Routine Work?

Yes

Routine Procedure: Critical Task Analysis & Procedure

No

Preliminary Risk Analysis

For all non-routine work, contractor or own internal personnel.
The magical number 7 +/-2: Some limits on our capacity for processing information

George A. Miller,
The Psychological Review, 1956
Preventing Major Injuries
Observations on Theory, Models & a Path Ahead

By David W. Wilbanks

Major injury events occur in every type of workplace, large and small, sophisticated or otherwise. Those performing maintenance (Reason, 1990), construction and installation services are especially at risk after consideration is given to the鸫 neglect of trained and skilled labor.

- Virginia: Worker died from head injuries after being struck by an excavator arm while trimming trees.
- Michigan: Worker installing insulation killed after falling 25 ft from roof.
Fatality & Severe Loss Prevention Symposium

Avoiding the Worst

Fatality Prevention
Findings From the 2012 Forum

By Jan K. Wachter and Lon H. Ferguson

© 2013 Kilpatrick & Wilbanks
The rate of fatal work injuries in 2012 was 3.4 fatal work injuries per 100,000 full-time equivalent workers, down slightly from 3.5 in 2011.

Note: Rate = (Fatal work injuries/Total hours worked by all workers) x 200,000,000 where 200,000,000 = base for 100,000 full-time equivalent workers (FTEs) working 40 hours per week, 50 weeks per year. The total hours worked figures are annual average estimates of total at work multiplied by average hours for civilians, 16 years of age and older, from the Current Population Survey (CPS).

In 2008, CFOI implemented a new methodology, using hours worked for fatal work injury rate calculations rather than employment. For additional information on the fatal work injury rate methodology, please see [link].

Fatal Injury Rate Per 100,000 People


© 2013 Kilpatrick & Wilbanks
2012 BLS STATISTICS

- In-Plant Mobile Equipment, 11%
- Contact with Objects & Equipment, 16%
- Harmful Substances/Environments, 7%
- Falls, 15%
- Fires, 3%

Excludes Roadway Accidents & Acts of Violence
Population of 2,407 “in-plant/work site” events
Preventing Heat Illness in Outdoor Workers

Protecting Temporary Workers

Latest News

- OSHA issues hazard bulletin to safeguard tree care workers (5/16/14)
- New OSHA requirement aims to reduce exposure among workers in the nursing home and residential care industries (8/1/14)
- OSHA announces new interactive training webinar on identifying radon hazards (6/18/14)
- OSHA scheduled stakeholder meeting to consider proposed standard to protect safety, health of emergency responders (8/15/14)
- More than 1,000 workers expected to participate in National Fall Safety Stand-Down (5/21/14)
- NRM for Silica hazardous safety and health training grants now available from US Labor Department's OSHA (7/19/13)
- OSHA announces that the final rule on service standards for electric power generation, transmission and distribution has been published in the Federal Register (6/26/14)

Worker Fatalities

4,628 workers died on the job in 2012

Georgia Work Safety Program

Go to OSHA QuickTakes Newsletter
OSHA.gov  Work Fatalities

- 3/2/14 Ohio: Worker killed in maintenance shop fire.
- 3/3/14 Colorado: Worker died from exposure to oil tank fumes.
- 3/8/2014 Iowa: Worker killed in fall from frost covered roof.
- 3/12/2014 Kentucky: Worker was caught and killed in a press while trying to retrieve a hammer.
- 3/12/2014 Arkansas: Temporary worker killed in fall from rooftop.
- 3/25/2014 Kansas: Two workers killed when a wireless communications tower collapsed.
- 3/27/2014 Georgia: Worker died in a grain storage silo after becoming entrapped by sweep auger.
- 4/2/2014 Texas: Worker electrocuted when bucket contacted energized powerline.
- 5/17/2014 Wisconsin: Worker struck and killed by a falling tree.
1. Major Injury
Accidents Still Occur
The hazards are known and controllable
Steel Industry Fatalities, North America
2006 - 2012

- Mobile / Materials Handling Equip.: 32%
- Energy Control: 23%
- Fall Protection: 18%
- Overhead Cranes: 10%
- Rail: 7%
- Pedestrian Path: 7%
- Confined Space: 4%
Critical Risk Standards Conformance. KPI requires minimum 85% overall avg & no standard < 80%,

<table>
<thead>
<tr>
<th>Critical Risk Process Flow</th>
<th>2014 Target</th>
<th>Dog Status</th>
<th>Bright Bar</th>
<th>CP</th>
<th>North</th>
<th>South</th>
<th>West</th>
<th>Rail</th>
<th>Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian Path</td>
<td>90.0%</td>
<td>92.5%</td>
<td>88%</td>
<td>95%</td>
<td>96%</td>
<td>93%</td>
<td>85%</td>
<td>98%</td>
<td>94%</td>
</tr>
<tr>
<td>Mobile Equipment</td>
<td>85.0%</td>
<td>83.2%</td>
<td>82%</td>
<td>83%</td>
<td>85%</td>
<td>85%</td>
<td>78%</td>
<td>86%</td>
<td>87%</td>
</tr>
<tr>
<td>Lockout/Tryout</td>
<td>95.0%</td>
<td>96.8%</td>
<td>98%</td>
<td>96%</td>
<td>98%</td>
<td>97%</td>
<td>96%</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>Confined Space</td>
<td>95.0%</td>
<td>95.7%</td>
<td>96%</td>
<td>95%</td>
<td>96%</td>
<td>98%</td>
<td>100%</td>
<td>93%</td>
<td>96%</td>
</tr>
<tr>
<td>Overhead Crane</td>
<td>82.0%</td>
<td>82.1%</td>
<td>82%</td>
<td>83%</td>
<td>83%</td>
<td>82%</td>
<td>79%</td>
<td>83%</td>
<td>86%</td>
</tr>
<tr>
<td>Rail</td>
<td>90.0%</td>
<td>92.0%</td>
<td>na</td>
<td>na</td>
<td>91%</td>
<td>91%</td>
<td>97%</td>
<td>91%</td>
<td>na</td>
</tr>
<tr>
<td>Working At Heights</td>
<td>86.0%</td>
<td>87.7%</td>
<td>92%</td>
<td>87%</td>
<td>89%</td>
<td>87%</td>
<td>86%</td>
<td>89%</td>
<td>89%</td>
</tr>
<tr>
<td>Overall Score</td>
<td>89.0%</td>
<td>89.0%</td>
<td>90%</td>
<td>89%</td>
<td>91%</td>
<td>89%</td>
<td>86%</td>
<td>91%</td>
<td>91%</td>
</tr>
</tbody>
</table>
We need to talk more about *Risk*, and less about *pyramids*.
1. Major Injury Accidents Still Occur
The hazards are known and controllable

2. All Hazards ARE NOT Equal!
We need a way to identify major injury hazards
Conclusions to major injury events often assume workers had adequate understanding and means to control hazards.

Frequently Not True.
3 Human Error Types:
- Slip
- Lapse
- Mistake

**Slip**
- Often Observable

**Lapse**
- Seldom Observable

**Mistake**
- Planning Failure

**Unintended Action**

**Unsafe Acts**

**Attentional**
- Failures
- Intrusion
- Omission
- Reversal
- Misordering
- Mistiming

**Memory failures**
- Omitting planned items
- Place losing
- Forgetting intentions

**Rule Based Mistakes**
- Misapplication of good rule
- Application of bad rule
- Knowledge-based mistakes
- Many variable forms

**Planning**
- Routine Violations
- Exceptional Violations
- Acts of sabotage

**Violation**

© 2013 Kilpatrick & Wilbanks
One of the most common accident scenarios involves the deliberate disabling of engineered safety features by operators in pursuit of what, at the time, seems a perfectly sensible goal....

Another happens when the defenses are breached because the operators are unaware of (hazards) because they have an erroneous perception of the system state. (Something has changed)

James Reason published in 2000
Hitting the *SWEET* spot

*The moment between (the worker) having enough information to assess the risk and the moment of exposure.*

© 2013 Kilpatrick & Wilbanks
1. Major Injury Accidents Still Occur
The hazards are known and controllable

2. All Hazards ARE NOT Equal!
We need a way to identify major injury hazards

3. Critical Error Moments can be Anticipated & Controlled

© 2013 Kilpatrick & Wilbanks

Major Injury Prevention
January 15, 2009

The Checklist Manifesto
Traffic

Equipment

Energy

Chemicals, confined spaces, combustion

Heights

Electrical

Pneumatic

Hydraulic

Gravity

Solids

Liquids

Gases

Springs (kinetic)
Roll-Up Door - Repair

Task: A roll-up door is broken.
What must you do to perform the work safely?

5/20/2010 IL - Worker was repairing a large overhead hanger door, and was later found caught in the folded door. OSHA.gov

© 2013 Kilpatrick & Wilbanks
1. Major Injury Accidents Still Occur
   The hazards are known and controllable

2. All Hazards ARE NOT Equal!
   We need a way to identify major injury hazards

3. Critical Errors can be Controlled

4. Checklists Are Critical

© 2013 Kilpatrick & Wilbanks
George Miller, 1956, The Psychology Review

The Magical Number Seven,
Plus or Minus Two:

Some Limits on Our Capacity for Processing Information

My problem is that I have been persecuted by an integer. For seven years this number has followed me around, has intruded in my most private data, and has assaulted me from the pages of our most public journals. This number assumes a variety of disguises, being sometimes a little larger and sometimes a little smaller than usual, but never changing so much as to be unrecognizable. The persistence with which this number plagues me is far more than a random accident. There is, to quote a famous senator, a design behind it, some pattern governing its appearances. Either there really is something unusual about the number or else I am suffering from delusions of persecution.
Human Performance Tools

Engaging Workers as the Best Defense Against Errors & Error Precursors

By Jan K. Wachter and Patrick L. Yorio

“Concurrent Verification Peer Checking”

© 2013 Kilpatrick & Wilbanks
“Our brains have always been terrible at remembering details.

When it comes to quickly retrieving information on the fly, all day long, …we rely on other people.”

From Smarter Than You Think: How Technology Is Changing Our Minds for the Better.
Transactive Memory
the art of storing information in the people around us..

- Groups relying on each other to recall information performed better than those who didn't use transactive memory.

- *Transactive* groups don't just remember better: They also analyze problems more deeply.

*From Smarter Than You Think: How Technology Is Changing Our Minds for the Better.*

© 2013 Kilpatrick & Wilbanks
1. Major Injury Accidents Still Occur
   The hazards are known and controllable

2. All Hazards ARE NOT Equal!
   We need a way to identify major injury hazards

3. Errors can be Anticipated & Controlled

4. Checklists Are Critical

5. Teams Impact Results faster than rules

© 2013 Kilpatrick & Wilbanks
Routine Work?

Yes

Routine Procedure: Critical Task Analysis & Procedure

No

Preliminary Risk Analysis

For all non-routine work, contractor or own internal personnel, involving a major injury /illness hazard(s)