

# Putting the 'M' in AMMR

Presented by:

Wes Reid

Senior VP of Product & Operations



POWERED BY **POSSIBILITIES.**



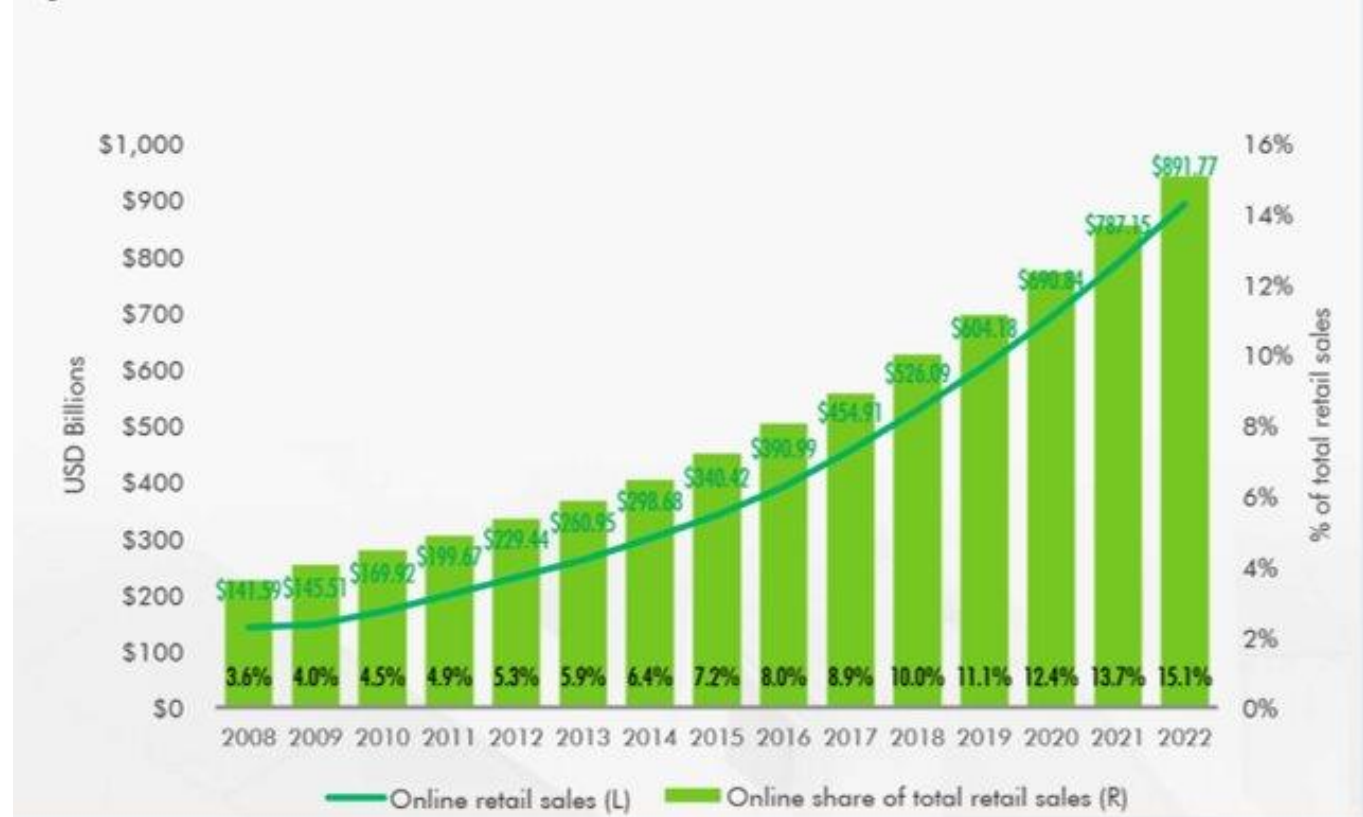
powered by  MHI

# The Growth of e-Commerce

- Consumer demand driving an increase in ecommerce options
- Demand is putting massive pressure on fulfillment centers

## Forecast e-commerce sales

Figure 1: Forecast E-commerce Sales and Share of Total Retail



Source eMarketer, 2018

# Everything Can Be a Distribution Center



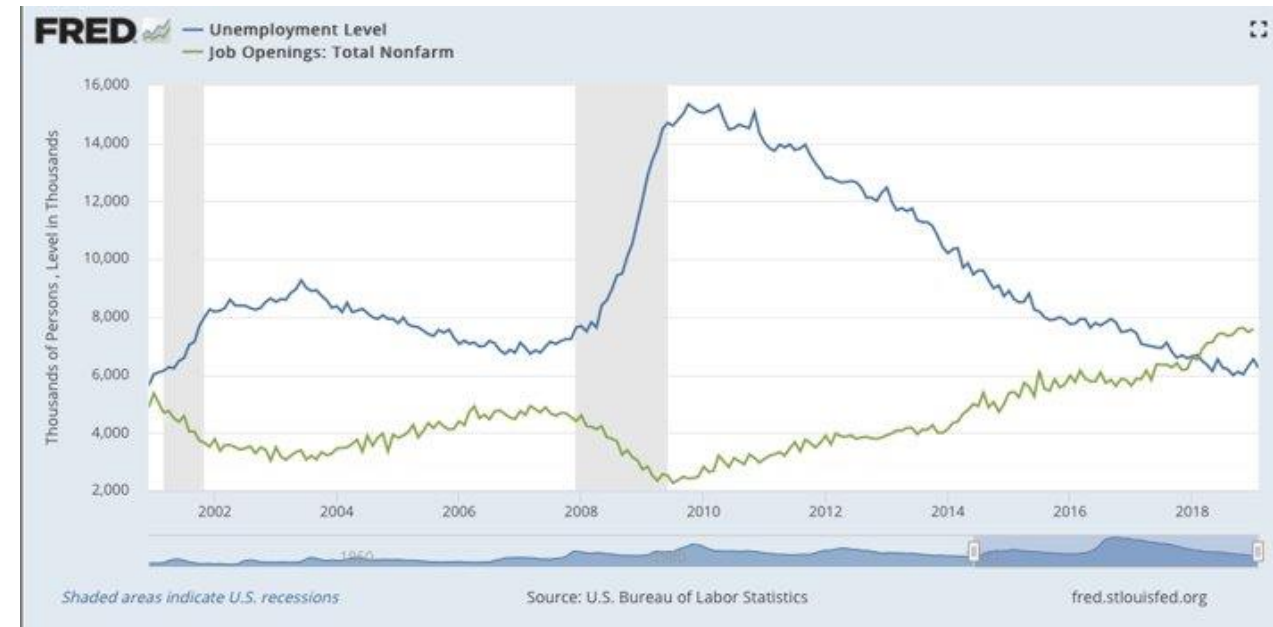
- Workload not limited to the warehouse
- Retail stores are becoming more and more like micro DCs

# Where Are the Workers?

Not enough labor available to support ecommerce demands

Two possible outcomes:

1. Completely halt all ecommerce growth
2. Find a better way to meet customer needs



Robotics is moving at a rate that is hard for businesses to know which solution is best.

# New Tools of the Trade

## Autonomous Mobile Robots (AMRs)

### **Technology**

Combines navigation and sensing

### **Usage**

AMRs excel at material transport. Used as flexible conveyors and to increase a pick worker productivity. Productivity increase directly related to reduction in walking. Typically paired with software to optimize pick patterns.

### **Quality of Life for Warehouse Workers**

- Walking greatly reduced, picking motions increased.
- Change in exhaustion and injury rates unknown.
- Worker focus remains on pick rate
- **People work for robots**

## Autonomous Mobile Manipulation Robots (AMMRs)

### **Technology**

Combines navigation, sensing, and manipulation

### **Usage**

AMMRs excel at material handling. Managed by workers who serve operations-centric roles. Productivity increase comes from force multiplication.

### **Quality of Life for Warehouse Workers**

- Large reduction in physical demands
- Worker focus is on operational aspects such as material flow, slotting, stocking levels, etc.
- **Robots work for people**

# Pick Methods

Pick Method	AMR	AMMR
Discrete Order Picking		✓
Zone Picking	✓	✓
Cluster/Wave Picking	✓	
Batch Picking	✓	✓

# Application Comparison

Primary goal in a pick operation – **keep the arms picking**

- Doesn't matter if the arms are human or robotic

Sample Customer – Example Corp.

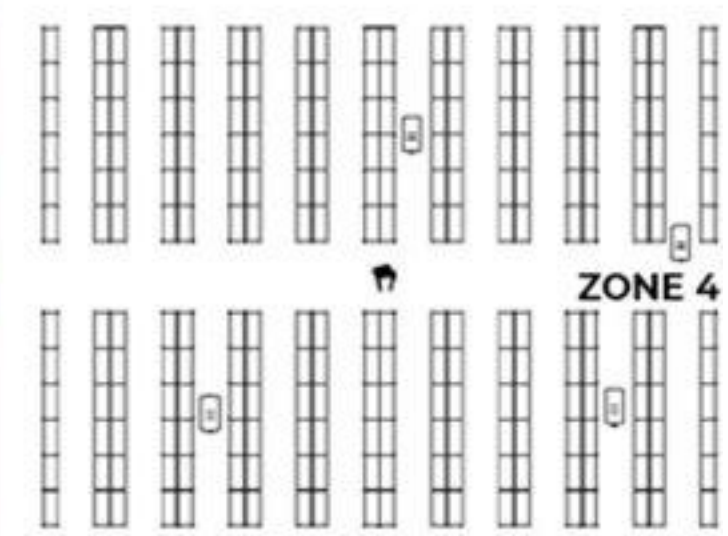
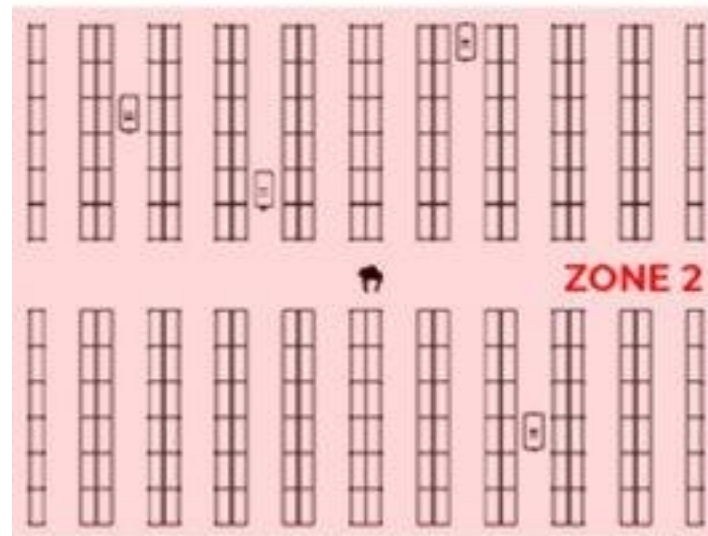
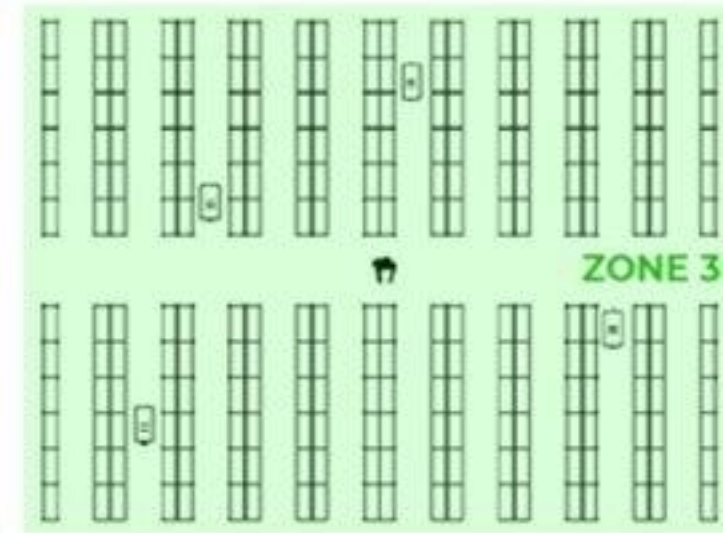
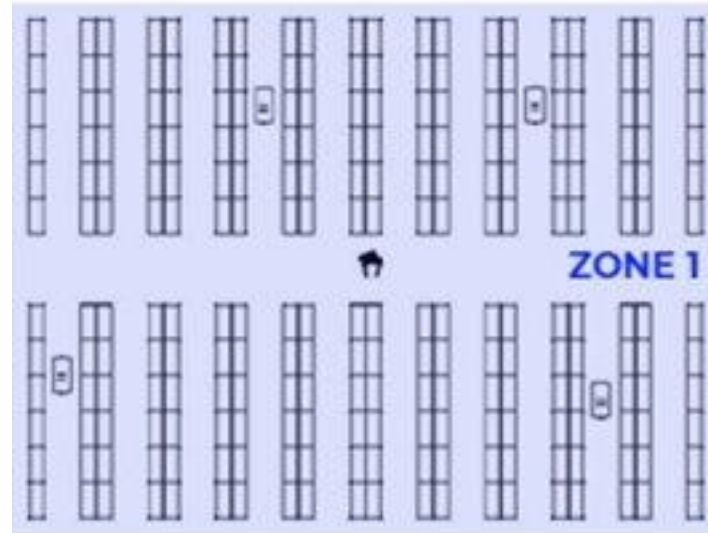
- 4 pick zones
- Single shift picking
- Consistent product movement
- Wants to increase productivity
- Requests quote from an AMR and an AMMR company



# AMR Solution

Philosophy – People are there to pick as fast as possible

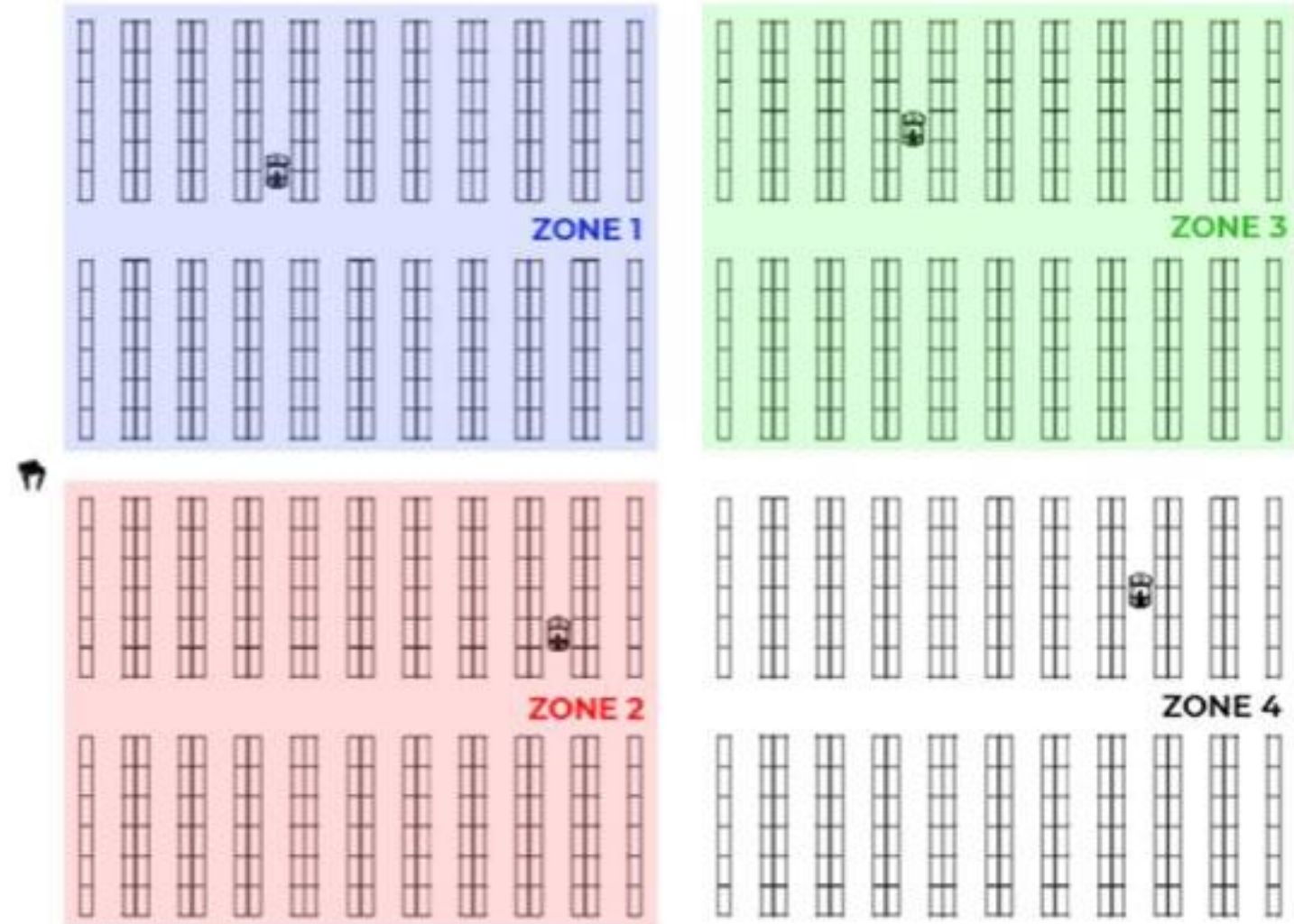
- Builds on existing productivity strategies
- One worker per zone, each with four robots
- Variety of options: follow-the-robot, robot follows, find-the-robot
- Some can work with conveyors
- Total Assets: **4 workers, 16 robots**
- Estimated rate increase: **2x current**
- Drivers of increase: Less walking, better picking through software



# AMMR Solution

Philosophy: People are there to oversee operational efficiency

- Significant change to current operations
- Minimal change to infrastructure
- Variety of options: piece picking, bin picking, AMR-to-fixed arm
- Can work with AMRs and conveyors
- Total assets: **1 person, 4 robots**
- Estimated rate increase: **1.2x current**
- Drivers of increase: Machines do the picking, picking does not stop



# Head-to-Head Comparison

## AMR Pros

- Higher realized rate increase
- Wide product range
- Fast setup
- Simpler hardware

## AMR Cons

- Higher potential cost
- Greater chance of HW issues
- Large increase to non-walking labor
- No worker = no picking

## AMMR Pros

- Lower potential cost
- Lower chance for HW issues
- Little physical demand
- Better employee retention

## AMMR Cons

- Lower realized rate increase
- Targeted product range per zone
- More involved setup
- HW and new job type requires more training

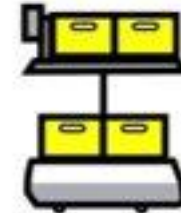
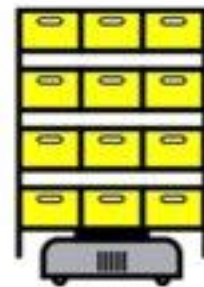
# Which is Best for Me

AMMRs best for facilities...

- Looking to increase productivity
- Can stock targeted SKU types in a zone
- Where labor is an issue

AMRs best for facilities...

- Looking to increase productivity
- Stocking many mixed SKU types together
- Where labor is fairly consistent



# Putting the 'M' in AMMR

## AMMRs Are Relatively New

No standards detailing the required infrastructure changes (e.g. aisle widths, spacing between products, conveyor interfaces)

Range of products that robots can pick, and its impact to SKU slotting

## Task Distribution

Human and Robotic centric areas need to be considered

Employees can often be more impactful in ways not previously envisioned

Some tasks are simply better suited for humans than robots

## Existing Environments

Requires additional analysis

## Inventory

New process and procedure for new products introduced

Product packaging changes

Product re-slotting/moving

Changes to racks, shelves, and slot dimensions

## Robots Work at a Uniform Speed

Consistency, reliable capacity, and predictable flow rates

Can address peaks in demand, but can't "hustle"

## Order Variability

Day-to-day and seasonal order makeup variability can cause bottlenecks

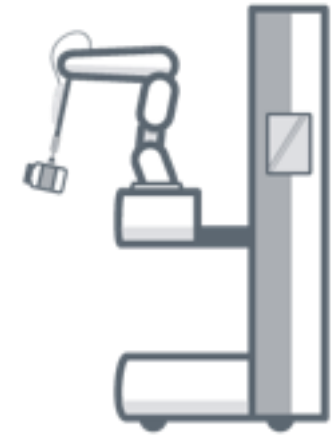
Especially true in a zone pick environment

## Labor Impact

Retention rates improve with robotic picking

Unskilled role becomes skilled (i.e. better pay, more responsibility)

"Force multiplier" aspect of robotic picking means an absent worker can have a greater level of impact



# Making AMMRs Work for You

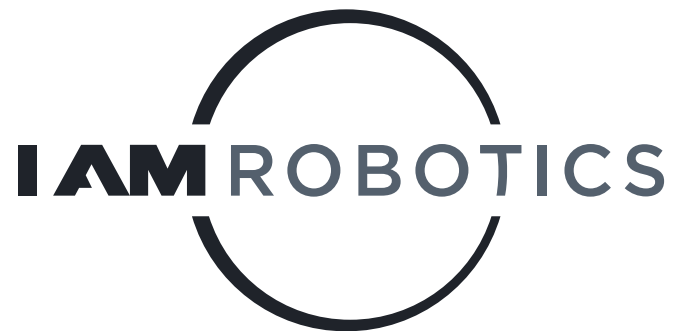
- Autonomous robots are a transformative technology
- Unlike established technologies, effective integration and adoption will require ideas from all parties
- View the robots as part of a material handling system, not a platform that works in isolation
- Questions to ask when considering:
  - “Can I envision a way to make this solution work for me?”
  - “How will this impact the surrounding operations?”
  - “How can we change the design of surrounding systems and processes to make our total operation more successful?”

*For more information:*

Speaker email: [john.cameron@iamrobotics.com](mailto:john.cameron@iamrobotics.com)

Website: [www.iamrobotics.com](http://www.iamrobotics.com)

Or visit MODEX Booth #9204



**POWERED BY POSSIBILITIES.**

