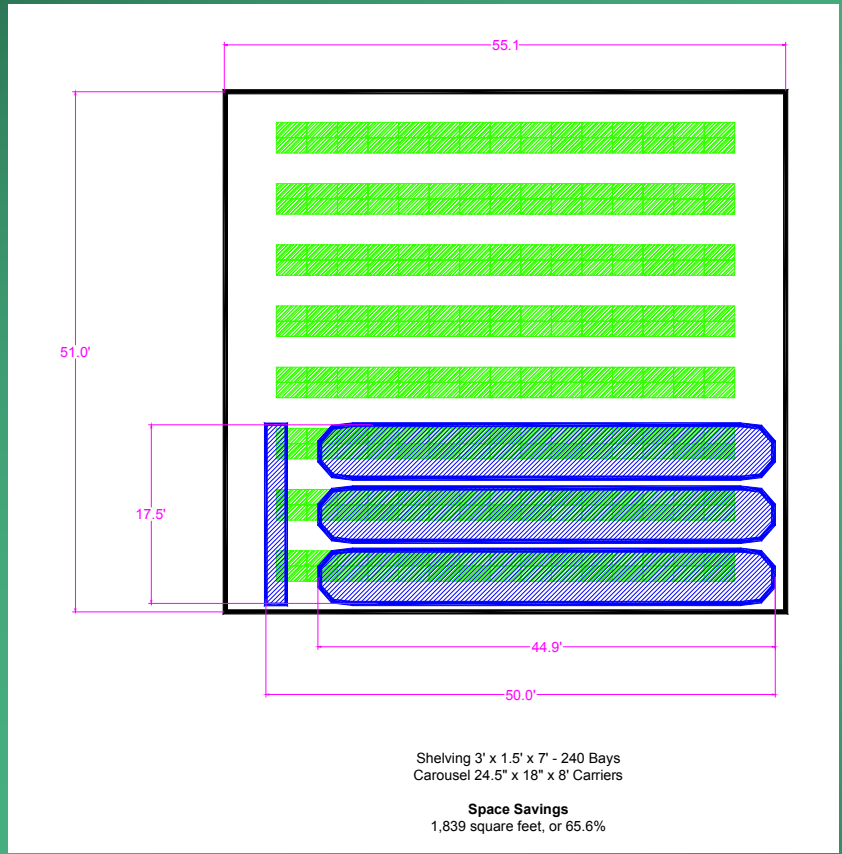
How Do They Save Space?

- Customize Cell Sizes
- Change Shelf Pitches
- Higher Density
- No Aisles
  - Access One End Only
- Use All Clear Height

- See Handout

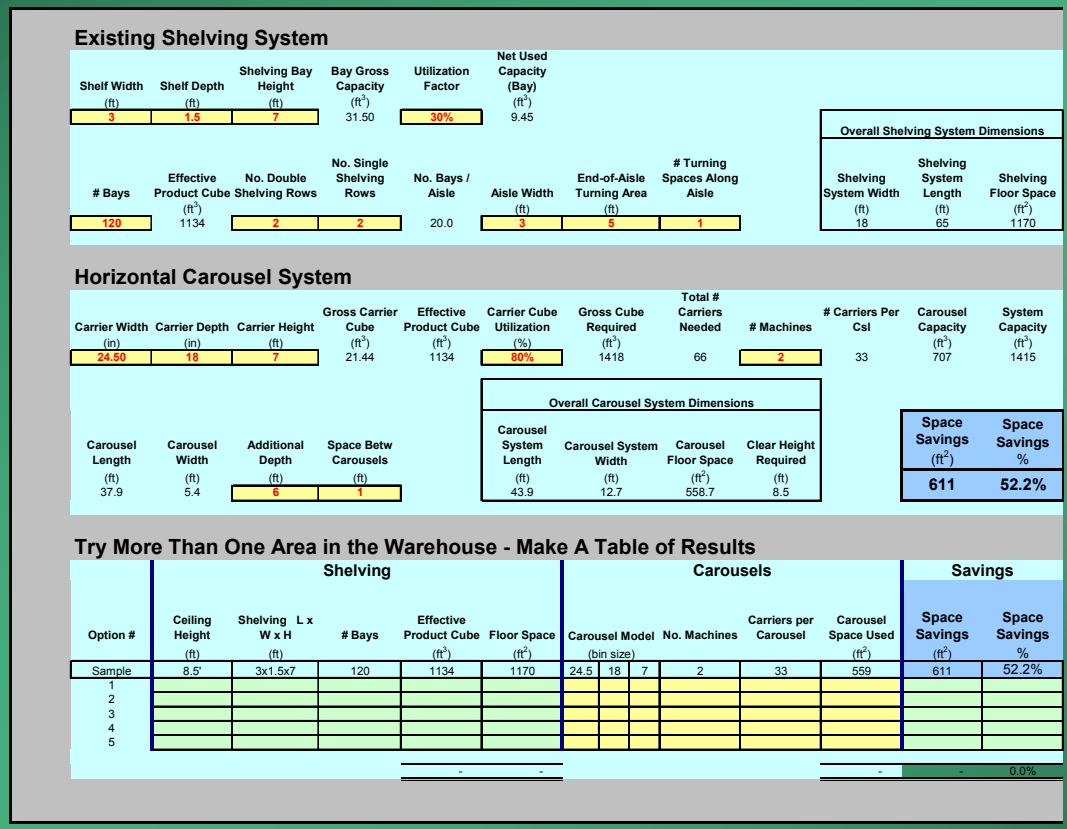
MEGASTAR SYSTEMS

Space Savings



MEGASTAR SYSTEMS

The Space Savings Tool



Existing Shelving System

Shelf Width (ft)	Shelf Depth (ft)	Shelving Bay Height (ft)	Bay Gross Capacity (ft^3)	Utilization Factor	Net Used Capacity (Bay) (ft^3)
3	1.5	7	31.50	30%	9.45

# Bays	Effective Product Cube (ft^3)	No. Double Shelving Rows	No. Single Shelving Rows	No. Bays / Aisle	Aisle Width (ft)	End-of-Aisle Turning Area (ft)	# Turning Spaces Along Aisle
120	1134	2	2	20.0	3	5	1

Overall Shelving System Dimensions

Shelving System Width (ft)	Shelving System Length (ft)	Shelving Floor Space (ft^2)
18	65	1170

Horizontal Carousel System

Carrier Width (in)	Carrier Depth (in)	Carrier Height (ft)	Gross Carrier Cube (ft^3)	Effective Product Cube (ft^3)	Carrier Cube Utilization (%)	Gross Cube Required (ft^3)	Total # Carriers Needed	# Machines	# Carriers Per Csl	Carousel Capacity (ft^3)	System Capacity (ft^3)
24.50	18	7	21.44	1134	80%	1418	66	2	33	707	1415

Carousel Length (ft)	Carousel Width (ft)	Additional Depth (ft)	Space Betw Carousels (ft)
37.9	5.4	6	1

Overall Carousel System Dimensions

Carousel System Length (ft)	Carousel System Width (ft)	Carousel Floor Space (ft^2)	Clear Height Required (ft)
43.9	12.7	558.7	8.5

Space Savings (ft^2)	Space Savings %
611	52.2%

Try More Than One Area in the Warehouse - Make A Table of Results

	Shelving					Carousels						Savings	
Option #	Ceiling Height (ft)	Shelving L x W x H (ft)	# Bays	Effective Product Cube (ft^3)	Floor Space (ft^2)	Carousel Model (bin size)			No. Machines	Carriers per Carousel	Carousel Space Used (ft^2)	Space Savings (ft^2)	Space Savings %
Sample	8.5'	3x1.5x7	120	1134	1170	24.5	18	7	2	33	559	611	52.2%
1													
2													
3													
4													
5													
				-	-						-	-	0.0%

MEGASTAR SYSTEMS

What We Do ..... Ask Lots of (familiar) Questions!

- What Do They Want To Do (Order Pick, Save Space, Low Ceilings ….)
- How Many People Are Doing This Now?
- How Much Are They Picking?
- How Much Space Is Available?
- What Are They Picking?
- How Much Storage Have They Now?

MEGASTAR SYSTEMS

And Then … Budgetary Sizing

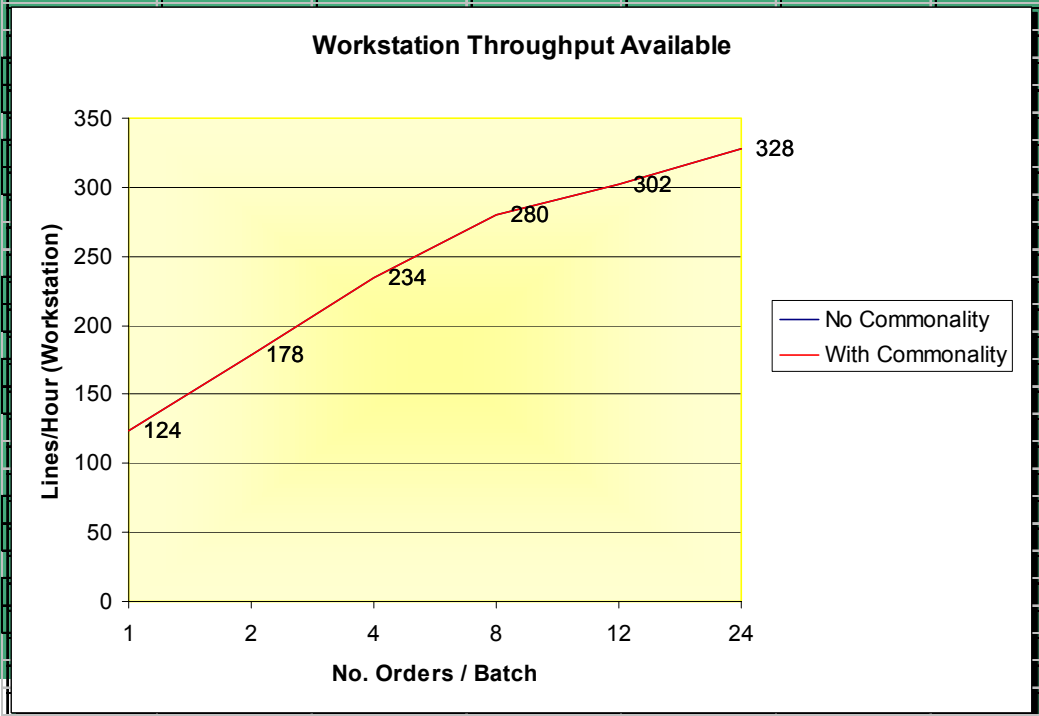
- Roughly Size The System
  - How Many Carriers?
- Estimate No. of Pickers Needed
- Select No. of Carousels Per Picker
- Select Carousel Length
- Verify With Simulation
- Estimate

MEGASTAR SYSTEMS

Simulate

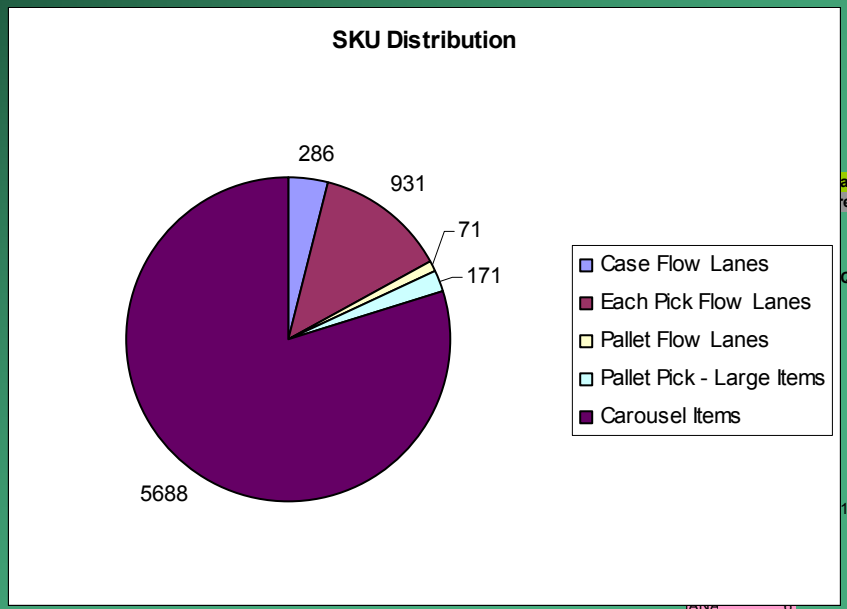
- Input Parameters
- Get Estimate
- Iterate

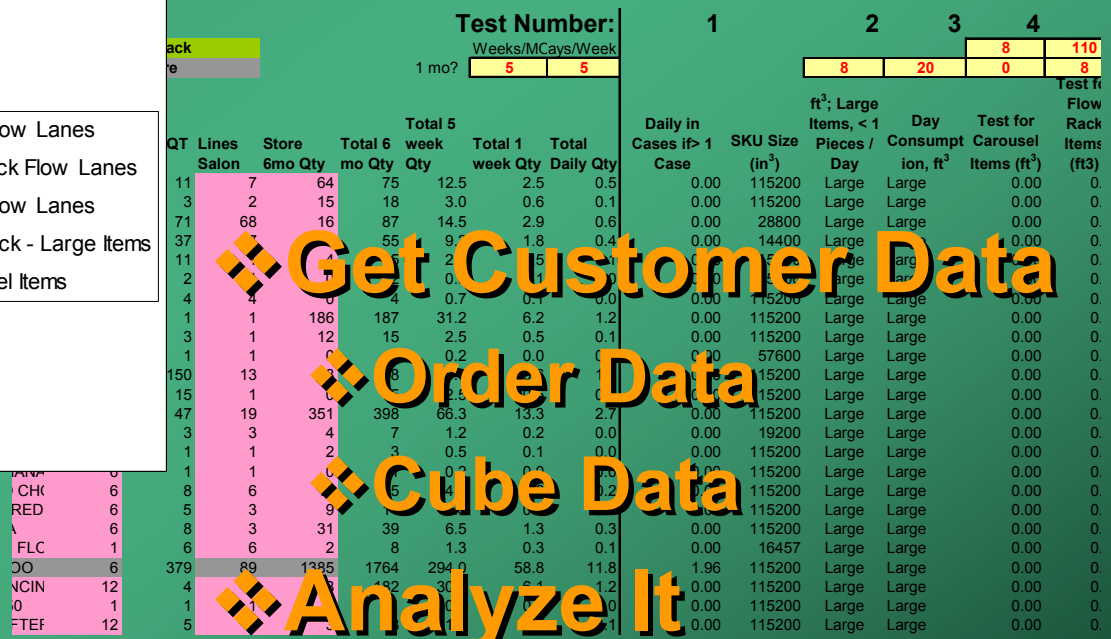
INPUT INFORMATION NEEDED		OUTPUT	
Required Total Lines / Day	0		
Picking Hours / Day	0		
No. of Workstations	1	No. of Carriers / Workstation	120
No. of Carousels / Workstation	3	No. of Carriers / System	120
Carrier Width (in.)	24.5	Approx. Carousel Length (ft.)	44.6
Av. No. Carriers / Carousel	40		
Carousel Speed (FPM)	65		
Average No. of Lines / Order	1	No. of Orders	0
No. of Stops / Tote	1	Average Lines / Workstation	1.0
Average Time to Pick or Put	10		
Commonality	0%	Lines Per Hour Needed Per Workstation	0
Time to Transition Batches	0		



MEGASTAR SYSTEMS

If More Detail Is Required …





- Get Customer Data
- Order Data
- Cube Data
- Analyze It

MEGASTAR SYSTEMS

Commonly Asked Questions

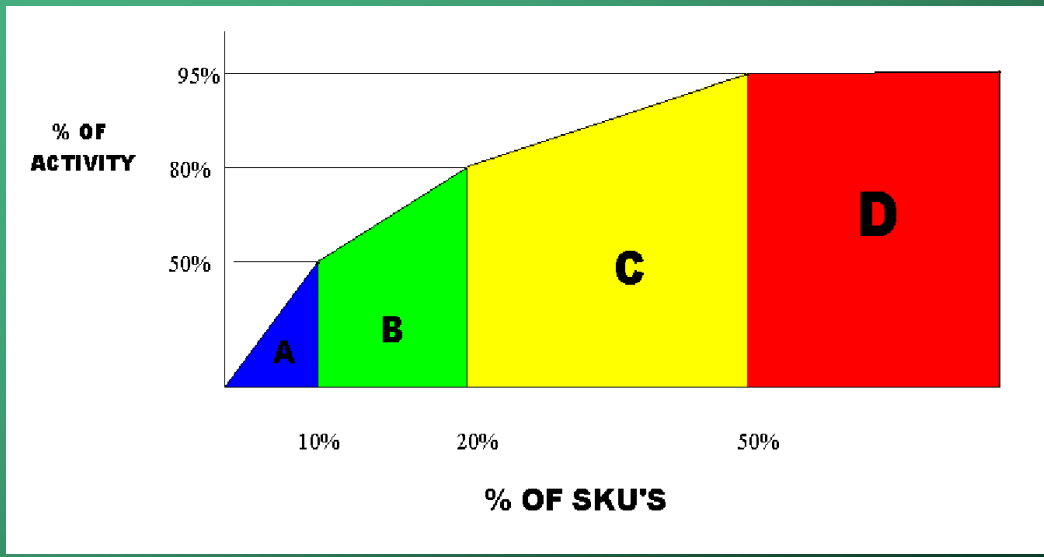
- Carousels Go Both Ways
  - Each Carousel Will Make Less Than One Full Revolution Each Per Batch of Orders
- Carousels are Very Reliable Machines
  - History Shows That Properly Maintained Carousels Have Very Little Down Time
- Software Does Not Break or Wear Out
  - When Properly Tested and Implemented

MEGASTAR SYSTEMS

Distribution Applications What Belongs in Carousels?

- Handle One Month Supply per SKU
  - 10 to 40% of the SKU's; up to 16FT^3 / SKU
  - Top 15% in Flow Rack or Pallet Picking
  - Others May be in Shelving

– Excess Replenishment Demand is a Sign of Poor Slotting



MEGASTAR SYSTEMS

Storing

- Stocking is Everything
  - The Most Important Past of a Quality Design is the Replenishment Portion
  - Random Storage is Always Better
  - Multiple random locations typically will improve cube utilization, throughput and load balance
- Restock 5% of The SKU's Per Day

System Flow

- Keep Things Simple - Carts Often Work As Well As or Better Than Conveyor
  - Few Restrictions to Material Flow and Work Zones
  - Velocities In & Out Can Be Very High
  - Much Less Expensive
  - No Maintenance
  - Work Zone Flexibility

MEGASTAR SYSTEMS

Start Simple

- For Design, Concept and Initial Budget
  - A Three Carousel Work Zone of 40 Bins Per Unit is a Good Start
  - 3 Carousels Are Always Better Than 2
    - Operators Rarely Wait in a 3 or 4 Unit Design

MEGASTAR SYSTEMS

Start Simple

- Shorter is always Better
  - Beware Horizontal Carousels that are Too Long or Too Tall
- Always Design Excess Capacity
  - Don't Exceed 80% of the Demand or the Cubic Capacity

MEGASTAR SYSTEMS