Popular technologies that assist order picking

- Conveyors
  - Transporter and buffer
  - Travel on conveyor cost very little
  - Extend “good locations”
  - Help to smooth the flow and improve utilization
- Pick to light and put to light
- Pick to voice
Conveyor

- Conveyors
  - Transport
  - Buffer
  - Extends the good locations throughout the facility
  - Can yield very high throughput
- Important for high throughput systems, more and more popular in US, often miles to tens of miles in a facility
- Requires significant investment

How to draw economic terrain contours

Schematic of a picking zone

- Pick module
  - Forward
- Reserve
- Receiving docks
- Sort to shipping docks
A graphical view of a pick module

- A case picking zone

Pick to light to station lighting

- Reduce search time
- Increase accuracy
- Reduce training

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Put-to-light

- Present one sku to the picker
- Scan the sku
- Lights associated with order containers will come on
- Put items into light indicated boxes

Differences between pick to light & put to light

- Pick to light
  - Skus are stationary and wait to be picked
  - Orders triggers the light
- Put to light
  - Orders are batched and wait
  - Sku triggers the light
Application example

A DC has two types of products
- Staple
- Flow through

Sales would try to convince you their technology is best for both

What do you think?

Pick to voice

- Scan the order
- Activate voice instructions for the picker
- Picker pick and place into the order container
- Picker confirm picking complete verbally
- No Sorting is required in this example
Comparison of pick to light and pick to voice

- Sales people will try convince you their technology is the best in terms of
  - Cost
  - Accuracy
  - ...

- Voice: number of players required is proportional to
- Light: number of lights required is proportional to

- Voice: Serial media
- Vision: Parallel media

Automated picking with A-Frame

- A frame
- Automated dispensing
Automated order fulfillment initiation

- Container types
- Labels and tracking

Sorting

- Manual
- Barcode directed
- Vision directed
- High speed sorters
Sorting: High Rate Tilt Tray

- 12,000 items/hr.
- Unit sorter
- Can sort to two sides

High speed conveyor sorters

- Roller sorter
- Shoe sorter
What does SLP stand for and what does it involve?
What is the default measure of distance between activities in typical software?
What is the most direct quantitative measure of operational efficiency in layout problems?
Are you comfortable with equal distance contours?
Warehousing intro

- What are the purposes of a warehouse (DC)?
- What are the main operations in a warehouse?
- Inventor positioning considerations
- What are the direct and concrete objectives in a warehouse?

Warehouse operations

- What are some of the material movement equipment used?
- What are categories of loads moved?
- What are the storage methods?
- How do you measure the storage methods?
- What factors are the most important in deciding an SKU's location?
- What are the advantages of carousel vs. bin shelving?
- What is the advantage of flow racks (pallet or case)?
Order picking

- What are the format of pick list?
- What are the order picking strategies?
- What strategy is suitable for which type of orders?
- What are some of the technologies used to improve accuracy and speed?
- What does conveyor achieve in a DC?
- What is one of the most important efficiency objectives in a DC?