Ingersoll-Rand

Zimmerman
Custom Handling Devices

Learning Objectives

- Market summary

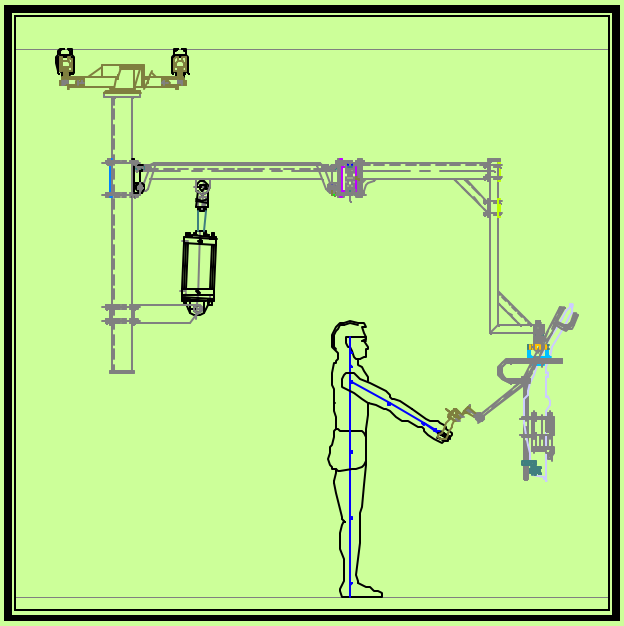
- How to identify a material handling application.

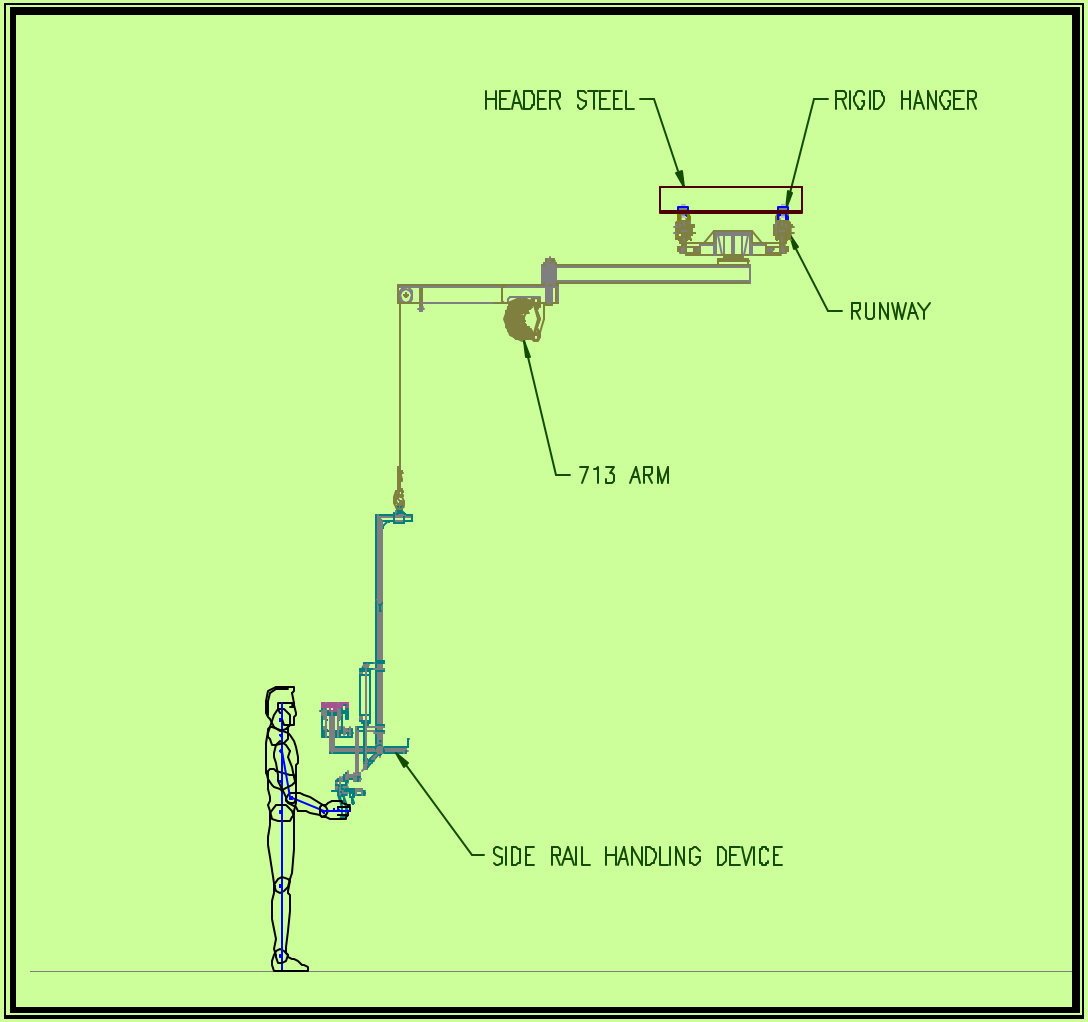
- Procedure to use while collecting data.

- Elements of an ergonomic material handling system.

- Advantages of a Zimmerman Handling System solution

System Solutions with interdependent parts





Module Preview

- Lost time from job related injuries totals ____million workdays each year?
  ____10 ____ 50 ____100 ____150

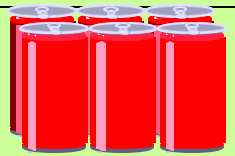
- Manual materials handling represents an estimated ___ of total workers compensation claims.
  ____75% ____50% ____35% ____15%

- The most common work group injured is between the ages of _____.
  ____18-24 ____25-34 ____35-50 ____51 and over

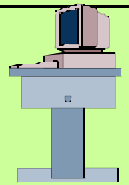
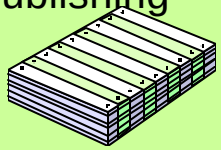
- Medical expenses, lost wages, lower productivity and other expenses from these injuries amount to ___billion annually.
  ____$100 million ____$500 million ____$500 billion ____$100 billion

- Back injuries account for ___% of all compensation claims according to various studies.
  ____10 ____20 ____30 ____40

Market Summary

Industries	Typical Applications	Major Customers
Food 	Labels, shipping crates, meat saws, tote pans, cartons, bags.	Nabisco, General Mills, Campbell Soup
Beverage 	Kegs, cases, shrink wrap rolls	Coca Cola, Pepsi, Miller Brewery
Textile (mill and fiber)	Bobbins	Dupont, Kimberly Clark, Burlington, Miliken
Textile (non-woven, ex. apparel)	Roll handling	Russell, Fruit of the Loom, Levi, Nike

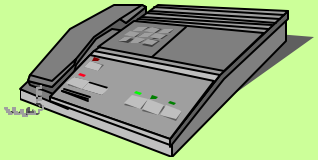
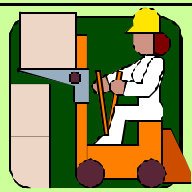
Market Summary

Industry	Typical Applications	Major Customers
Furniture 	Packaging area, table tops	Herman Miller, Hon, Heckman, Steelcase
Converting, paper and allied products	Roll handling	Procter & Gamble, Dupont
Printing and publishing 	Bundle handling	RR Donnelley, Banta, World Color Press
Pharmaceutical products 	Drum handling, drum dumping, packaging	Johnson & Johnson, Eli Lilly, Abbott Labs

Market Summary

Industries	Typical Applications	Major Customers
Rubber and misc. plastic products	Tire handling, molding operations	Goodyear, Michelin, Cooper Tire, Kohler
Fabricated Metals 	Press-breaks, welding fixtures, welding guns	Eaton Steel, TRW, Warner Electric
Industrial Machinery 	Farm equipment, refrigeration equipment, foundry equipment	John Deere, Blaw Knox, Hussmann, Thermoking
Computers 	Monitor, CPU (tower), printers, packaging	Compaq, Dell, Hewlett Packard

Market Summary

Industries	Typical Applications	Major Customers
Electronics 	Fixture assembly, wire reels, packaging	Applied Material, Lucent Technology, Texas Instruments, Motorola
Appliances 	Sheet metal, assembly operations, packaging	Whirlpool, Westinghouse
Automotive 	Body shop, all body panels, seats, glass, instrument panels, tires, engines, transmissions, axles, etc.	GM, Ford Chrysler, Honda, Toyota, Harley Davidson, Saturn, Kenworth, Navistar, Peterbuilt, Mack Truck
Warehousing 	Pallets	Meijer

Customer Relationships

Industrial Engineers

Purchasing

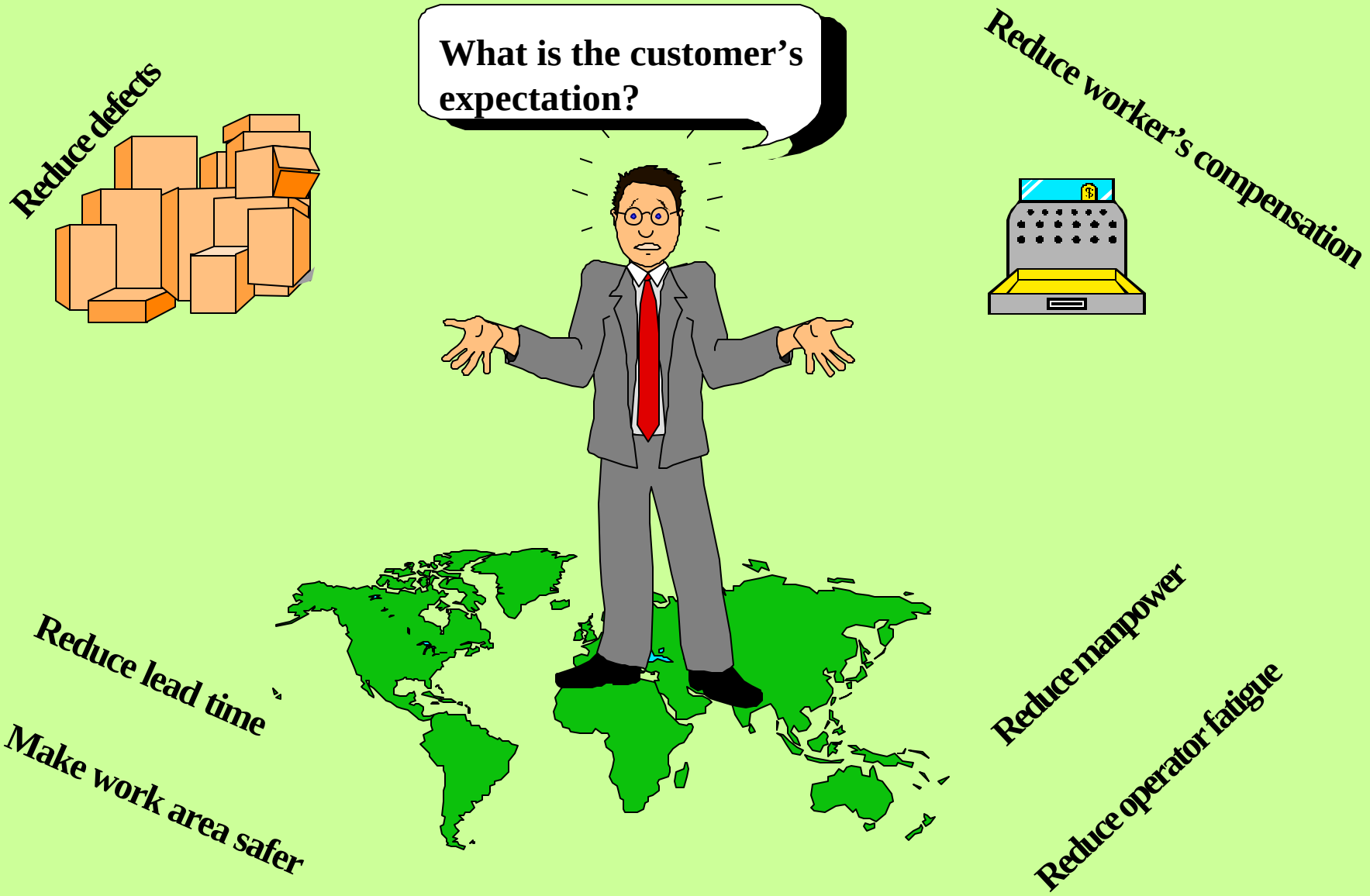
Selling a system solution begins with developing relationships with several individuals at a customer's facility.

Maintenance & Assembly Line Workers

Ergonomics & Safety

Do not to over-sell the equipment and ruin your relationships!

Identify a Zimmerman Handling System Application

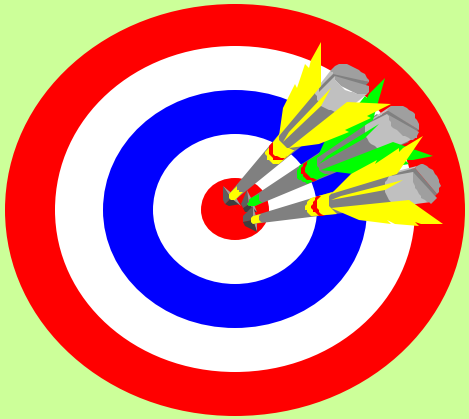


Identify a Zimmerman Handling System Application

- Workers bending and / or reaching while lifting even a light load.
- Two-person operations.
- Observe how the part is being handled, does the worker have complete control of the movement? Does his handling cause any potential damage to the product or to him? Are others in the work area at risk while he is handling the part?
- Look for any safety items that you feel we can improve upon, for example: sharp edges, temperature of part, or close proximity to moving parts.
- Can we keep an operator away from fumes, heat and liquids with a handling system?

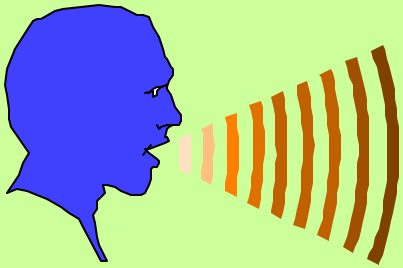
Data Collection

Listen



Pictures

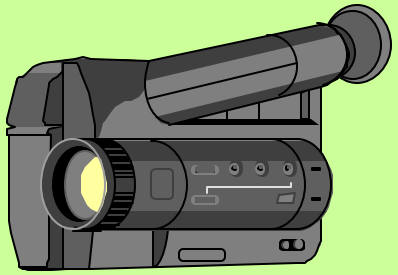
Getting it Right the First Time



Explain

Observe

Question



Videotape

Data Collection

- Safety Glasses
- Application Data Form
- Tape Measure
- Camera (Digital if possible)
- Video Camera
- Timing Device: cycle time, repetition rate
- Graph Paper
- Pencil, eraser, permanent markers, highlighter

Application Data Form

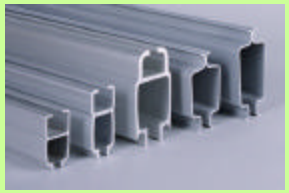
Ergonomic Elements of a Zimmerman Handling System Solution

Defining the handling device is the first step in providing a system solution. Next, the lifting method, capacities and vertical travel can be established. Finally the movement method will be determined.

- Grasping or Gripping Means
  - End Effector or Handling Device
- Lifting Means:
  - Balancer
  - Manipulator Arm
  - Hoist
- Movement Means:
  - Rail - Usually overhead
  - Jibs
  - Lift Trucks, wheeled carts

Grasping/Gripping

Lifting



Moving

Handling Application Attributes

Favorable Attributes

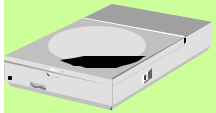
Part Weight under 300 lbs.	No obstructions
Straight Transfer or single axis manipulation	Clean part
Single part transfer	Low production rate
Complete information at proposal stage	Batch run
Basic Shape	Pick up and set down heights in moderate range (0-50")
	Customer material available.

Unfavorable Attributes

Multiple axis manipulation	Rapid cycle time
Wide variety of weights and/or sizes.	Constraining work area.
Obstructions in work area	Low headroom above the work station
Oily, hot, dirty, wet or fragile parts	Random run
Attempting to pick up from above the operator's head obstructs line of sight.	Incomplete information at proposal stage.

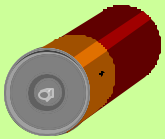
Basic Part Shapes

Five Basic Shapes

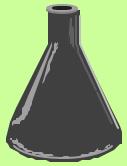


- **Flat**
  - Examples: glass, sheet metal, doors, lids or covers, desk tops, plywood and boards.

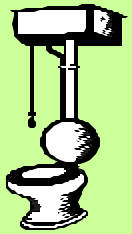
- **Cubical** (solid or hollow)
  - Examples: Boxes, bundles, furniture, cabinets, appliances, computers, electronic equip., air conditioner housings, shipping crates, molds.



- **Tubular** (solid or hollow)
  - Examples: Rolls of paper, film, labels, tape. Silicon wafer ingots, bobbins, wire spools, tubing and pipe, bar stock and shafts, artillery shells, missile casings, water heaters, tires.

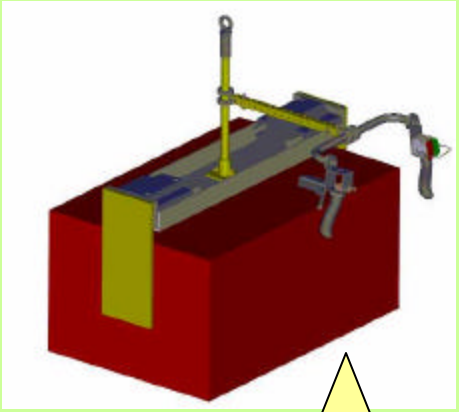


- **Spherical** (shapes with convex or concave spherical surfaces)
  - Examples: barrels, cathode ray tubes CRT's, crucibles, glass, air conditioning compressors, boat hulls.



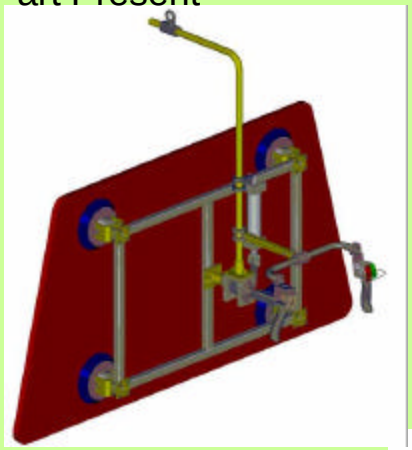
- **Amorphous Shapes** - shapes that lack a definite form, but may have elements of one or more of the other shapes. Includes complex shapes that do not fit into the other categories.
  - *Examples:* engines, transmissions, most automotive sheet metal, bags, castings, plumbing fixtures, chairs, and seats.

Basic Handling Devices

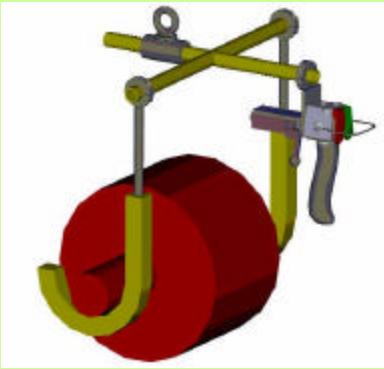


Clamps
- Mechanical
- Air Cylinder Actuated
- Pneumatic Controls
- Safety Interlock when cylinder is used
- Part Present Option

Vacuum
- Venturi
- Pneumatic Controls
- Safety Interlock
- Multiple cup systems
- Part Present

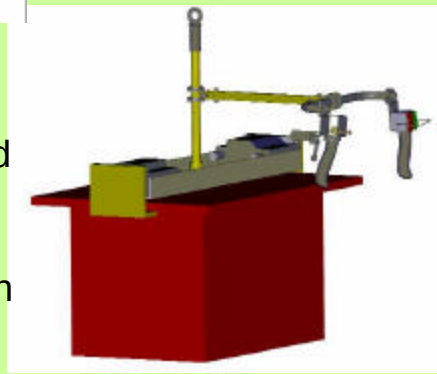


Handling Devices

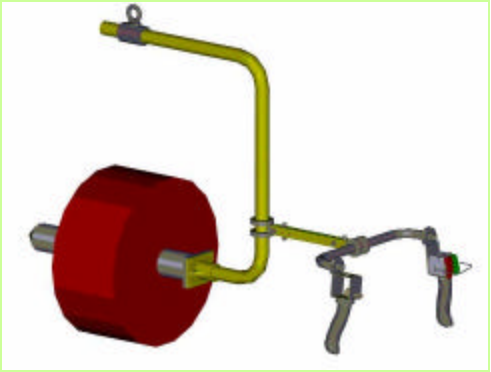


J-Hook
- Single or dual hook
- Straight Transfer

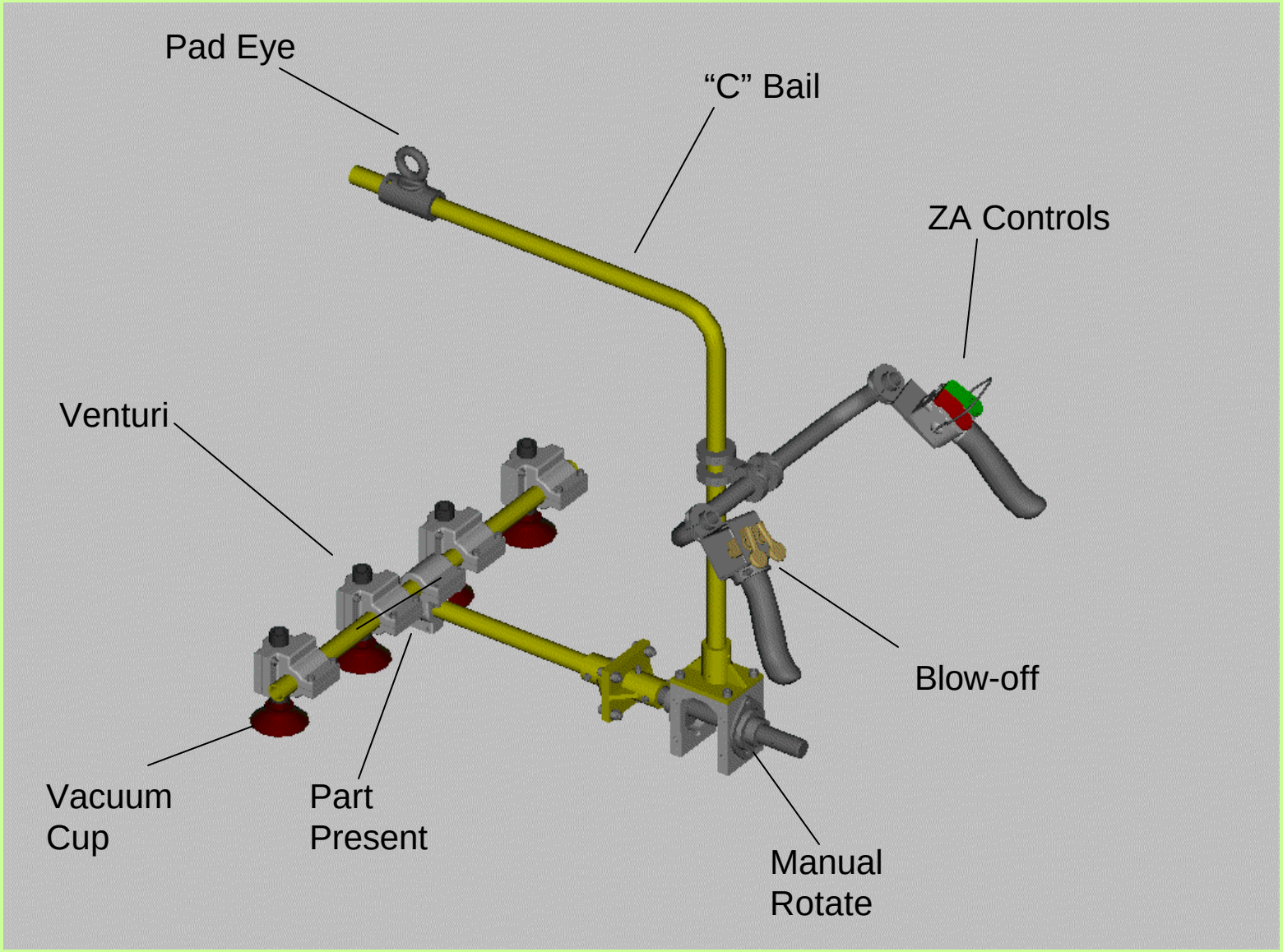
Trap
- Mechanical Design
- Air Cylinder Actuated
- No Force Applied to Product
- Safety interlock when cylinder is used



Probe
- End effector portion of this style device is inserted into object such as: inner diameter of rolls or cylinder bores.



Elements of a Handling Device



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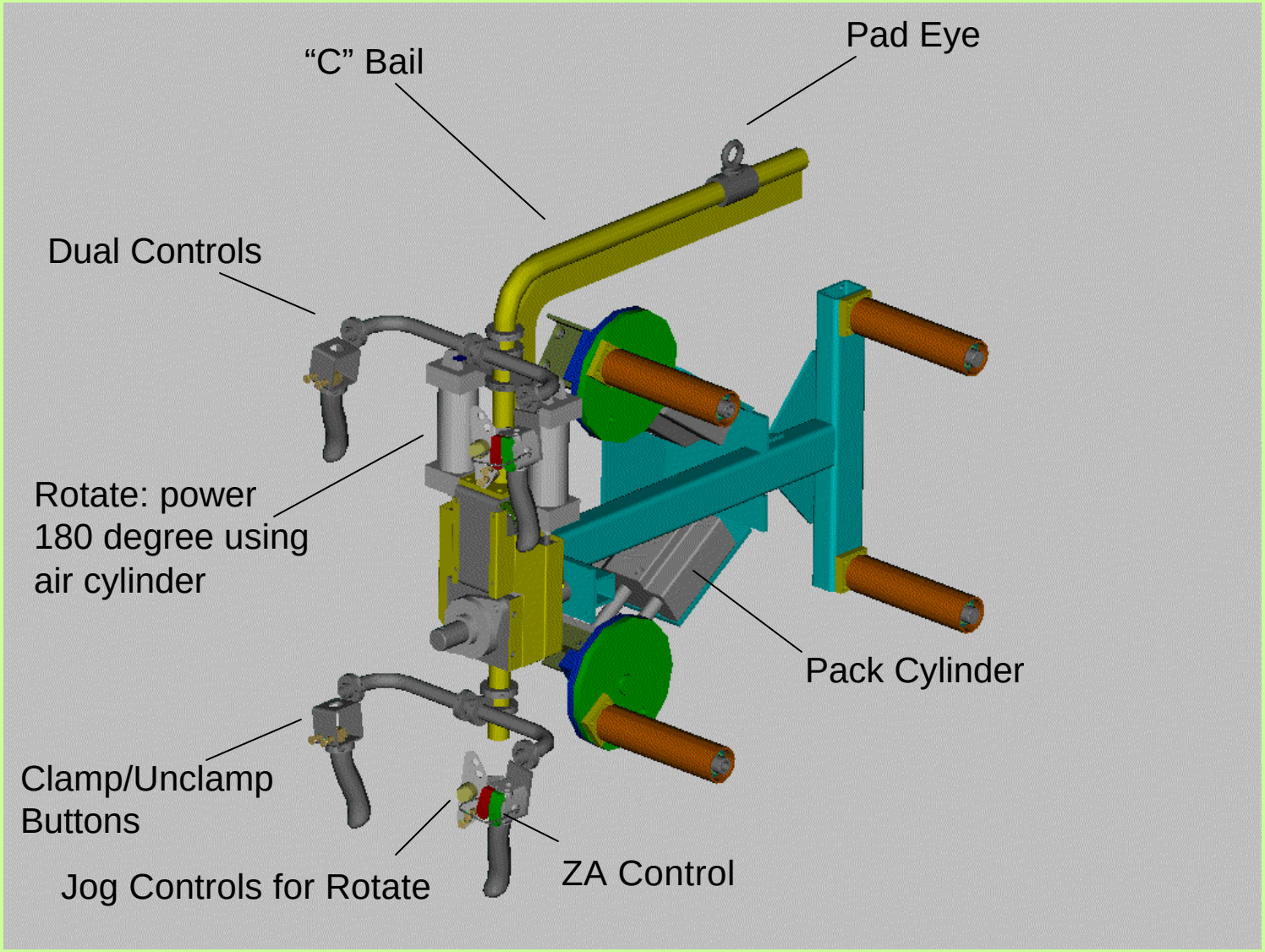

Logic Behind Choosing the Method of Attachment

		Basic Shapes				
		Flat	Cubical	Tubular	Spherical	Amorphous
Style	Clamp	X	X	X	X	X
	Trap	X	X			X
	Vacuum	X	X		X	X
	Probe			X		
	J-Hook			X	X	X

I-R/Zimmerman Handling System Advantages

Feature	Benefit	Advantage
•End effectors are designed and manufactured to our interpretation of the ASME B30.20 specification for Below-the-Hook Lifting Devices.	•Adherence to regulations and plant specifications related to marking, construction, installation and safety.	•Meet and exceed quality and safety standards that OSHA inspectors adhere to.
•Designed for complete control of the load with minimum bending or stretching.	•Comfort for the operator during repetitive motions and ease in lifting parts.	•Reduction of workers compensation claim and less need for frequent job rotation.
•Precision balance control of the load.	•Complete control of the load at all times.	•Minimize risk of injury to operator and part damage.
•Simplify process of handling parts.	•Reduce the number of times the operator manually handles the parts.	•Increase productivity; reduce back strain and fatigue.
•Low maintenance pneumatic and electrical circuits.	•Makes maintenance and troubleshooting simple.	•Most of the labor force can troubleshoot, eliminates the need for “experts” in controls.
•User friendly, minimal amount of training required.	•Easy to follow sequence of operations, minimal amount of buttons and triggers to operate devices.	•Less skilled labor force is required saving the company in labor cost.

Review

False 1. (T / F) A flat part shape can be handled easily using a J-Hook Handling Device.

True 2. (T / F) Single part handling applications are favorable.

True 3. (T / F) The first step in data collection is to listen.

False 4. (T / F) It is important to build relationships with cafeteria employees at a customer's facility.

False 5. (T / F) Tell the customer "there's no part we can't handle!"

Thanks