SAFE AND LEAN

An Ergonomics Strategy in Truck Manufacturing

2018 YPSW Annual Meeting

Tom Slavin

Traffic Safety Word Association

What comes to mind when you think of "**traffic safety**"?

Word Association

TRAFFIC SAFETY:

TRAFFIC SAFETY UNIT
SPEED LIMIT
DUI 35
VIRGINIA BEACH, VA
POLICE

CLICK IT OR TICKET
Massachusetts is Serious About Saving Lives

Traffic Safety – Another View

- **What is the safest way to travel across the country in your car?**
- Would you choose the route with…
  - Most stop lights
  - Lowest speed limits
  - Poorest cell phone reception
  - Most "dry" counties
- Or…

Expressway

- But … is this a Safety measure?

Safety Insight (from a while ago)

Principle 1:

Efficient Automotive Transportation, not accident reduction, is the fundamental problem.

Accidents, like congestion, are only indices of inefficiency.

- Traffic Accidents and Congestion

--Maxwell Halsey, 1941

Stoplights and Speed Limits: Lessons

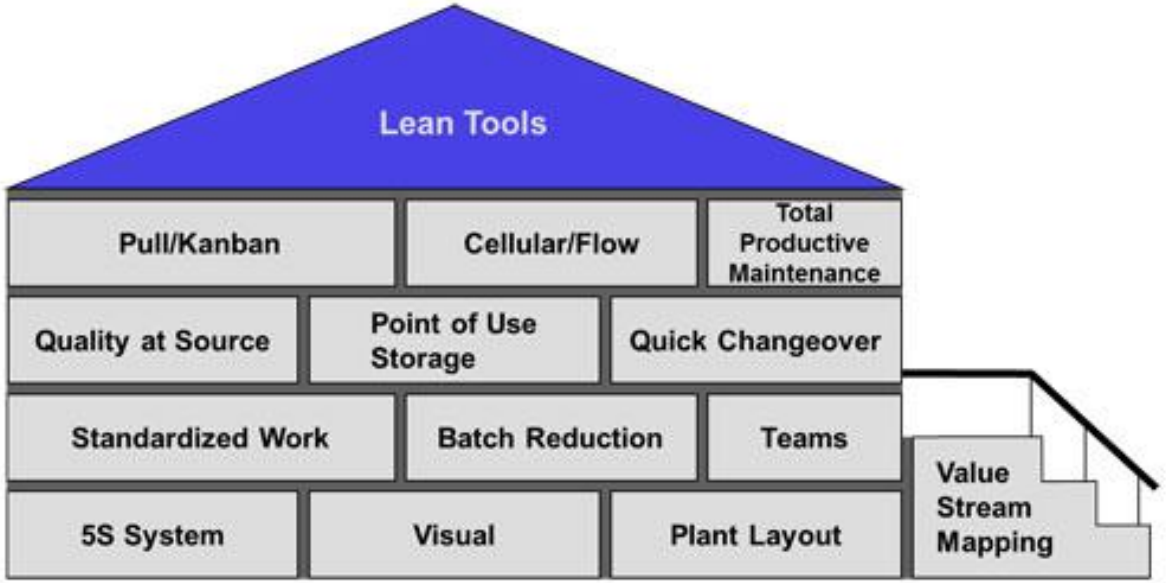
- The best safety solutions add value
- EHS professionals do not have a monopoly on safety ideas
- Safety problems are often business problems
- Best results come when everyone is engaged

What Is LEAN????
(No standard Definition)

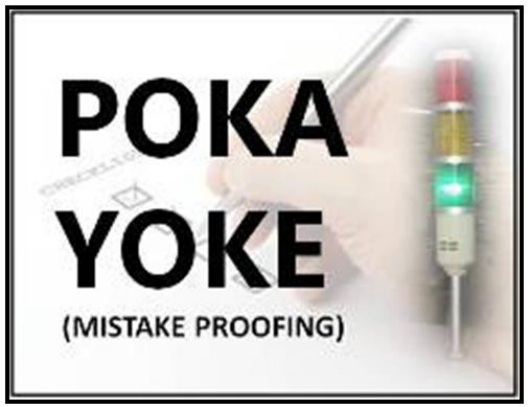
- Deliver Value Fast;
- Eliminate Waste

- When you do LEAN right you also get CLEAN and SAFE

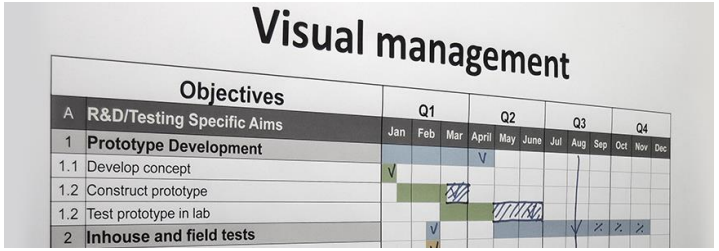

INVENTORY
OVER-PRODUCTION
DEFECTS
WAITING
8 Wastes in Lean
OVER PROCESSING
UNUSED CREATIVITY
INTERNAL TRANSPORT
MOTION


Lean Tools
Pull/Kanban
Cellular/Flow
Total Productive Maintenance
Quality at Source
Point of Use Storage
Quick Changeover
Standardized Work
Batch Reduction
Teams
5S System
Visual
Plant Layout
Value Stream Mapping


Sort
Set in order
Shine
Standardize
Sustain
5S
LEAN


POKA
YOKE
(MISTAKE PROOFING)


success
Standard of Work

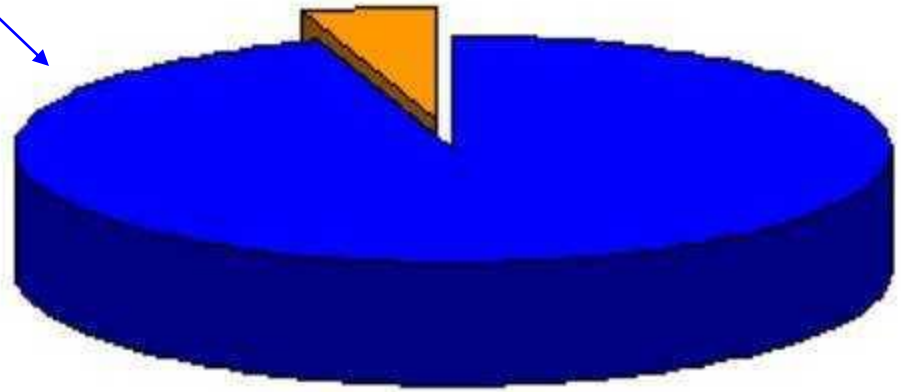

Visual management
Objectives
A R&D/Testing Specific Aims
1 Prototype Development
1.1 Develop concept
1.2 Construct prototype
1.2 Test prototype in lab
2 Inhouse and field tests
Q1
Q2
Q3
Q4
Jan Feb Mar April May June Jul Aug Sep Oct Nov Dec

THE 8 WASTES

Non-Value Added

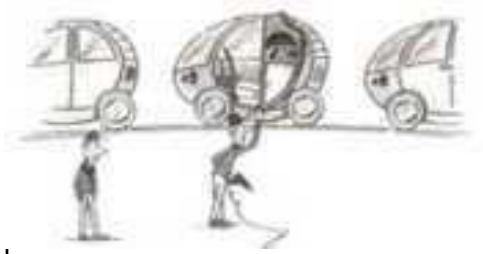
- Defects*
- Overproduction*
- Waiting
- Non-Utilized Resources
- Transportation*
- Inventory*
- Motion*
- Excess Processing*

Value Added



95%

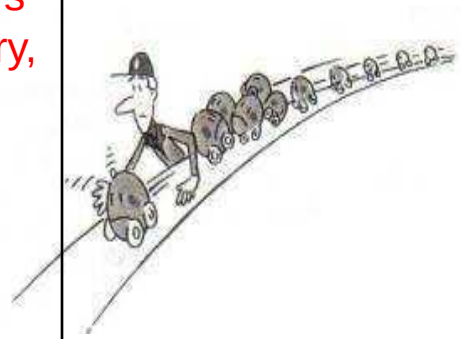
Defects

		Safety Impact	
	Production defects and service errors waste resources in 4 ways: Material is consumed, cost needed to produce part, rework and labor to address possible coming complaints	Defects require repairs to be made out of station which introduces the possibility for injuries. Defects can be associated with sharp metal, and unstable stacking.	

REPAIRS OFF LINE

➲ Overproduction

Safety Impact

	It is caused when more goods are produced than necessary or by producing faster than needed. *e.i. Internal stampings, over shipments, sub assemblies*	Overproduction indicates that workers may be working faster than necessary, which can increase the risk of a repetitive strain injury. Also housekeeping, tripping, crowding, falling parts.	

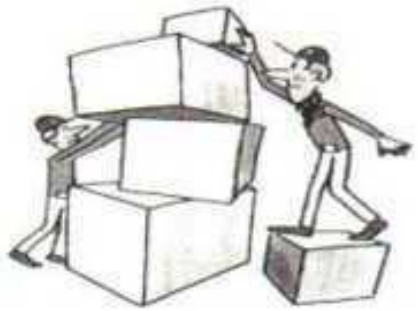
➲ *Transportation*

Safety Impact

	When materials and processes are poorly coordinated materials must be handled multiple times – loading and unloading, storing and retrieving	Loading and unloading increases the risk of a repetitive strain injury. Forklift traffic creates the potential for damage and injury.	

Excess Inventory

Safety Impact

This refers to inventory that sits between operations or that is delivered by internal/external suppliers before requirement, using valuable floor space (WIP & Warehouse) and risk of damaging material	Excess inventory between operations due to large lot production or supplier packaging increases the risk of trip hazards, distractions, blind spots for pedestrians and fork lifts and material handling injuries.	

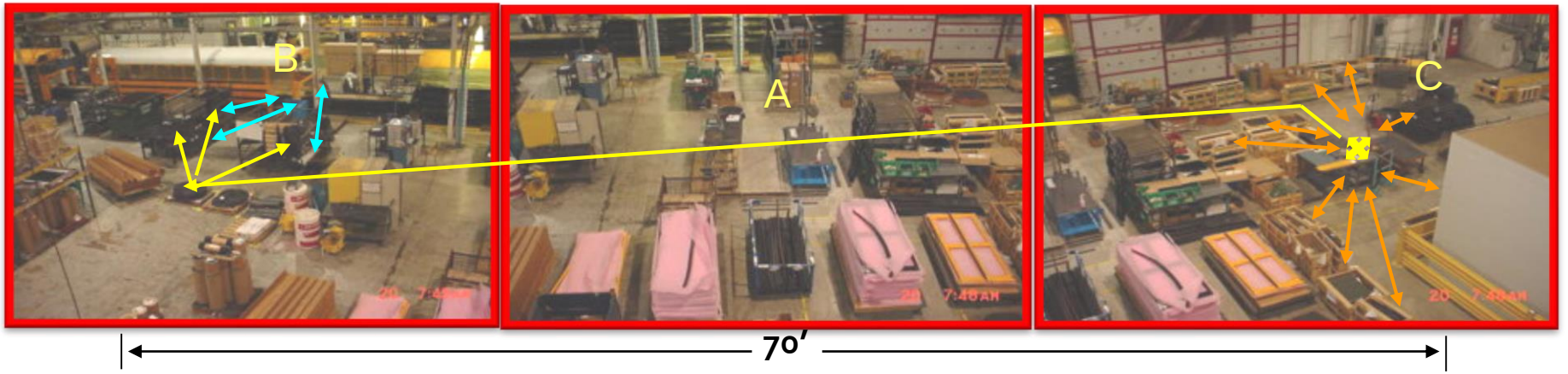
➲ Excess Motion

Safety Impact

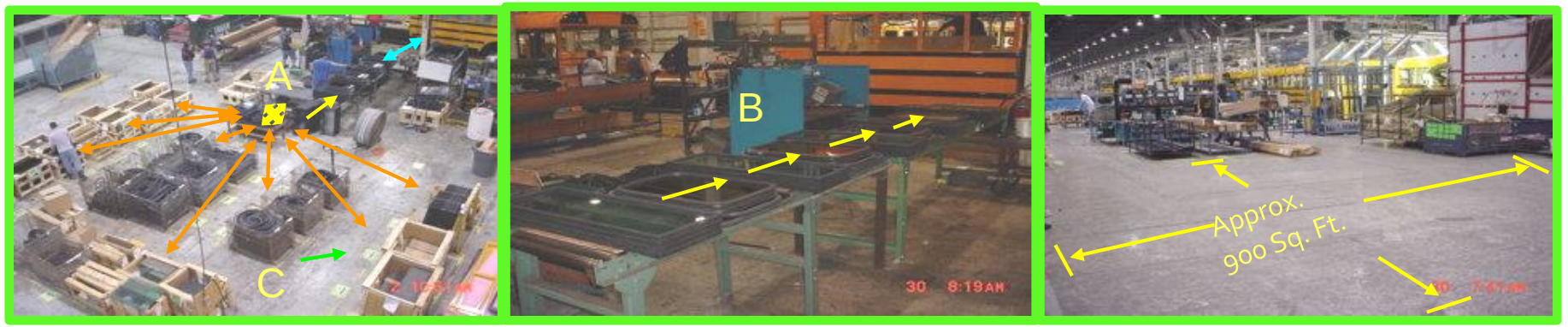
	This is any movement by a worker or machine which is not necessary for the production process, bending to reach parts, long walking distance to reach parts, lift heavy parts,etc.	Storing tools / parts outside of the work station requires additional effort such as walking, bending, carrying, thus presents an opportunity for injuries.	

KAIZEN "Door Glass Area" -Excess Motion

BEFORE CONDITION:



AFTER CONDITION



Assembly Line example:
Reduces excess inventory, excess motion, cycle time.

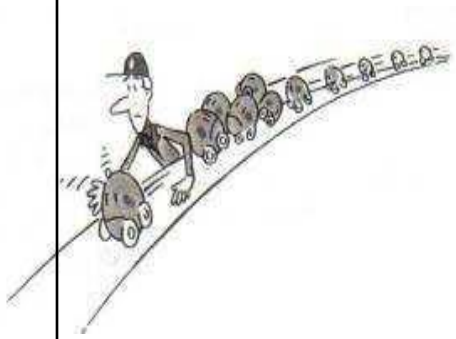
Small lot packaging reduces weight.

Inclined racks make parts accessible and allow rear loading.

Easy access reduces bending, walking and cycle time.

Excess Processing

Safety Impact

	It is caused when more work is done than necessary or more operations are performed than needed. *e.g. scrap allowed to get wet and must be dried; sprue design requires cut off*	Excess processing requires more force than needed to remove sprues leading to strains; excess gas used to cure cores leads to exposures of TEA, formaldehyde, etc.	

Sprue removal

5S FOR THE WORKPLACE

5S is a philosophy that focuses on workplace organization, cleanliness and standardization of work procedures. It is the foundation for lean strategies.

- **Sort :** *Keep only what is needed*
- **Set in order:** *A place for everything & everything in it's place*
- **Shine :** *Cleaning the Workplace-Housekeeping*
- **Standardize:** *Maintain the 1st, the 2nd and 3rd Ss*
- **Sustain:** *Maintain Workplace Organization.*

5S is intended to simplify the workplace environment by making "out of standard"conditions readily visible, identifies waste and non-value activity while improving quality,efficiency and safety.

➲ 5S FOR THE WORKPLACE

Unnecessary Items at Shop floor

5S FOR THE WORKPLACE

Safety Hazards from cluttering and stacking.

➲ 5S FOR THE WORKPLACE

A Place for everything & everything in it's place

BEFORE CONDITION:

AFTER CONDITION

5S FOR THE WORKPLACE

A Place for everything & everything in it's place

➲ 5S FOR THE WORKPLACE

A Place for everything & everything in it's place

BEFORE CONDITION:

AFTER CONDITION

➲ 5S FOR THE WORKPLACE

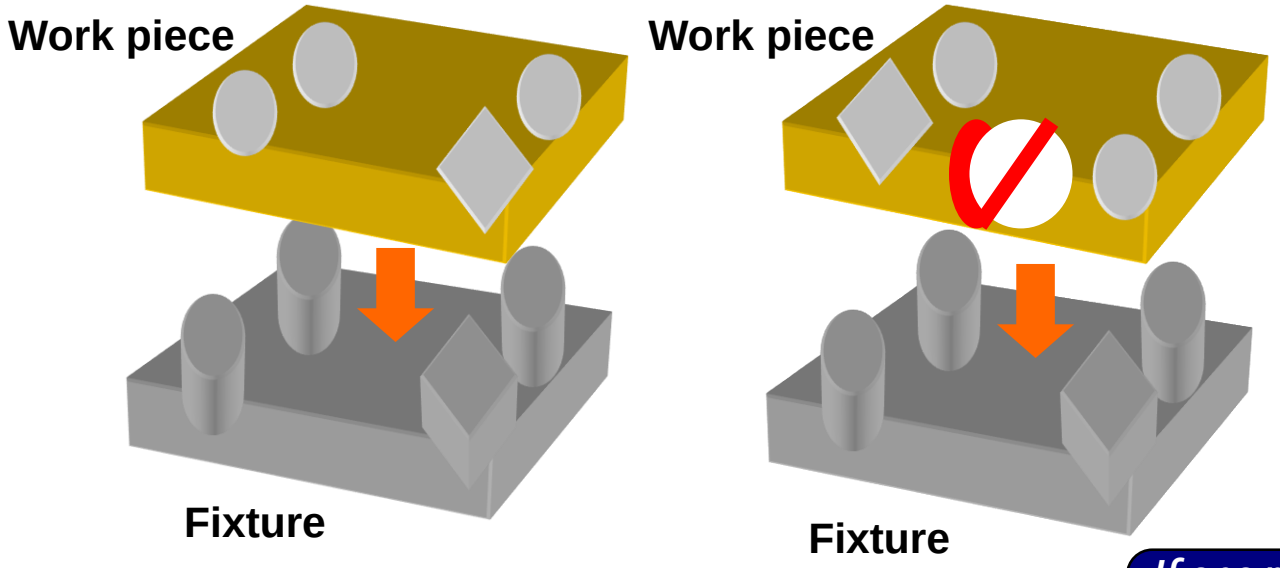
A Place for everything & everything in it's place

maintenance shop

Mistake-Proofing “POKA-YOKE”

- *POKA-YOKE: Japanese term for 'mistake-proofing'.*

Making it impossible for parts, tooling, equipment and fixtures to be used improperly preventing defects and safety incidents from occurring.



If one person makes a mistake ANYONE can

➲ *Mistake-Proofing "To err is human"*

- *What if you had to write your name 1500 times everyday*

  With all of life's distractions…..

  Are you 100% sure that you would never make a mistake?

Have you ever done the following:

- *Driven to work and not remembered it?*
- *Driven from work to home when you meant to stop at a store?*

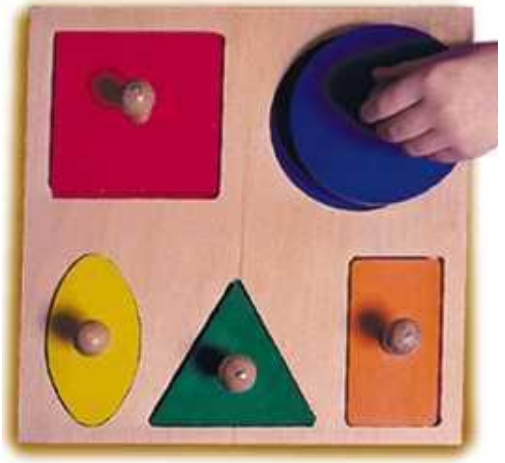
It happens to all of us.

POKA-YOKE *Mistake-Proofing Techniques*

- ***Built-in mistake proofing***

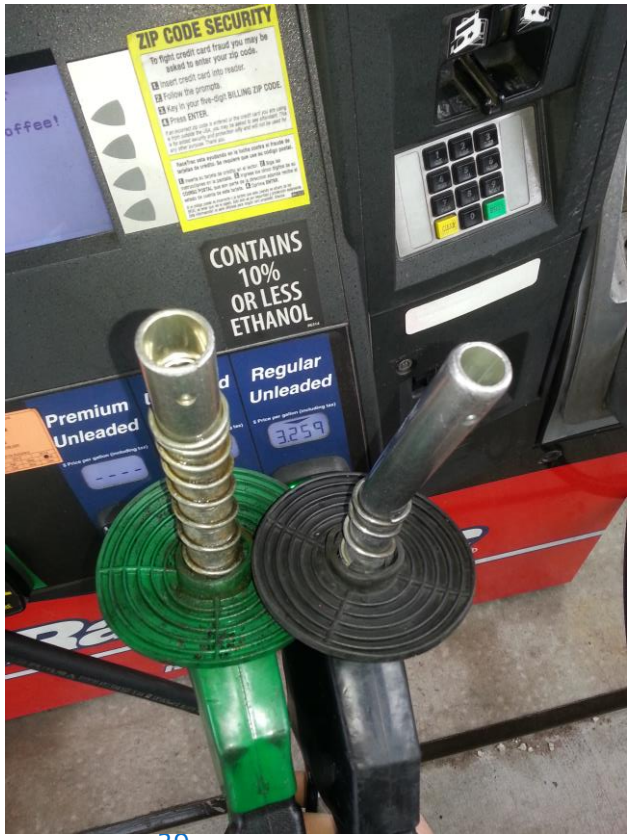
Designed devices or inspections techniques to assure no mistakes

- ***Designed for Manufacturability (DFM)***



Designs that cannot be manufactured or assembled incorrectly. This technique can also be used to "Simplify" the design and therefore reduce cost

Mistake-Proofing examples around us



Mistake-Proofing "POKA-YOKE"

Things done right 99.9% of the time means…..

- *Two unsafe landings at O'Hare Chicago airport each day*
- *16,000 lost pieces of mail per hour*
- *20,000 incorrect drugs prescriptions per year*
- *22,000 checks per hour deducted from wrong accounts*
- *500 incorrect surgical operations per week*

Why mistake-proof is an important lean tool?

- *Prevents possible injuries* *(Safety)*
- *Improves process efficiencies and resources* *(Waste elimination)*
- *Allows Zero Defects Quality* *(ZDQ)*
- *Increases business profitability* *(Cost)*
- *Improves Customer Satisfaction* *(Quality)*

Mistake-Proofing “POKA-YOKE”

Parts bin synchronized to tool and process sequence so correct bolt must be selected

➲ VISUAL MANAGEMENT

The intent of visual management is that any abnormalities can easily be identified such as:

- ➲ **Material out of location**
- ➲ **Equipment & tooling out of location**
- ➲ **Performance information levels**
- ➲ **Excess / shortage of material**
- ➲ **Ergonomic issues**
- ➲ **Identify safety hazards**
- ➲ **Visual poke yokes**

THE POWER OF VISUALIZATION

The human brain responds 55% to visual instructions, 32% to vocal and 13% to written instructions.

VISUAL TEST "WORDS"

Castrol Chevron Chilis Cirrus MSNBC Colgate Comfort Coors Light Corona

DQ Daytona Dell Denny's DHL Directv Domino's ESPN Hooters

ESSO FedEx Finlandia Firestone Flowmaster Gatorade Hanes Lays

Goodyear Holiday Inn Total Home Hooters Hot wheels IKEA Kit Kat

Lipton Mercedes Mobil Old Navy Texaco STP Subway Pepsi MasterCard

Rxmax Texaco Valvoline Taco Bell Tic Tac Tropicana Virgin Zellers Oreo

ESSO FedEx Finlandia Firestone Flowmaster Wendys Xerox Nivea

McDonald Nestle Oral-B Red Lobster Hot wheels Walmart Penske

KFC Kmart Kodak Kool-Aid Land Rover Nasa Nintendo

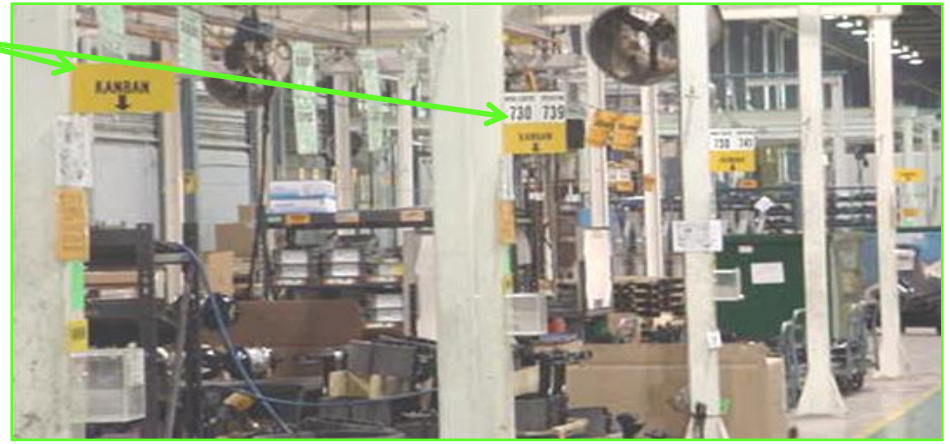
VISUAL TEST " PICTURES"

➲ VISUALS AT OUR FACILITIES

Visuals for pipe color coding

Rack content list

Kanban Mailboxes at assembly line



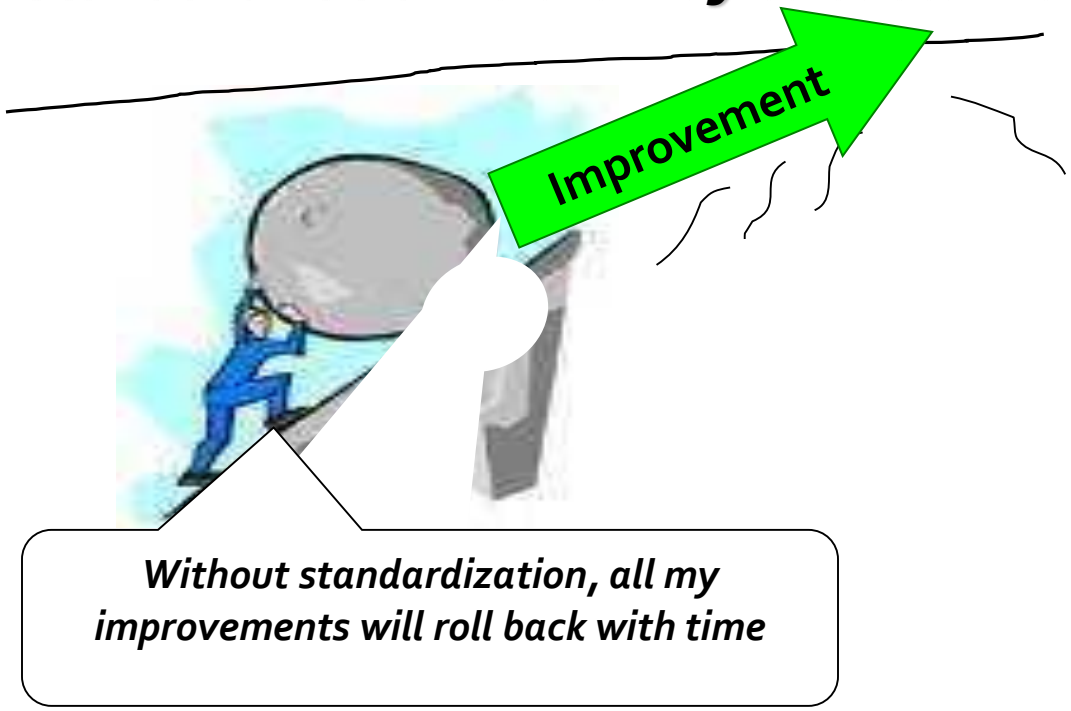
➲ *VISUALS AT OUR FACILITIES*

STANDARDIZED WORK

"There is no kaizen without standardization"

Taiichi Ohno

Standardization is the way to sustain the kaizen Gains



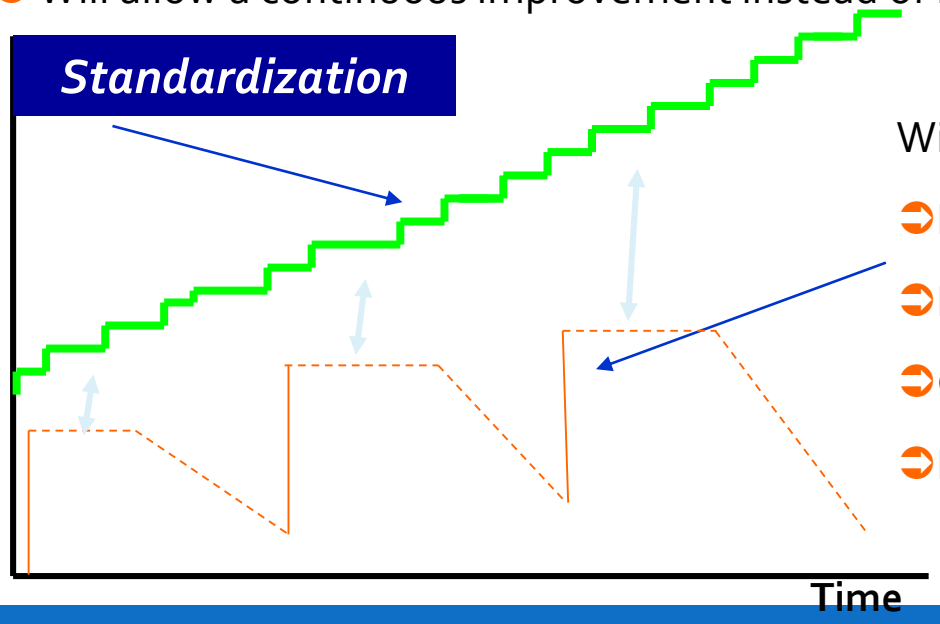
Standardization is a tool that will ensure your improvements will be sustained.

STANDARDIZED WORK

Is the way to sustain the kaizen Gains

Standardization:

- Will make Improvements consistent
- Will make results predictable
- Will ensure improvements stay in place
- Will allow a continuous improvement instead of repetitive one



Innovation:

Without standardization:

- Improvements are inconsistent
- Results are unpredictable
- Gains are not sustained
- Improvements become repetitive

STANDARDIZED WORK

By standardizing the method, we standardized good ergonomics. Where there are no standard methods, the operators will each develop their own which may, or may not, be the safest way to do the job.

Standardizing the right motions reduces the chance of repetitive motion injury. And paying attention to why unusual motions are necessary comes back to reducing variation and overload in the workplace.

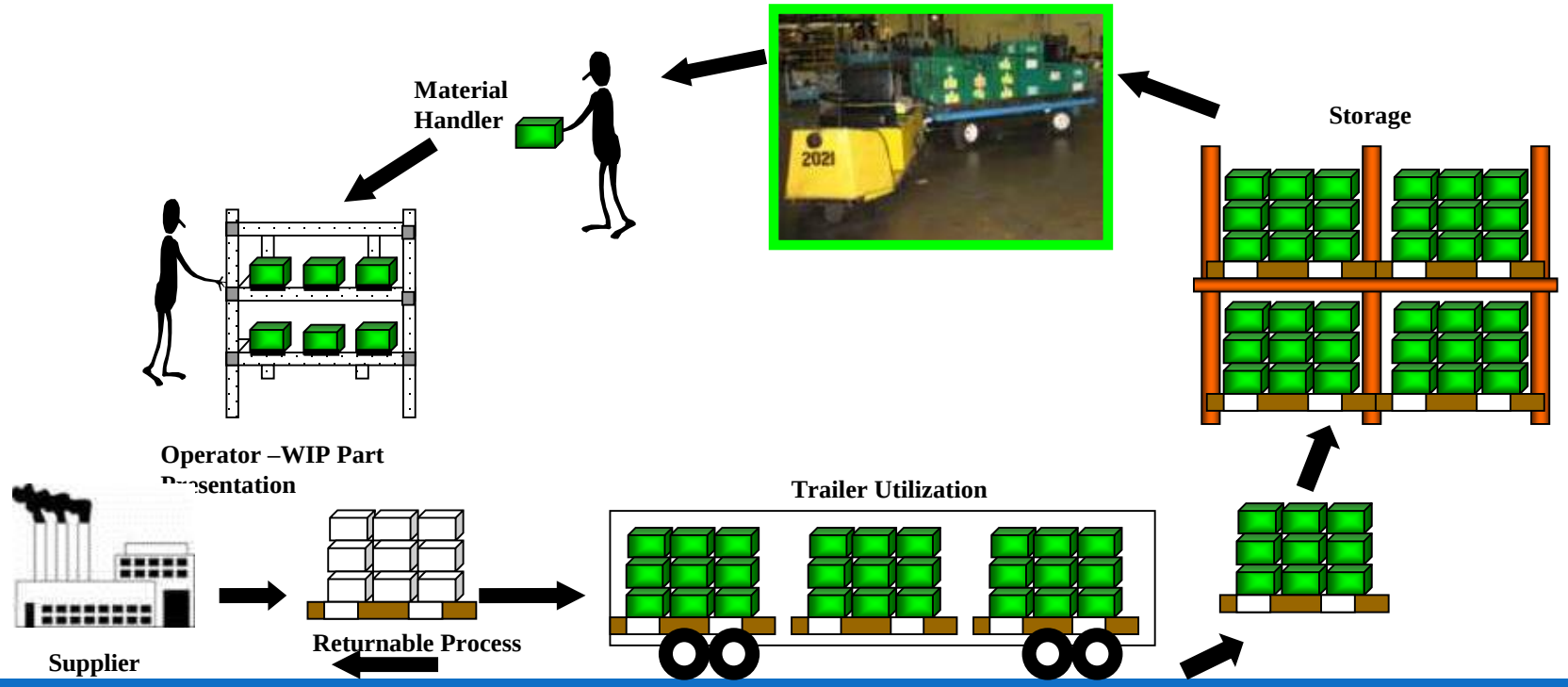
Something to remember about Standardized Work

"The right process produces the right result"

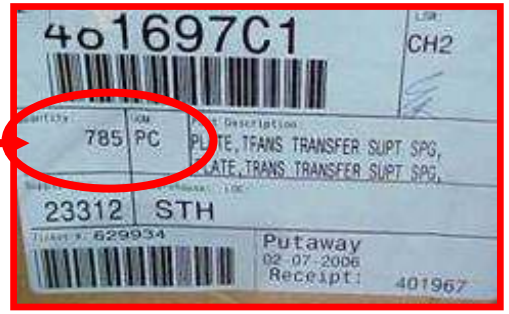
SMALL LOT PACKAGING

Determining, assigning or designing the appropriate standard pack and container that minimizes size and lot quantity for each part.

The purpose is to provide parts to the operator in a user-friendly container that facilitates damage-free and economical/ergonomically handling during shipment, storage and delivery.



Small Lot Packaging



Pack Quantity = 785 Pieces

Daily Requirements (Average)= 80 pieces

Days of inventory at Line Side = 9.8 Days

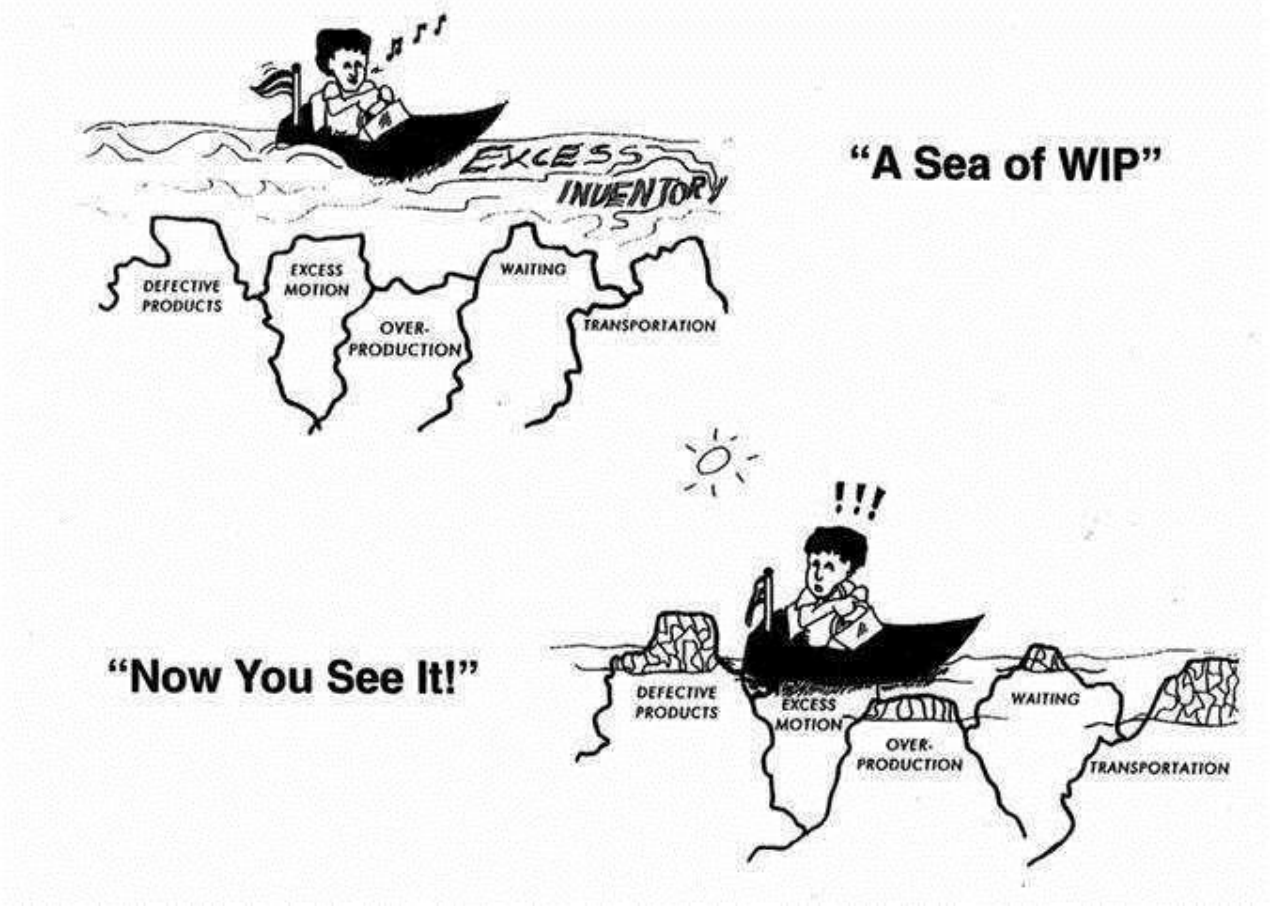
Small Lot Packaging = 40 Pieces

Hand Delivery

Small lot packaging will result in less fork lifts required, less propane, reduce working capital, improve material flow/presentation, safety working conditions, etc.

Small Lot Packaging

Lower Levels Of Inventory Expose Problems



LEAN done wrong or right

Bad Lean

- "less employees are needed"
- Do more with less
- Increase stress due to demands
- No time to talk to customers
- Impersonal
- Remove guards for speed

Good Lean

- Employee contributions are valued
- Efficient process
- Decrease stress, no parts shortages
- Focus on customer needs and value
- Better communication
- 5S everything in its place

Introduction of Ergonomics at Navistar – A Little Background

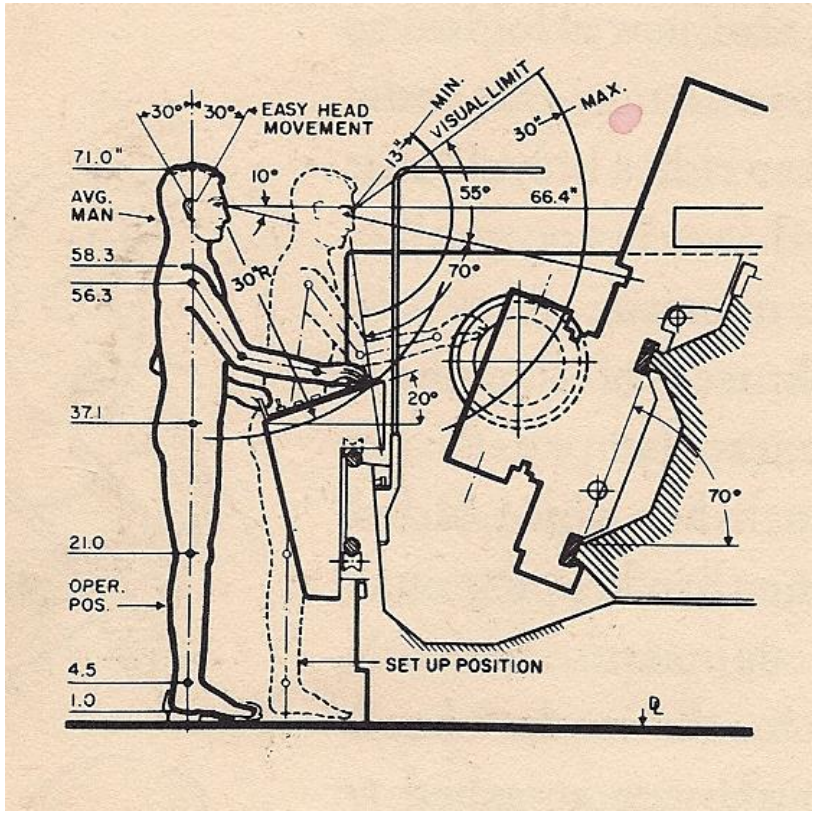
- Labor contract negotiations – safety subcommittee
- Big Three had agreed to form ergonomics committees
- Ergonomics language looked like a win-win

"Ergonomics is too important for health and safety."

---COMPANY PRESIDENT

Health and Safety Approach to Ergonomics

- Programs
- Committees
- Focus on Force, Frequency and Posture
- (Stop signs and speed limits)



“Ergonomics is too important”: Lessons for EHS

- Designed in safety is not the same as designed by safety
- EHS must get out of the way of EHS
- EHS is better at supporting than controlling

THANK YOU!