SAFESTART HUMAN FACTORS

CONFERENCE

SAFESTART®

2022

Orlando, FL

November 8 & 9

DARE TO THINK NEW: DESIGNING PROCESSES ALIGNED TO HUMAN FACTORS

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Music: El Cortecito
By Steve Bialas – Retired Epiroc Employee

WHY IS SAFETY IMPORTANT TO ME?

The Human Factors….

The Poodle Factors….

01 **FAMILY**

8 Children
10 Grandchildren
1 Poodle (PPE)

02 **PROFESSIONAL**

Manufacturing 1977
M.E., NC Programmer,
Quality, IT, Safety,
SafeStart® Global PM

03 **INTERESTS**

Technology
YouTube Creator
Music; Vinyl Collector
Theatre (Acting)
Baseball

AGENDA

- The Human Factor in Business Processes

- The Design Dilemma

- The Operational Dilemma

- The Worker Dilemma

- Dare To Think New…Rewind to Align to Human Factors

- Dare to Think New…An Old Tool With A New Spin

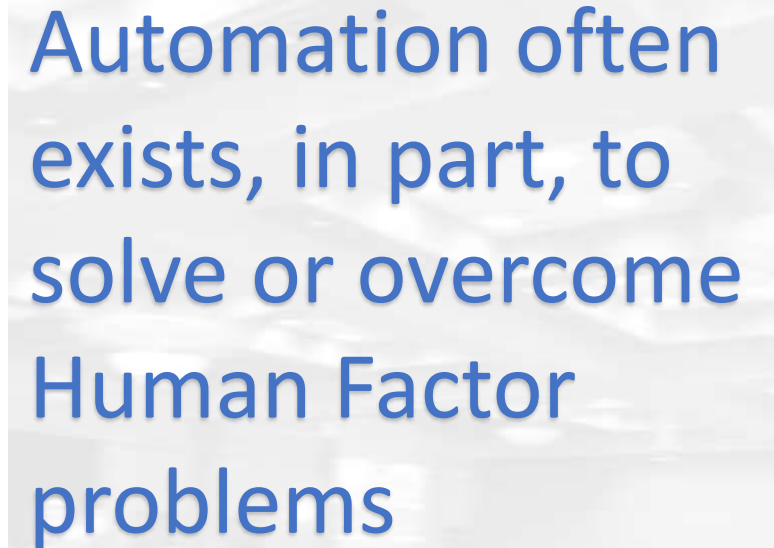SAFESTART HUMAN FACTORS

SCOPE

Primarily focus on manual assembly of products

Not automation

Stationary build vs. moving production line

Activities where human engagement is required

Focusing on work content and work environment, including culture

Automation often exists, in part, to solve or overcome Human Factor problems

WHY THIS TOPIC?

- POLL AUDIENCE – Recordable Rates
- CovID-19 Impact?
- Safety Goals: ZERO Harm, ZERO Injuries
- Doing "all the right things"
- People still get hurt - Why?

To what degree do our work process designs consider the critical aspect called Human Factors?

Are people part of the solution, or part of the problem?

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THE HUMAN FACTOR IN BUSINESS PROCESSES

- What is often a Missing Element?

- Considering Human Factors in **Work Content**

- Aligning human factors with the end product
  - Does the end justify the means?
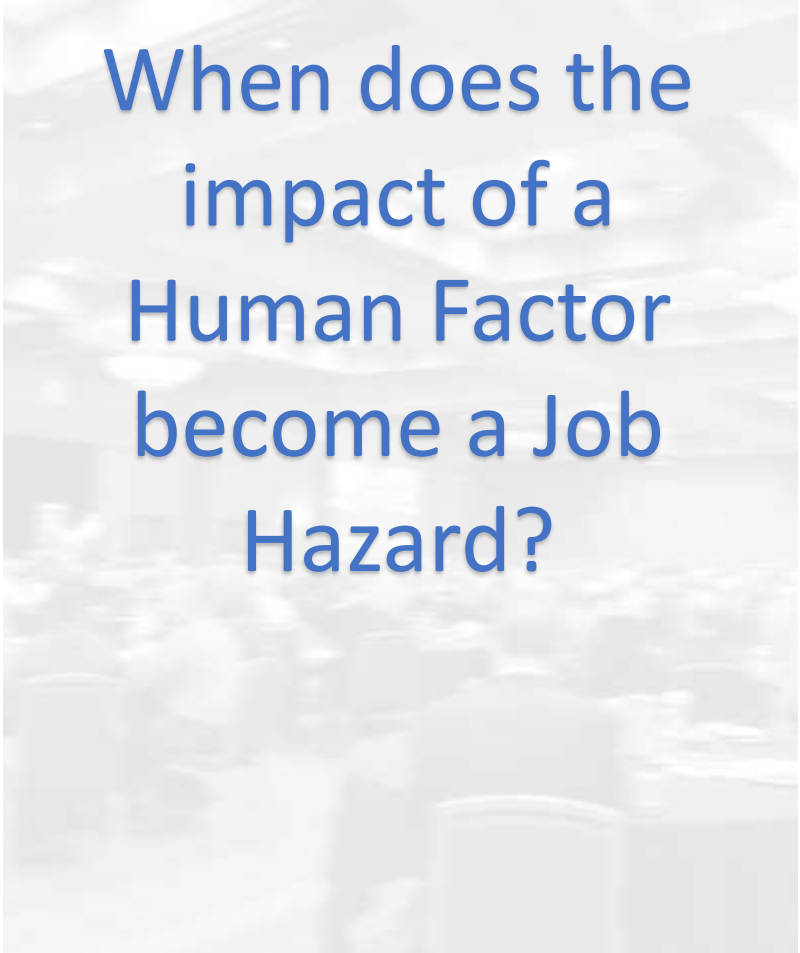 - The hidden impact of considering Human Factors

CASE STUDY

- Accounting Close (End of month/qtr/year)

➤ *Name the Human Factors for those working the close*

- Design a Business Process to Leverage these factors

- Dare to Think New: Benefit to worker and business

Product = outcome of a process

Human Factor
+ Enablers
- Disablers

TRADITIONAL JOB HAZARD ANALYSIS

- Engage employees doing the work
- Review accident history
  - Near miss events also
  - Were problems fixed?
- Preliminary job overview
  - Focus on known hazards
  - If life threatening, take immediate action
- List, rank and set priorities for hazards present
- Outline steps and tasks
  - Observe work being performed

When does the impact of a Human Factor become a Job Hazard?

TRADITIONAL IDENTIFICATION OF HAZARDS

- What can go wrong?
- What are the consequences?
- How could it arise?
- What are other contributing factors?
- How likely is it the hazard will occur?

<u>Focused On Things</u>
Mechanical
Operational
Physical Failures

But…
The Impact is on
HUMANS

The Starting Point: Product Design

HUMAN FACTORS: KNOWING LIMITS

Impacts of the Human Condition: **Frustration**

- External and internal customer expectations

- Lack of collaboration before committing

- Creating competing success measures

- Stretching outside of reality vs. risks

- Misaligned stretch goals lead to conflict

- There is no "I" in TEAM

"We can do that for sure"

Marketing vs. Design

HUMAN FACTORS ENGINEERING

- Studies the interactions between humans and the systems that surround them
- How do humans interact with:
  - Tasks
  - Devices
  - Tools
  - Processes
  - Environment around them
- Goal: Balance human strengths and limitations
- Focus: The operation of the designed product(s)

ORIGINS OF HUMAN FACTORS ENGINEERING
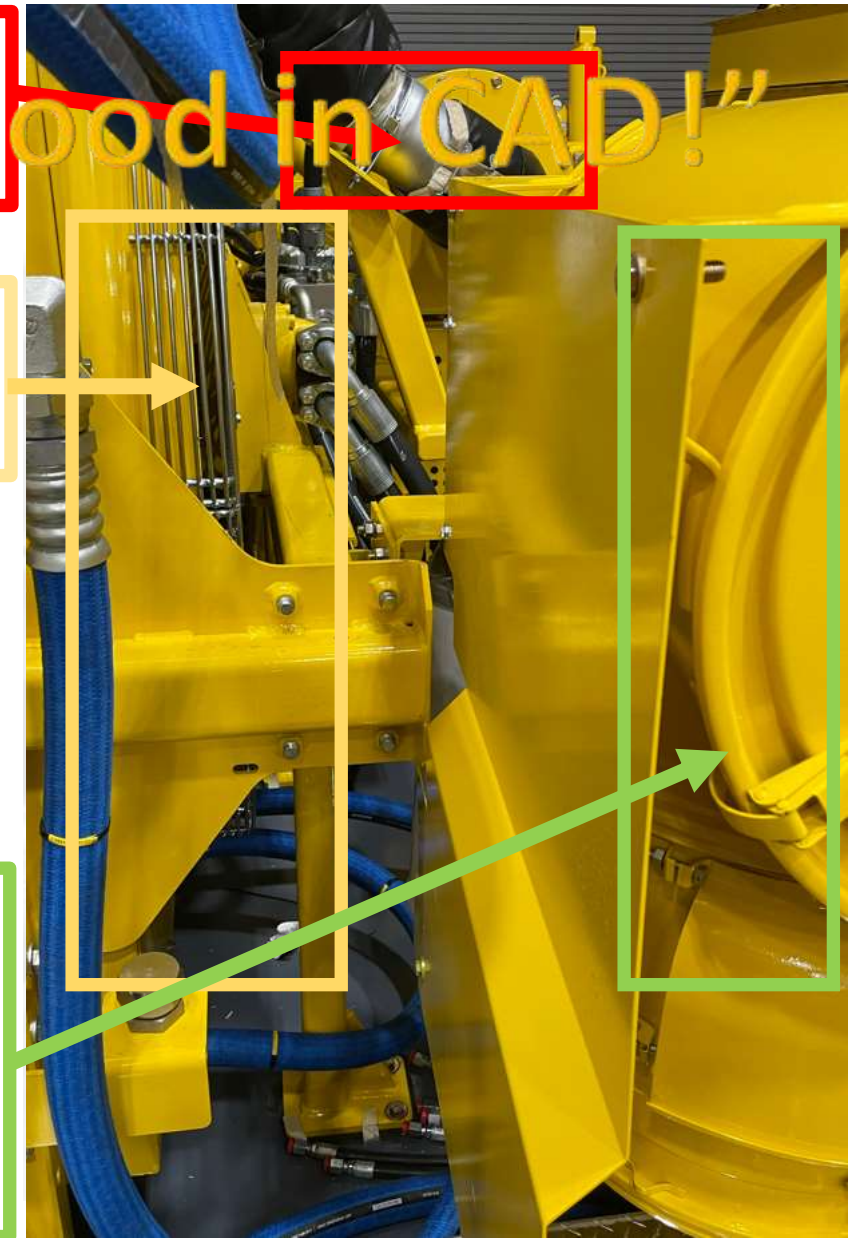
B-17 Plane Crashes in WWII
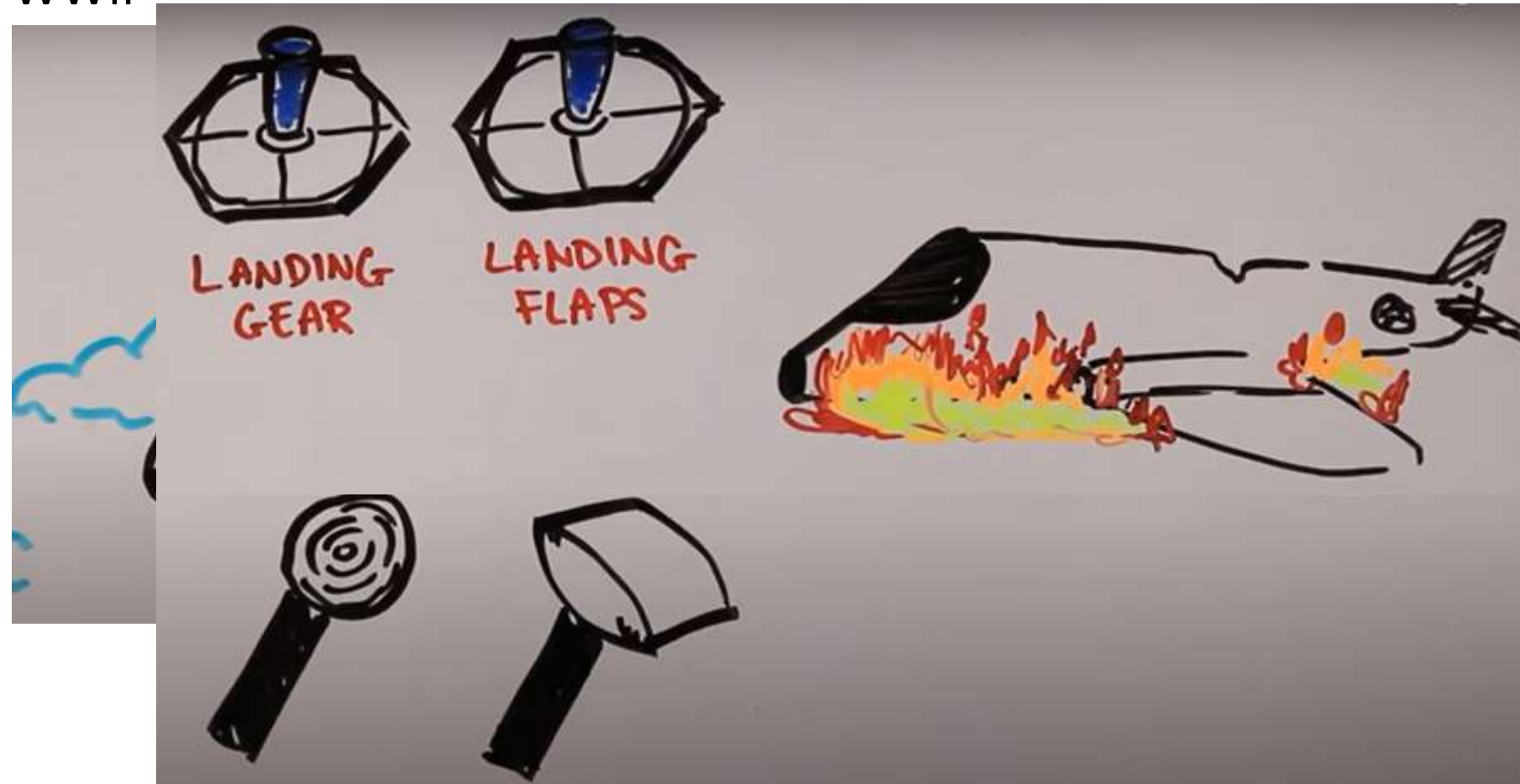
THE DESIGN DILEMMA "It Looks Good in CAD!"

- Product Focus: End User / Consumer
- Design Norms: Form, Fit, Function
- Design considerations hierarchy
- Sub-systems design efficiency
- Evolution towards "Smaller is better"
- Where smaller not possible: "More compact"
- Can challenge DFMA principles

Exhaust

Cooler

Air Cleaner

TOOLS OF THE DESIGN TRADE

- Design for Manufacturing and Assembly (DFMA)
  - Manufacturing: faster, cheaper and easier
  - Assembly: simplify, shorten and mistake-proof
- DFM ←→ DFA – Conflict with each other at times
- Potential Benefits (within subassembly process):
  - Shorter time to market
  - Lower production development costs
  - Reduced waste
  - Greater product reliability
  - Quality control

Design for Subassembly

TOOLS OF THE DESIGN TRADE

- Design for (End Product) Assembly?
  - "One Time Event" – Assemble & Test

- Design for Serviceability?
  - \+ Remote diagnostics to focus service activity
  - \+ Replacement of systems vs. individual parts
    - Often easier to remove systems
    - Higher part replacement cost
    - More labor?
  - \- Ease of access to service points
  - \- Interference factors
  - \- Hazards such as heat or leaks
  - \- Service personnel "fitness"

Change Fitting

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The Rubber Meets the Road: Operations

HUMAN FACTORS: WORDS SPOKEN & UNSPOKEN

Impacts of the Human Condition: **Rushing**

- "We have to be done at 3pm or else"
- "I don't care how you get it done, just do it"
- "Get some help if you can't figure it out"
- "This job is so hot, the CEO called about it"

"I never said not to do it safely or follow the rules."

THE OPERATIONAL DILEMMA

- Throughput and output is King
- Efficiency and Effectiveness
  - When Human Factor elements are absent
  - Downstream process consequences
  - "Pay me now, pay me later"
- Ideally, tasks performed as designed
- Tasks performed in reality (parts shortages)
- Unexpected complications (rework, part failure)
- Accommodating for change
  - In-line Design Change
  - Customer Requirement(s)

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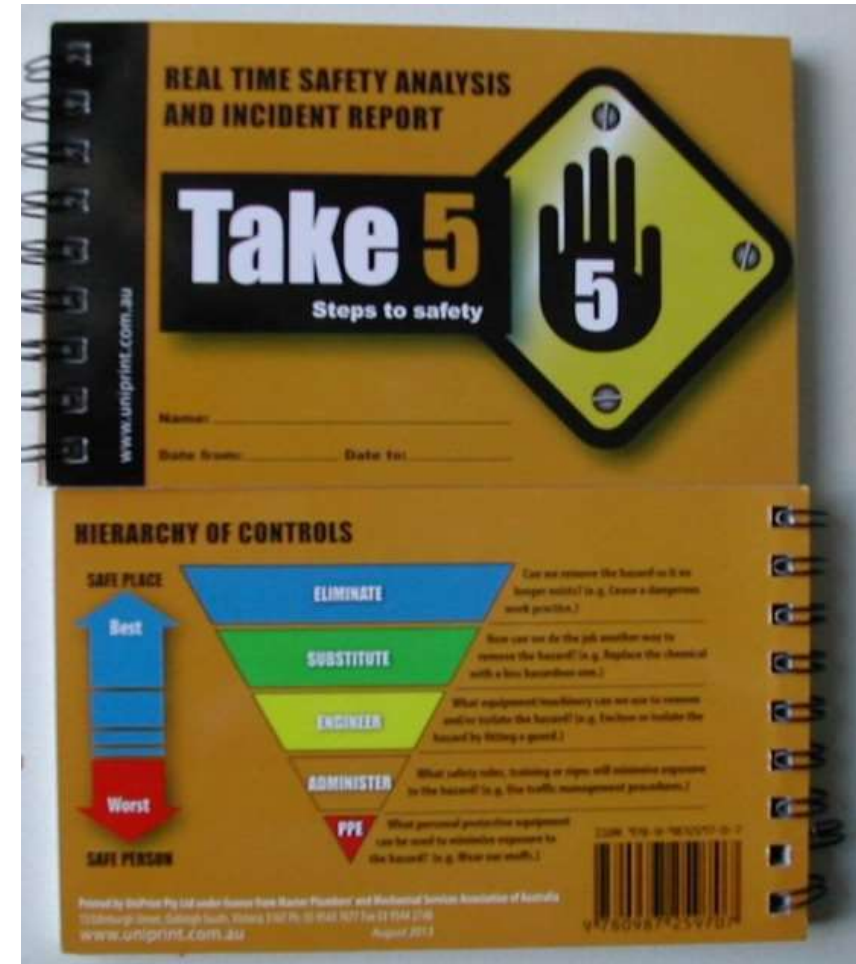
THE WORKER DILEMMA

- Headstrong focus on task completion
- Fear of complaining about difficult work content
- Promotes "creative" workarounds
  - These are often more risky by default
- Successful shortcuts become norms
- Drives complacency towards risky behavior
- Deadlines: Perceived, self-imposed

Post Pandemic…
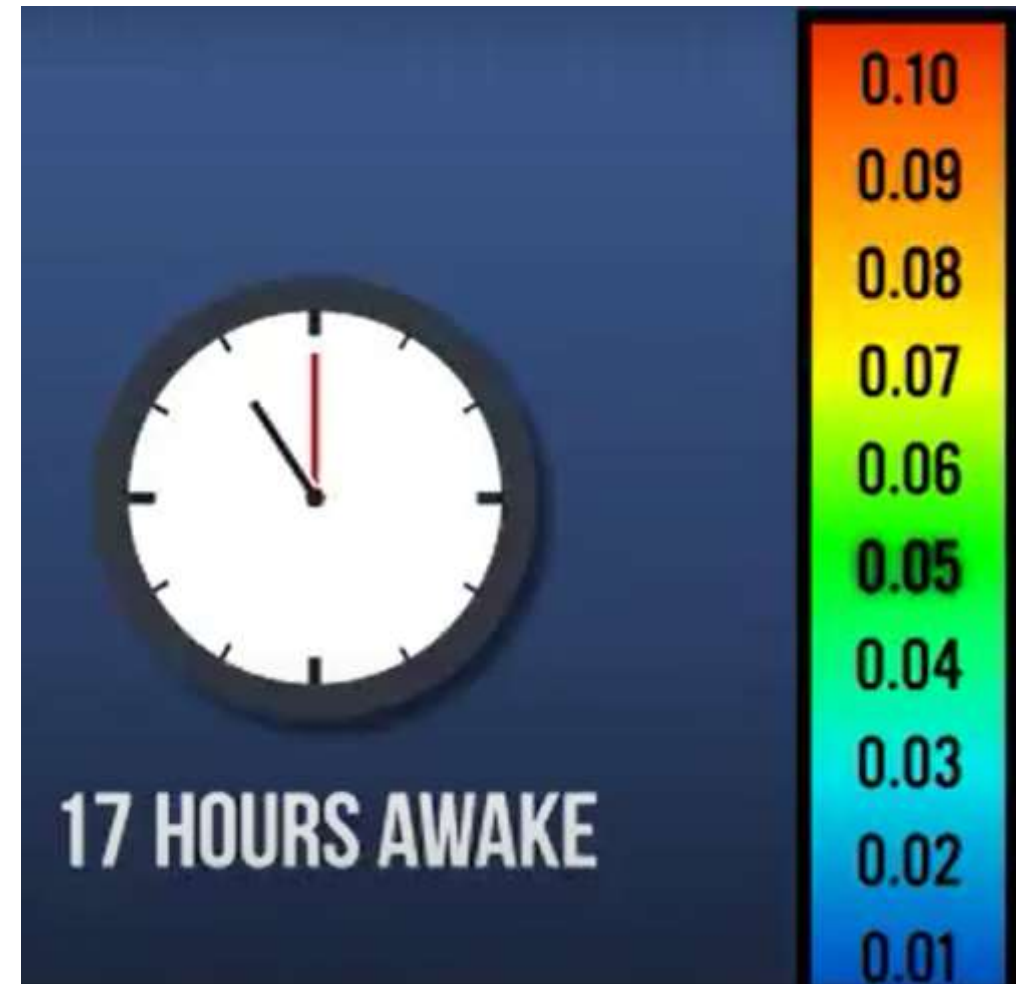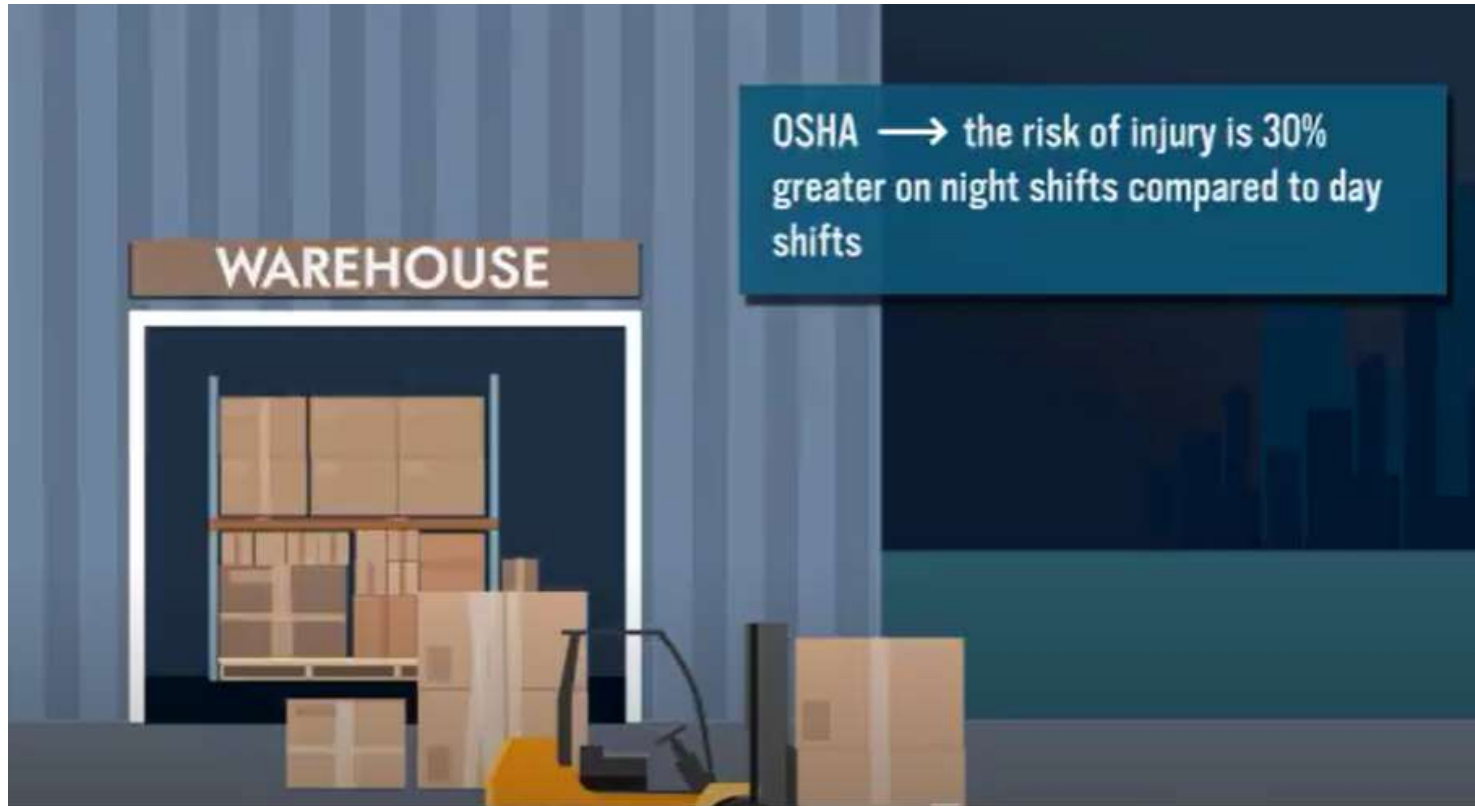- Global Part Shortages
- Assembling out of sequence
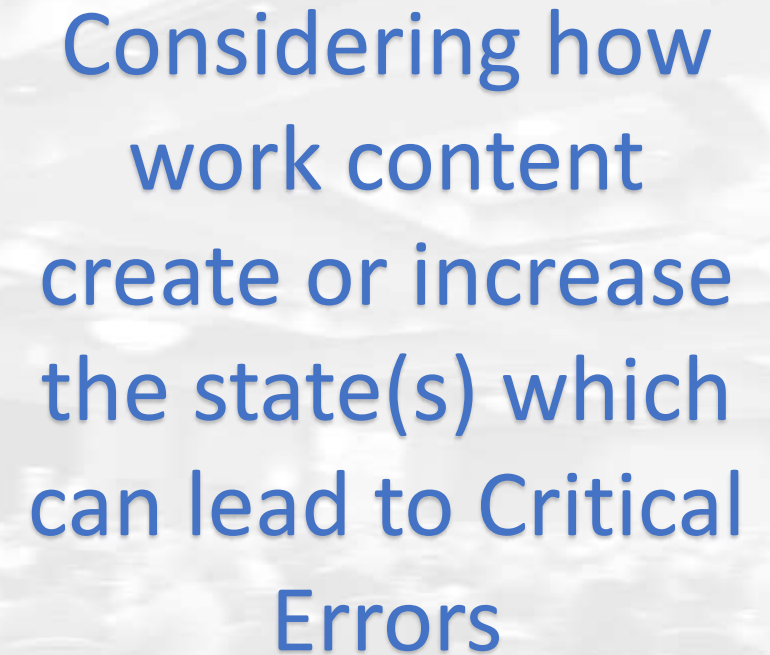- Normative Job Hazard Analysis not Applicable

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Rewind to Align Human Factors

DID YOU KNOW?

Impacts of the Human Condition: **Fatigue**

OSHA → the risk of injury is 30% greater on night shifts compared to day shifts

WAREHOUSE

17 HOURS AWAKE

0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01

IDENTIFYING THE MISSING LINK(S)

- Reviewing Near Misses, Accidents, Injuries
- Peeling back the onion for all associated factors
- Factoring UP the Human Factor
- The "**5** Why's" – Do we go far enough?
  - 5 may not be enough!
- Why did THAT person DO or NOT DO something?
  - The true driving force(s) influencer(s)
- Did work content drive/contribute to the state(s)?
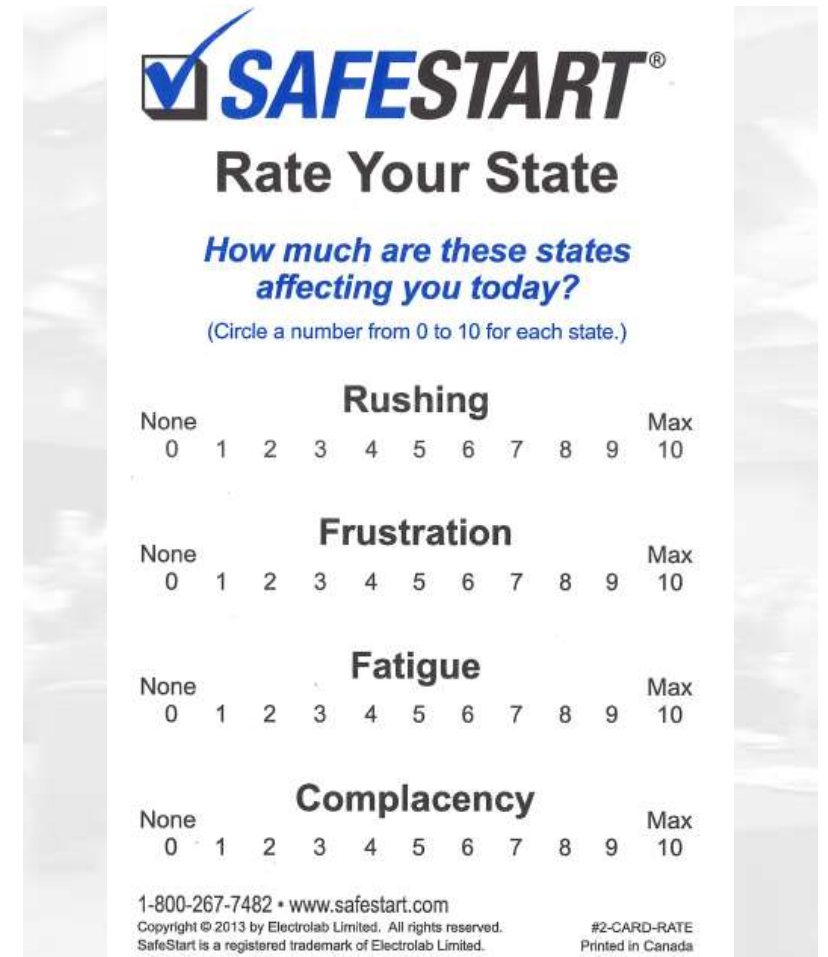- Did work content drive/contribute to near miss or injury?

Considering how work content create or increase the state(s) which can lead to Critical Errors

THE WORKER ~~DILEMMA~~ SOLUTION

- Start considering your personal state(s)
- Consider what work content may trigger them
- Collaborate with colleagues to confirm pattern
- Integrate these into the JHA process
- Establish any techniques to counteract the effect
- Document those into the process
- Are there physical characteristics enablers/disablers?

SafeStart® "Rate Your State" Process

SAFESTART®
Rate Your State

How much are these states affecting you today?

(Circle a number from 0 to 10 for each state.)

			Rushing								
None	0	1	2	3	4	5	6	7	8	9	Max 10

			Frustration								
None	0	1	2	3	4	5	6	7	8	9	Max 10

			Fatigue								
None	0	1	2	3	4	5	6	7	8	9	Max 10

			Complacency								
None	0	1	2	3	4	5	6	7	8	9	Max 10

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RUSHING

Example <u>work content</u> that can trigger Rushing

- Personal risk consequences such as:
  - Body strain – hurrying to minimize pain
    - Stretch, lift, contorting, tight quarters
- Sensory strain – impact on the senses
  - Visual limitations, auditory discomfort
  - Temperature proximity
- Does design of process promote the state?
- Does design of product promote the state?
- Take learning up stream to impact future designs of process or product

FRUSTRATION

Example <u>work content</u> that can trigger Frustration

- Personal risk consequences such as:
  - Forcing fit on mismatched components
  - Pull/Push Force – hazardous energy inertia injury
  - Lifting – exerting vs. use of equipment/assistance
- Does design of process promote the state?
- Does design of product promote the state?
- Take learning up stream to impact future designs of process or product

FATIGUE

Example <u>work content</u> that can trigger Fatigue

- Work Environment is a huge factor on this state:
  - Temperature / exposure / work area
- Personal risk consequences such as:
  - Taking on overtime hours when already tired ($)
  - Staying in one position for a prolonged time
  - Focus on one task for a prolonged time (mental)
- Does design of process promote the state?
- Does design of product promote the state?
- Take learning up stream to impact future designs of process or product

~~TRADITIONAL~~ ENHANCED IDENTIFICATION OF HAZARDS

- What can go wrong…
  - As it relates to Human Factor Performance?

- What are the consequences…
  - If those Human Factors become triggered?

- How could it arise?
  - Name conditions that trigger them.

- What are other contributing factors?
  - Name other influencers that trigger them.

- How likely is it the hazard will occur?
  - Think of trends of these human factor influencers
  - What drives those trends?

Focused on people impacts

~~TRADITIONAL~~ ENHANCED JOB HAZARD ANALYSIS

- Engage employees doing the work

- Realtime interview engagement vs. staged
  - Natural responses vs. using recall/memory

- 3rd Dimension of activity assessment
  - What is being felt/experienced in the activity?
  - What is creating this response?
  - Is it unique/unusual condition?
  - Is it common condition for the process?
  - Insight for changes to improve/remove obstacle(s)

TRADITIONAL TOOL - JOB HAZARD ANALYSIS

Process/Product/Project Name:

		Classify			RV			Can you:		
		P = Probability			Extreme Risk (Action Plan Required)			Eliminate the Risk?		
		I = Impact			Moderate Risk (Action Plan Discretionary)			Lower the Probability?		
		RV = Risk Value (RV= P x I)			Low Risk (Action Plan not required)			Lower the Impact?		
								Accept the risk without action?*		

										Re-evaluation		
Risk #	Risk Description	Date	P	I	RV	Action Plan	Responsible	Re-eval. Date	P	I	RV
1	Environmental Considerations				0						0
2	Job Hazard Impact (SHEQ Manager)				0						0
3					0						0
4					0						0
5					0						0
6					0						0
7					0						0
8					0						0
9					0						0
10					0						0
11					0						0
12					0						0
13					0						0

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H.F. JOB HAZARD ANALYSIS

- Weighting the Human Factor

- Driving Elimination, Reduction if possible

- Offsetting Actions to Mitigate Impact

- Magnify use of CERTS and Safety Habits

Demo View

Safety-Related Habits

- ☐ Test your footing or grip before you commit your weight (getting out of car, etc.)
- ☐ Look carefully at anything you are going to stick your hand into or rest your hand on
- ☐ Move your eyes first before you move your hands, feet, body or car
- ☐ Get your eyes back on the road quickly if you've been distracted
- ☐ Look for line-of-fire potential before moving (blind corners, aisleways, etc.)
- ☐ Look for things that could cause you to lose your balance, traction or grip
- ☐ Glance up before standing up or raising your hands (bang head or hands, etc.)
- ☐ Keep your hands out of pinch points
- ☐ Use three-point contact when ascending or descending (ladders, mobile equipment, etc.)
- ☐ Hold the handrail on stairways
- ☐ Other: _____

_____

QUESTIONS?

- To obtain the Excel H.F. JHA
- E-mail: david.bianco@epiroc.com

-or-

- Take a Photo of this QR Code

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THANK YOU FOR ATTENDING!