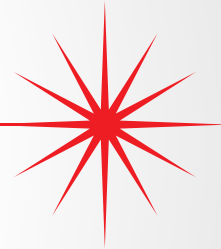


Solutions2.0

Virtual Conference



Upcoming CRL Workshops



Sept 25 – 29

**Reliability Leadership Institute
Fort Myers, Florida**

More information: www.reliabilityleadership.com



Providers



maximo world

August 1-3, 2017 at the Dolphin Resort in Orlando,
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Reasons to Attend MaximoWorld:

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WIRAM Series



Design in Your Equipment Reliability through Early Equipment Management

by Mary Jo Cherney, Corporate
TPM Leader, GE Appliances



Early Equipment Management at GE Appliances

- Develop equipment design standards that incorporate TPM principles.
 - Safety and reliability designed in
 - Ease of maintenance
 - Ease cleaning, inspection, lubrication
 - Designs support Company's PdM program, i.e. sensors, IR windows, lube ports
- Develop a cross functional team (Eng, EHS, TPM, Maintenance, Operations) to review equipment designs at important milestones in process
- Develop a process and training for Eng / MEs to identify equipment designs risks
 - MFMEA incorporated in upstream design reviews which includes plant's input to i.d. potential failures before equipment build, prioritize improvements
 - Capture and proliferate best practices
- Establish a feedback loop to capture legacy issues are addressed in new designs.
 - Including a way to ID poor performing components and remove from preferred list / standard



Basic Elements of Early Equipment Management

	Definition	Description
Reliability	Elements that do not cause function deterioration and stoppage	<ul style="list-style-type: none"> • Low frequency of equipment failure • Lower frequency of slowdown /minor stoppage • Low frequency of defects • No corrosion • Infrequent adjustments • Stable machine cycle time • Good quality welding
Maintainability	Deteriorations are easy to measure and repair	<ul style="list-style-type: none"> • Easily detected failures • Easy to replace parts and quick function reset • Easy inspections • Easy access for maintenance • Easy detection of deteriorated parts • Easy oiling and oil change • Easy overhaul
Autonomous Maintenance Capacity	Operators can easily accomplish maintenance activities such as cleaning, oiling and inspections	<ul style="list-style-type: none"> • Easy cleaning, oiling and inspection • Easy scrap collection • Inexistent or limited dirt and contamination • Control of forced deteriorations • Easy inspection circuits • Easy oil check • Simple quality maintenance—easy to measure accuracy

	Definition	Description
Operability	Elements allowing right operation, quickly and accurately, during equipment operation and set-up change.	<ul style="list-style-type: none"> • Easy set-up and adjustment • Easy to change and adjust tools • Easy steering of process • Easy to operate buttons (layout, number, color) • Easy to install
Material and Energy Savings	The equipment enables an efficient use of resources.	<ul style="list-style-type: none"> • Raw material: Low yield loss • Personnel: Job optimization • Low energy consumption • Low tooling consumption • Savings on consumables • High degree of by-products recycling
Safety	The equipment is not harmful to personnel's physical integrity, health, morale, or life.	<ul style="list-style-type: none"> • Minimal exceptional work in case of failure, stoppage or quality defects. • Minimal exposure of rotating and drive parts • Few protrusions and hooks, etc. • Easy access • Easily detected process or equipment defects
Flexibility	Possible and easy changes in equipment if product changes	<ul style="list-style-type: none"> • Low cost in equipment improvement to change tolerance • Reduced adaption period

Examples of EEM Design



Grease Fittings in a bank outside the equipment.

Motor rotated for accessibility.



Vertically oriented motors to save space.

Examples of EEM Design



Automatic Chain
Lubrication System



Air Line Clean Out
Valves installed



Examples of EEM Design



Expanded Metal Guarding to enable running PM check

Easier access under the conveyors and access door on top of the conveyor platforms

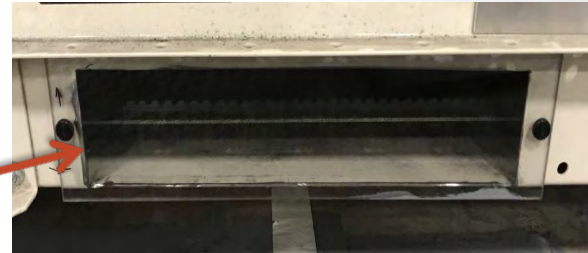


Examples of EEM Design



Conduit raised
for ease of
cleaning.

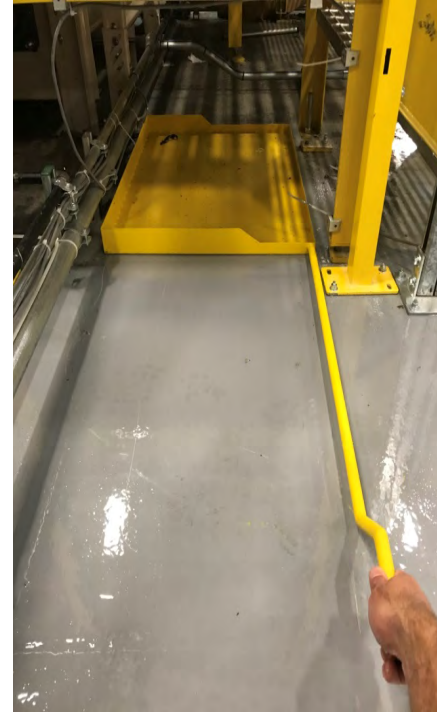
Plexiglas windows
for ease of viewing
and cleaning out
under conveyor
belt.



Examples of EEM Design



Removable Catch
Pans for easy cleaning.



Examples of EEM Design



Lockout by Zone

Electrical boxes installed at eye level for ease of maintenance.

Contact Information:

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Mobile: 502-443-5582

Questions??

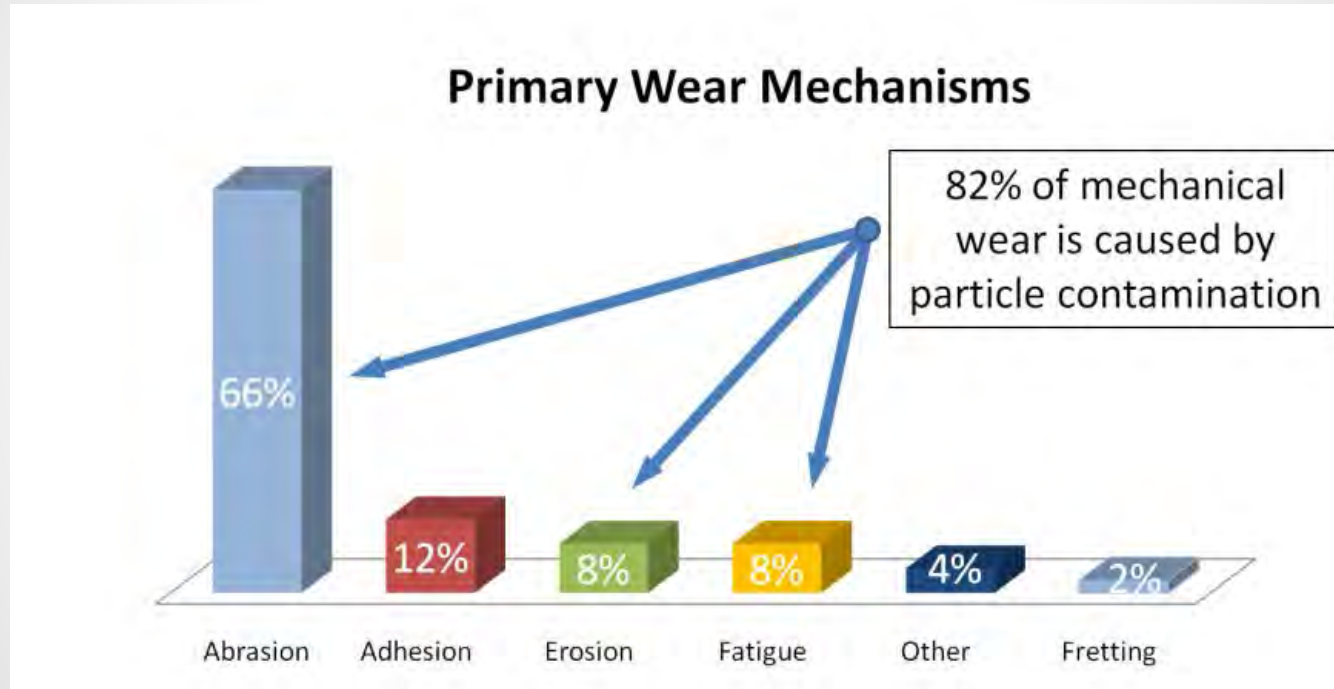
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Holistic Lubricant Management

Des-Case

What Causes Machines to Wear?



How Much Does it Take to Contaminate?



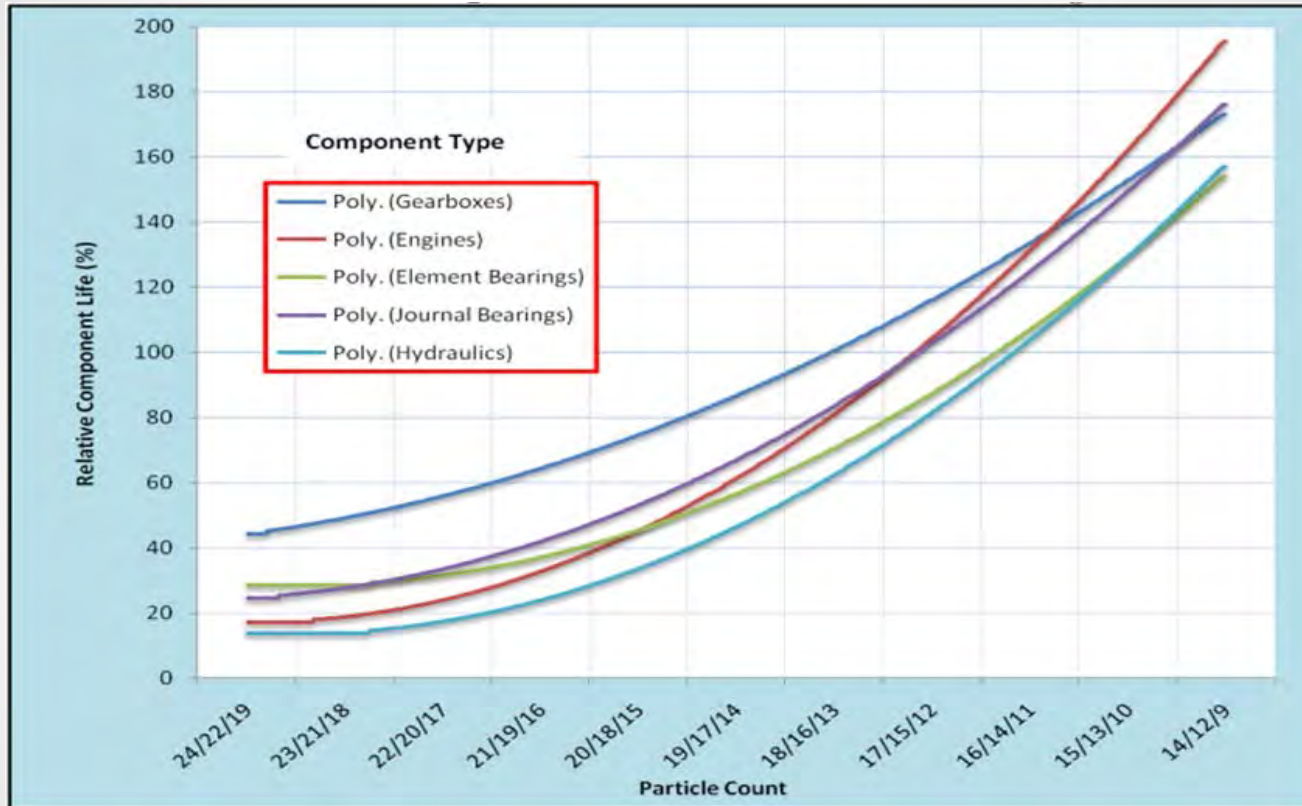
One teaspoon of dirt in a 55 gallon drum yields a particle count of 19/17/14.

That means there are about one billion particles in the drum which are greater than 4 microns in diameter.

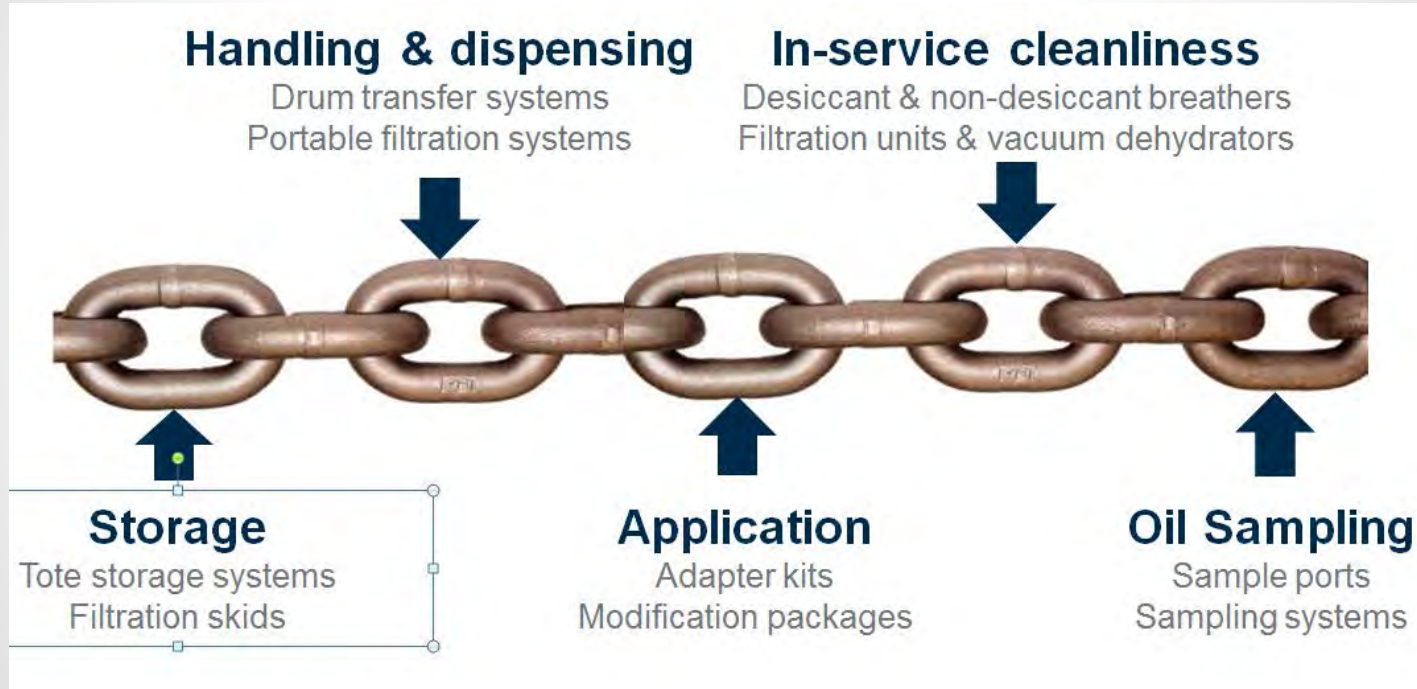
How Clean / Dry Should Oil Be?

Machine Type		Particle Level Target	Moisture Level Target
Hydraulics 1500-2500 psi	With servo valves	15/13/11	125 ppm
	With proportional valves	16/14/12	150 ppm
	Variable volume piston pump	17/15/12	150 ppm
	With cartridge valves or fixed piston pump	17/16/13	150 ppm
	With vane pump	18/16/14	150 ppm
Gearbox		19/16/13	300 ppm
Paper Machine		18/14/11	200 ppm
Steam Turbine		18/14/11	100 ppm
Pumps		17/14/12	150 ppm

Effects of Particle on Component Life



Effects of Particle on Component Life



Holistic Fluid Management



Contact:

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Inside Sales Specialist-Gulf Territory (AR, LA, TX)

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Paul Knock

SKF Baker Instruments

Global Sales Manager

Electric Motor Condition Monitoring

EMCM Baker Introduction



SKF Baker Instruments Company Information



SKF electric motor test and monitoring products

- Dynamic monitoring
- Static maintenance
- Static quality control



Baker Instrument Company, an SKF Group Company

US Company Based in Fort Collins, CO

- 60+ Employees located in Ft. Collins
- Baker Electric motor shop founded 1940
- Baker Instrument Co. founded in 1961
- All Equipment is Mfg. in Fort Collins
- 15 Electrical Engineers on staff
 - Improving the Product
 - Technical Support
 - Research and Development
- World Wide Company – Name Recognition
- Purchased by SKF June 19, 2007
- 42,000 Employees – 190 Countries



Motor Testing Methods

Electric motor management drives predictive maintenance and quality assurance programs

SKF Online Motor Analysis
System NetEP



SKF Dynamic Motor Analyzer

EXP4000



SKF Static Motor Analyzer
Baker AWA-IV



Two different, but complementary strategies

Strategy 1:

Limit unplanned downtime by averting motor failures caused by insulation breakdown
Perform quality control on rebuilds & repairs



Strategy 2:

Maximize the lives of motors by correcting problems found in the operating machine systems (power, motor, or load conditions)



Why Test Motors?



Electric Motor Deconstruction



Why Is Motor Testing Important?

3 Key Points Should be considered

Unscheduled Electrical motor breakdown is one of the most costly issues maintenance teams face!

Electric motors are the most common Rotating Plant in any Industry

Electric Motors are the biggest energy users in industry today!
(65% on average of any Ind facility)

Field Predictive Maintenance





THANK YOU!

Questions?

Paul Knock

EMCM/Baker Instrument

an SKF Group Company

Educational Session

Do You Have an Asset-Centric CMMS?

by John Reeve, Senior
Business Consultant, Total
Resource Management



**How well do you intertwine the HSE role
with the CMMS functionality?**

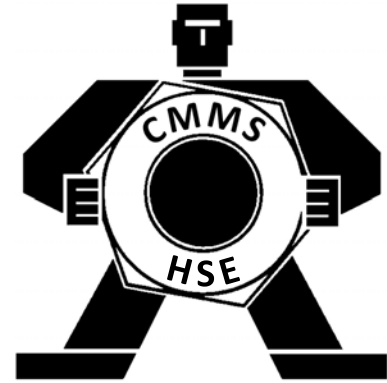
A 3D-style graphic featuring a dark grey arrow pointing right, a globe, and a curved arrow. The arrow is the central focus, with the text 'SAFETY-RISK MANAGEMENT' written in a light grey, sans-serif font across its body. To the right of the arrow is a globe showing the continents of Africa and Europe. A curved arrow shape is visible behind the main arrow, suggesting a cycle or flow.

**SAFETY-RISK
MANAGEMENT**

Safety-Risk Management from a CMMS Perspective

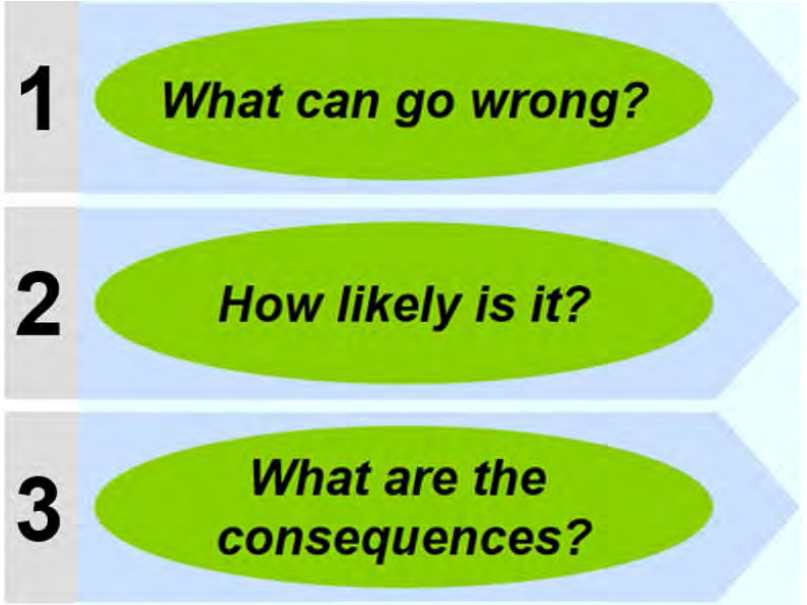
Safety and Risk go together

1. Job planners evaluate **hazards** and apply **safety precautions** during planning process.
2. There *should be* a field on the work order record which would inform others that this task has **potential risk** to equipment and personnel
3. Maintenance Supervisors *should* conduct **job safety briefings** at beginning of shift.
4. Maintenance Technicians *should* conduct **pre-job checklists** at job site.
5. Techs *should* **cord off area** and put away tools when they temporarily leave an in-progress job.
6. Techs *should* provide a **good turnover** of job status (written and verbal) and share knowledge regarding potential hazards.



Four Elements of Safety-Risk Management

There are 3 questions that define risk.



Set of Events or Scenarios

Likelihood of occurring

Harm or unwanted events

An additional question defines risk management.



It helps to have a Planner checklist as to risks

Hazard	✓ Hazard	✓
Mechanical/Kinetic	Chemicals/Substances	
Contact with moving plant/parts (cutting, shearing, entanglement, etc)	Inhalation of dusts, gases, fumes, vapours and mists	
Contact with sharp objects/edges	Ingestion of chemicals/substances	
Contact with moving vehicles/mobile plant	Absorption of chemicals/substances through skin	
Struck by projectiles or ejected items (including struck in eye by object)	Radiation	
Mechanical damage to services, PPE or other items	Exposure to ionising radiation source (industrial radiography, non-destructive testing)	
Gravitational	Exposure to non-ionising radiation source (laser, welding flash, infrared, radiofrequency)	
Fall from height	Biological	
Falling object from height	Exposure to algal, bacterial, fungal, viral or parasitic agents (skin contact, ingestion, inhalation)	
Slips and trips	Animal, insect and spider bites/stings	
Access/work beneath a suspended load/unstable object	Sharps/needle-stick exposure	
Thermal and/or Explosive	Manual Handling/Postural	
Fire/Explosion	Handling heavy, unstable or awkward objects/loads	
Ignition of gas/dust in a hazardous area	Repetitious movements	
Contact with hot/cold objects/parts	Maintaining static or awkward postures	
Excessively hot/cold environments (including heat stress)	Tool use that requires excessive force	
Electrical	Psychological/Mental, Social, Medical	
Contact with live electrical parts (overhead power line, etc)	Working for excessive time periods and/or while fatigued	
Exposure to high fault currents (within switchboards, battery banks)	Exposure to workplace bullying, harassment, violence	
Mechanical damage to power leads/fixed electrical wiring	Work Environment	
Ingress of water into electrical components	Inadequate lighting	
Noise and/or Vibration	Wet/slippery/uneven/unstable work surface	
Exposure to increased noise (levels that may cause hearing damage)	Weather conditions (including flooding, lightning, wind)	
Contact with vibrating plant/vehicles/tools/objects		
Environmental		
Air/ground/water contamination (including spills, uncontrolled release, etc)		

Identify Risk

LOW

MEDIUM

SERIOUS

EXTREME

Section 3 – Risk Analysis

Step 1 – Consider Consequences		Step 2 – Consider Likelihood		Step 3 – Calculate Risk																																			
What are the consequences of the hazard occurring? Consider what is the most probable consequence (below) with respect to this work hazard		What is the likelihood (below) of the hazard consequence in Step 1 occurring.		1. Take Step 1 rating and select correct column 2. Take Step 2 rating and select correct row 3. Use the risk score where the two ratings cross on the matrix below H = High, S = Serious, M = Medium, L = Low																																			
	Workplace Safety Extreme Multiple fatalities Critical Single Fatality or serious injury/illness Major Medical treatment /LTI Minor First Aid and/or medical treatment	Legislative & Regulatory Non-compliance, business activity affected/penalty enforced Major non-compliance resulting in regulatory notice Non-compliance - warning Minimal non-compliance	Almost Certain Is expected to occur in most circumstances (once per year) Likely Will probably occur at least once (every 5 years) Possible Event might occur at some time (10yrs) Unlikely/Rare Event not expected to occur/ only in exceptional circumstances (20+yrs)	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Consequences</th> </tr> <tr> <th>Min</th> <th>Maj</th> <th>Crit</th> <th>Ext</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Likelihood</th> <th>Almost Certain</th> <td>S (A4)</td> <td>S (A3)</td> <td>H (A2)</td> <td>H (A1)</td> </tr> <tr> <th>Likely</th> <td>M (B4)</td> <td>S (B3)</td> <td>H (B2)</td> <td>H (B1)</td> </tr> <tr> <th>Possible</th> <td>L (C4)</td> <td>M (C3)</td> <td>S (C2)</td> <td>S (C1)</td> </tr> <tr> <th>Unlikely/Rare</th> <td>L (D4)</td> <td>M (D3)</td> <td>M (D2)</td> <td>S (D1)</td> </tr> </tbody> </table>							Consequences				Min	Maj	Crit	Ext	Likelihood	Almost Certain	S (A4)	S (A3)	H (A2)	H (A1)	Likely	M (B4)	S (B3)	H (B2)	H (B1)	Possible	L (C4)	M (C3)	S (C2)	S (C1)	Unlikely/Rare	L (D4)	M (D3)	M (D2)	S (D1)
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Description of Risk	Control Measures (Detail any existing controls)	Risk Analysis			Additional Controls (detail additional controls to be implemented)	Risk Analysis (with additional controls)		
		C	L	Risk Rating		C	L	Risk Rating

Business Rule: If planned work is deemed to be **SERIOUS or **EXTREME** then **HSE Manager** should be present at job site.**

Asset Centric HSE

Separate databases do not make sense



Scott Peters

Contributor at Techspace

1st

Scott Peters • 1st
Solutions Director



CMMS Implementation

For those of who decide to go down this path, I recommend bringing your **Health and Safety team** into the process early... We have seen organisations struggle with Maximo is the "Work Management System" and not understand that it is an important part of achieving objectives in the Zero Harm initiatives of organisations. We like to talk about "Asset Centric HSE" to take down the barriers between HSE groups and the Asset Centric pieces of the business...

Goal: Asset Integrity Management



Subject: Workplace Fatality at Arkansas Nuclear One during an outage. 500-ton turbine generator stator fell 30 feet to the floor – March 31st, 2013



The Department of Labor has issued \$175,000 in fines to several companies involved in an accident. A **24-year-old contractor employee was killed and eight others injured** while **causing extensive damage** to Unit 1, and, caused an unplanned shutdown of Unit 2. Occupational Safety and Health Administration announced plans to penalize plant owner Entergy and three contractor companies for **30 safety violations related to the accident.**

OSHA said, "**This tragedy could have been prevented had the employer ensured vital safeguards to protect workers from potential hazards and proper planning for a project of this magnitude.**" A wrongful death lawsuit stated, "*This is an action for wrongful death, ordinary negligence, negligent hiring, negligent training, negligent supervision, negligent retention, negligent hiring of an independent contractor, for declaratory judgment, and for punitive damages, stemming from multiple incidents of recklessness and negligence that lead to the collapse of an industrial crane killing Wade Walters.*"

- ❖ **Siemens Power Generation** fined \$63,000
- ❖ **Bigge Crane and Rigging Co.** fined \$56,700
- ❖ **Entergy** fined \$49,000
- ❖ **Precision Surveillance Corp.** who employed the worker who died will be fined \$6,300

Bigge Crane & Rigging Co. of San Leandro, Calif., was hired to **build a gantry, a bridge-like frame, to move a 550-ton generation turbine as part of a regular refueling operation**, according to the suit filed this month in Pope County Circuit Court.

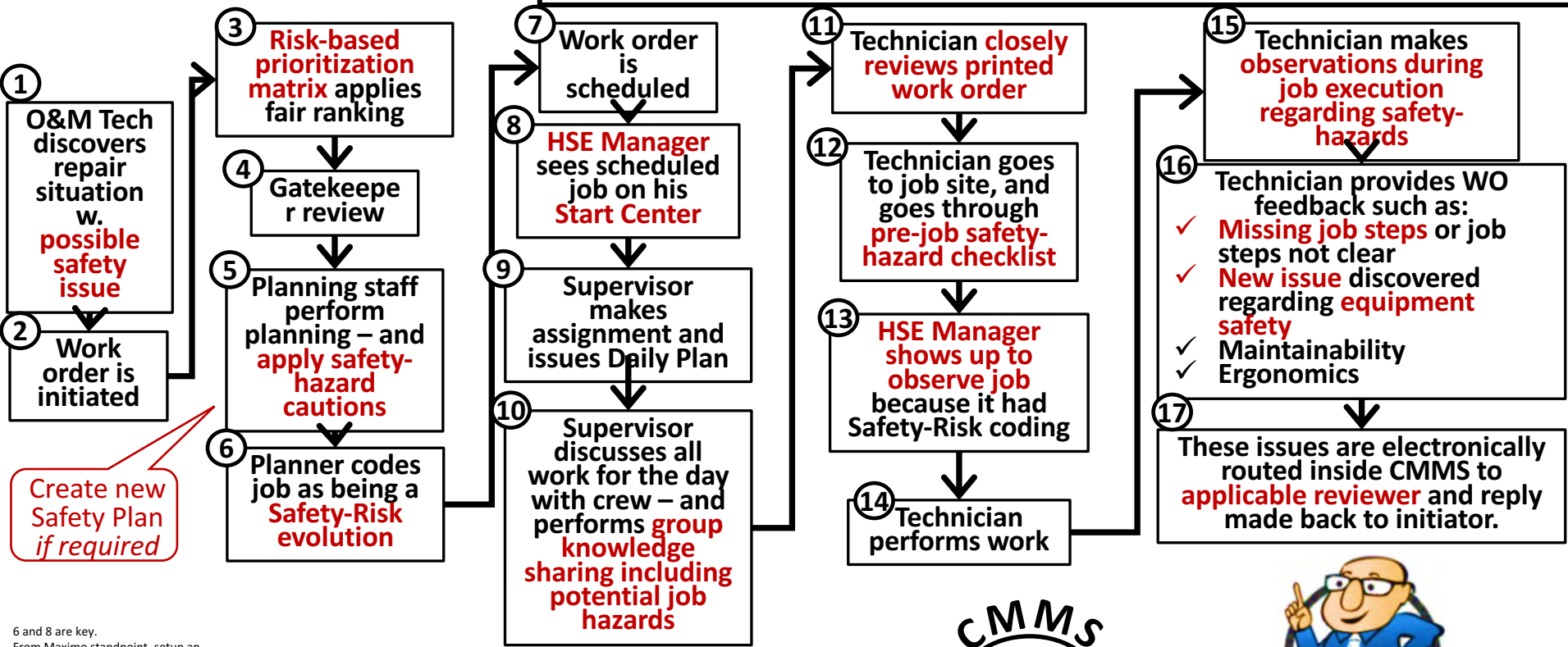
The job entailed **lifting the turbine, called a “stator,” from its cradle, moving it over the turbine deck, turning it 90 degrees and lowering it onto a transport vehicle.** The gantry was designed by Claus Frederiksen, an engineer working for Bigge, the suit says.

Entergy alleges that **Bigge didn’t properly test the gantry before lifting the stator.** Entergy is seeking undetermined monetary damages for repairs and for increased administrative and generation costs



Could we have prevented this loss of life accident?

An injury-free workplace should be ingrained in all daily functions and fully supported at all levels of the company
 // Al Poling, CMRP



Create new Safety Plan if required

6 and 8 are key.
 From Maximo standpoint, setup an ACTION-NOTIFICATION that sends automatic email to HSE Manager when SAFETY-RISK field is categorized as "HIGH" and work order status = SCHEDULED.

CMMS
ASSET CENTRIC HSE



Contact:

John Reeve

john.reeve@trmnet.com

Questions & Answers



Thanks Again to Our Sponsors



Next Webinar

Date: Wednesday, August 9

Keynote & Educational Session

by John Fortin, Global Director,
Asset Management and
Reliability, CH2M



We'd love to hear your feedback!
Email your questions or comments to
sean@reliabilityweb.com

Thank You
for Joining Us!