GOErgo presents

The 18th Annual applied ergonomics CONFERENCE 2015

Practitioners talking with practitioners

Introducing Ergonomics to the Product Design Process using 6S

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Agenda

- Who is Cummins?
- DMAIC
- Outputs

Who is Cummins?

Diversified Global Power Leader

- Four Complementary Businesses

Engines

Power Generation

Components

Distribution

Cummins Mission Statement

- Motivating people to act like owners working together.
- Exceeding customer expectations by always being first to market with the best products.
- Partnering with our customers to make sure that they succeed.
- **Demanding that everything we do leads to a cleaner, healthier, safer environment.**
- Creating wealth for all stakeholders.

ROBERT W.
CAMPBELL
recipient AWARD®
PRESENTED BY THE National Safety Council

WORLD HEADQUARTERS

500 Jackson Street
Columbus, Ind., 47201

STOCK SYMBOL (traded on NYSE)

CMI

FOUNDED IN 1919

WEB SITE

www.cummins.com

SALES / EARNINGS

In 2012, Cummins earned **$1.65 billion** on revenues of

$17.3 billion.

FORTUNE 500 RANKING (2013)

160

EMPLOYEES

Worldwide, approximately **46,000 people.** More than 60 percent of the Company's employees are located outside the U.S.

CUSTOMERS

The Company's customers are located in approximately **190 countries** and territories that Cummins reaches through a network of more than **600** company-owned and independent distributor locations and approximately **6,500** dealer locations.

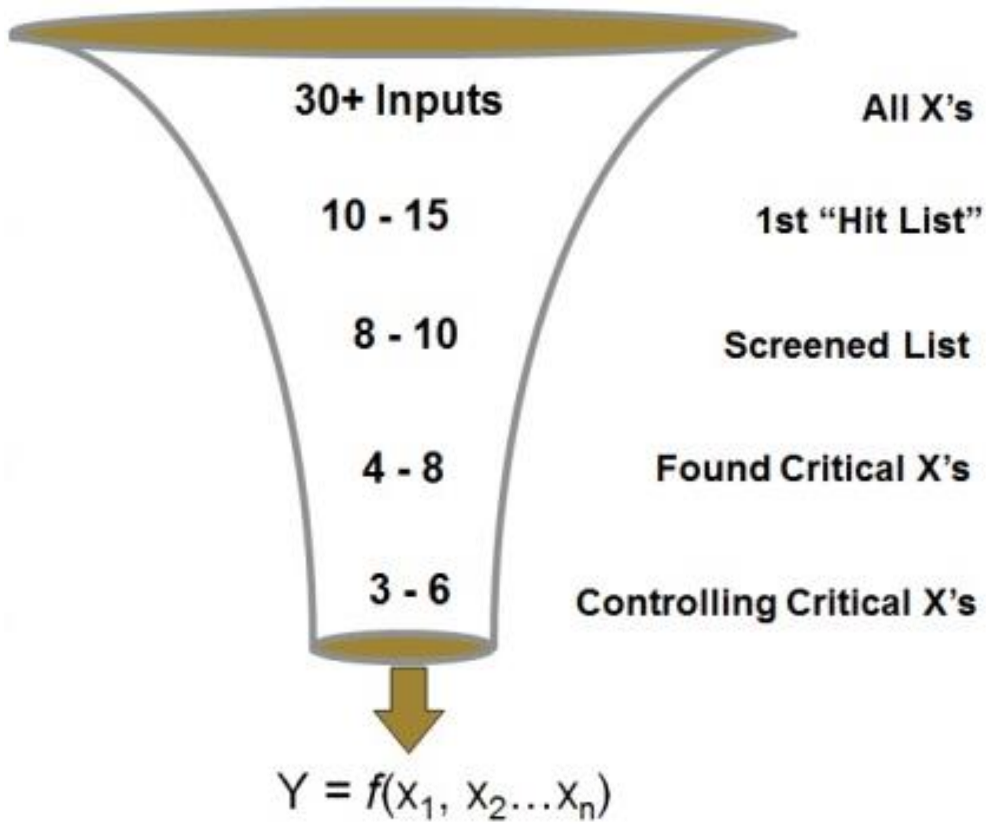
Show of hands…

(Electronically)

6σ

DMAIC

- Define
- Measure
- Analyze
- Improve
- Control



Define

- This doesn't look so bad right? Do we have a problem?

Define

- Ergonomic Injuries still represent the leading cause of injuries at CMI - ~24%
- We found that at least 47% of our ergonomic injuries have some relation to product design
- Currently no ergonomics process for the design/development of new products

Define

- Charter was created with a Y statement that focused on introducing ergonomics into the Product design process

Measure

- Conducted a thorough Voice Of the Customer (VOC) of product engineers/designers from varying backgrounds
- What is a VOC?

Analyze

124
- Voices

13
- “Red” statements

5
- “Blue” Statements

Improve

- The “people have spoken”:
  - An ergonomics checklist should be available
    - Easy to use
    - Provides guidance
    - Quantitative in nature

Improve

- Additional voices identified other important improvement areas:
  – Communication
  – Data
  – Engineering Standard Work

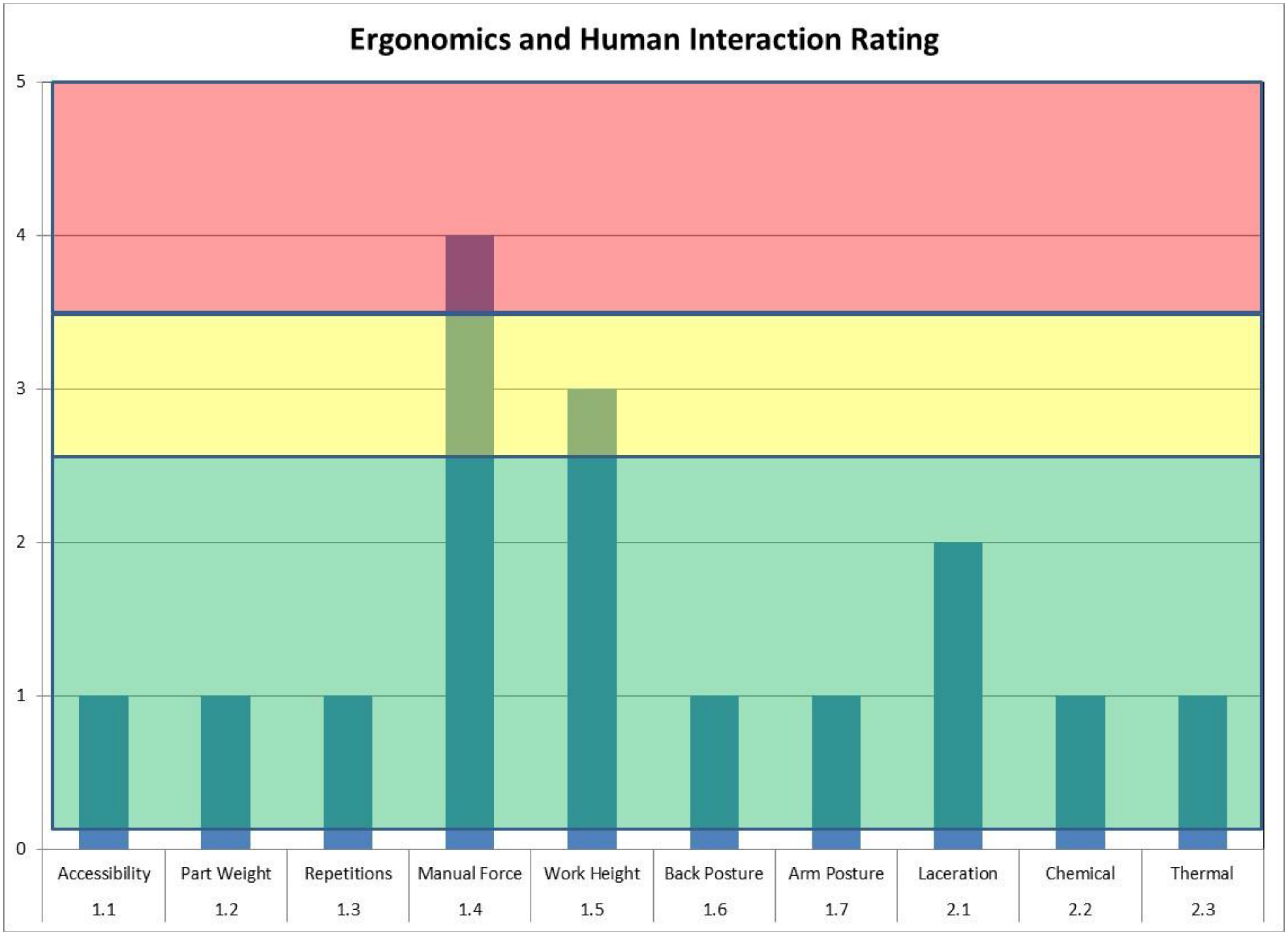
Improve

- Ergonomic checklist for designers was created
  - Covers 10 risk areas
  - Includes accessibility, component weight, force requirements and working postures
  - Provides quantitative values and guidance
- User acceptance survey conducted
  - "speak now or forever hold your peace"

Checklist Sample

Engine:		Application:	
Engine System:		Parent Engine:	
Component:			
Part Number:			
Component Engineer		Other Participants:	
Review Date:			

Act.	Attribute	1	2	3	4	5	Score
1.1	Accessibility	Easy to access with good visibility		Easy to access with poor visibility		Difficult to access with poor visibility	1
1.2	Part Weight	<10 lbs	10 - 15 lbs	15 - 20 lbs	20 - 30 lbs	>30 lbs	1
1.3	Repetitions	<10		10 - 20		> 20	1
1.4	Manual Force	Minimal amount of manual force is required for assembly		A moderate amount of manual force is required for assembly		Excessive manual force is required for assembly	4
1.5	Work Height	36" - 48"		32" - 36" or 48" - 52"		>52" or <32"	3
1.6	Back Posture	Neutral		Bend Over		Squating and Bend Over	1
1.7	Arm Posture	Thumbs neutral Elbow close to body	Thumbs pronated Elbow close to body	Thumbs neutral Elbow away from body	Thumbs down and elbow close to body or thumbs pronated and elbow away from body	Thumbs down Elbow away from body	1


Ergonomics and Human Interaction Rating
5
4
3
2
1
0
Accessibility 1.1
Part Weight 1.2
Repetitions 1.3
Manual Force 1.4
Work Height 1.5
Back Posture 1.6
Arm Posture 1.7
Laceration 2.1
Chemical 2.2
Thermal 2.3

Control

- Signed, Sealed and Delivered
  – Documentation (work instruction)
  – Training
  – Communication

Outputs

- Created a “grass roots” process for identifying ergonomic issues
- Opened the door for future growth in product design ergonomics
  - “S-Curves”
  - Benchmarking Matrix
- Using 6Sigma helps provide better overall adoption
  - Due diligence
  - Company accepted practice

Questions