



## Fan Guard Prototype

Craig Davis, a CH2MHill Alaska employee, was seated inside of a company vehicle one day when he reached down to blindly feel around on the floorboard in search of something. When his hand closed over a strange metal object, he looked down to realize that his hand was directly touching the blades of the auxiliary heater that had been installed on the floor board behind the front seat. The heaters are installed by the company to work in coordination with the factory installed heating system of the vehicle, due to the arctic conditions.

Knowing that he could have been cut by the blades, had the auxiliary heater fan been running at the time, Craig was concerned. He wondered if the auxiliary heater in his company vehicle was the only one with no type of protective guard covering the heater fan blades. Craig resolved to check around.



No guard protection for fan blades

His first course of action was to begin conducting a number of vehicle inspections. He was surprised to see that there were other auxiliary heaters in vehicles without protective guards.

In the meantime, before Craig could complete his investigation, he attended a CI workshop. After the workshop, the group was divided

**Fan Guard... cont. on page 3**

## The Power of a Keystone Habit

*by Winston P. Ledet*

Before his appointment as U.S. Secretary of the Treasury, Paul H. O’Neill was chairman and CEO of Alcoa for 12 years. Alcoa is a company with 140,000 employees in 36 countries. He improved the safety record from 1.86 lost workday incidents (or, accidents per 100 employees that led to days lost from work) to 0.2. It later dropped to 0.05. He maintained that the goal should be zero. “O’Neill’s success at Alcoa is just one example of a **keystone habit**, a pattern that has the power to start a chain reaction, changing other habits as it moves through an organization,” according to Charles Duhigg in his book, *The Power of Habit: Why We Do What We Do in Business and Life\**. Duhigg goes on to further say in his book, “Keystone habits explain how Michael Phelps became an Olympic champion and why some college students outperform their peers. They describe why some people, after years of trying, suddenly lose 40 pounds while becoming more productive at work and still getting home in time for dinner with their kids. And keystone habits explain how Alcoa became one of the best performing stocks in the Dow Jones index, while also becoming one of the safest places on earth.”

Duhigg goes on to say that, “By the time O’Neill retired in 2000 to become Treasury Secretary, the company’s annual net income was [\\*http://bit.ly/Q8fEEc](http://bit.ly/Q8fEEc)

five times larger than before he arrived, and its market capitalization had risen by \$27 billion. Someone who invested a million dollars in Alcoa on the day O’Neill was hired would have earned another million dollars in dividends while he headed the company, and the value of their stock would be five times bigger when he left. What’s more, all that growth occurred while Alcoa became one of the safest companies in the world.”

Identifying a keystone habit and then implementing it on a widespread basis, has a profound effect on a company’s safety, environmental issues, production rates, and overall bottom line results. Defect elimination is a keystone habit. If everyone, regardless of their position in the company, is looking for defects very early in the life of the defect and doing everything that is within their authority to eliminate them, then this chain reaction of improvement will begin.

Faced with the challenges of improving reliability, safety performance, environmental performance and increasing production while simultaneously lowering maintenance costs is today’s challenge for most manufacturing facilities. Finding a leverage point is the key to success. Root cause failure analysis research has shown that each work order represents from 1 to 14 defects. Based on this information, most

**The Power... cont. on page 2**

**What’s Inside?**

The Power of a Keystone Habit	1-3	Fan Guard Prototype	1,3
Calendar	2	When a Person Asks...	4

## SCHEDULE

Throughout the year, The Manufacturing Game® holds workshops for the general public at universities and/or professional organizations.

For more information visit [www.mfg-game.com](http://www.mfg-game.com)

### Public Workshop

The Manufacturing Game® will be holding a Public Workshop at Reliability 2.0 South Point Resort, Las Vegas April 9, 2013

For more information or to register visit: <http://maintenanceconference.com>

### Conferences of Interest



#### IMC 2012

Bonita Springs, Florida  
December 4–7, 2012

To register or for more information: [www.MaintenanceConference.com](http://www.MaintenanceConference.com)

Visit The Manufacturing Game at Booth #2



#### Reliability 2.0

South Point Resort, Las Vegas  
April 9–12, 2013

To register or for more information please visit: [www.MaintenanceConference.com](http://www.MaintenanceConference.com) or call (888) 575-1245



Reliability & Maintenance Conference  
Orlando, FL

May 22–25, 2013

For more information or to register visit: [www.afpm.org](http://www.afpm.org)

Mark Your Calendar!



### The Power... cont. from page 1

production facilities have not just hundreds of defects but tens of thousands of them that they must address each year. This is the reason that we choose defect elimination as the keystone habit that will have an emphatic change on the entire operation. With so many possibilities to work on, it doesn't require a reliability team or expert teams to begin the process. **A company's culture exists in the habits of the workers and the nature of the facilities that are being operated.**

Most facilities do an exceptional job of addressing the top 16% of these issues through programs that use the expertise of a few specialists. But this leaves the other 84% of the defects to be handled through the normal, reactive process and excludes the majority of the workforce from participation in defect elimination.

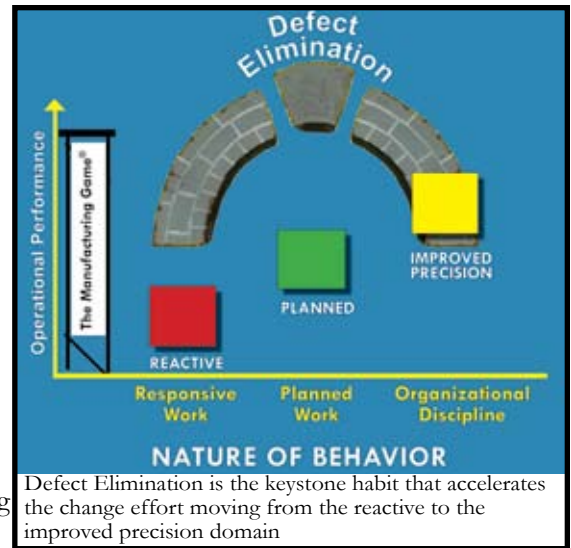
What is necessary is an alternative approach of identifying a keystone habit to unlock the immense potential that resides in the ideas and skills of the entire front line workforce, freeing them to make equipment improvements that they recognize as necessary every day. This approach uses Defect Elimination to build understanding and enthusiasm among the front line workers as well as the subject matter experts and launches hundreds of proactive Action Teams to eliminate defects. These defect elimination habits can be made systematic through the use of "DE" work orders in the Work Management System.

#### Three factors are critical to the success of this approach:

##### *Widespread workforce engagement*

All employees plus core contractors need to be actively engaged in the Defect Elimination process. Studies show that defects can be introduced from a variety

of sources including operations, workmanship, parts quality, raw materials and design making it essential that personnel from all those areas participate in the effort.



#### *Action*

It is not enough to understand the impact of defects and develop the ability to identify them. It is essential that identified defects be removed in a way that prevents their return; going beyond solving today's problem by preventing tomorrow's as well. Targeting the action on frequently failing equipment provides a quick return on investment as well as the repetition necessary to create new proactive defect elimination habits which ensure sustainability.

#### *Follow up*

With many Action Teams working simultaneously, effective coordination is imperative. A system must be implemented to support the coordination of activities and to celebrate successes. An effective follow up system walks the fine line between managing the chaos and becoming a choke that slows progress and curbs the enthusiasm of the front line workforce.

In a twelve month period this approach embeds proactive defect elimination habits in the entire workforce allowing every person to participate in maintaining reliability. Companies with the best results have had 50% of their employees

**The Power... cont. on page 3**

### The Power... cont. from page 2

participate in a “DE” workshop in the first three months and 100% within the first year.

#### Why does it work?

Planned work takes fewer resources. Equipment that doesn’t break doesn’t need to be fixed (preventing failure is cheaper than detecting it early which is in turn cheaper than repairing it after the failure occurs). Focusing on reliability reduces costs (significantly) and eliminates the need for most extra contractors.

Defects come from many sources: operations, material, material handling and storage, design, maintenance repair practices. Working cross functionally provides different perspectives and ensures defects are eliminated at their source. Reliability leads to the safest conditions for operations and maintenance.

### How does it work?

People follow the path of least resistance. Therefore, make it easy for people to identify and eliminate defects at the lowest levels of the organization by minimizing paperwork, making resources available, rewarding defect elimination, celebrating successes, not focusing on defect elimination efforts that are unsuccessful.

Defect elimination reduces equipment downtime and costs come into line. Launching Defect Elimination Action Teams for 1% of the work orders you perform reduces total defects by 37% in three years, and 70% in six years and embeds defect elimination habits into the work culture. Combining the “improvement work” with normal “fix it” work prevents extra shutdowns to accomplish the improvements.

Using the work management

system to schedule and record defect elimination helps target frequently failing equipment; thereby reducing the distraction in the day-to-day operations allowing the organization to focus on higher value work.

### TMG News Going Green

Recently we began sending our newsletter electronically. If we have your email address you will be receiving your newsletter via a site called Vertical Response. Please set your email so it will accept emails from Vertical Response. If you are still receiving your TMG News in print and would prefer the electronic version, please send an email to [CBraun@mfg-game.com](mailto:CBraun@mfg-game.com) including your name and updated contact information so you can be included in the electronic version of TMG News. Many of our readers find it is quicker and more convenient to receive their newsletters this way.



### Fan Guard... cont. from page 1

into teams to tackle a defect. His teammates were, Lynn Rogers, Adam Millburg, Jon Dupont and Allen Schmitt. The team was struggling with coming up with a defect elimination topic. Craig suggested they join his own investigation into the auxiliary heater problem. They all agreed, and the problem became an official action team topic.

Because the team members were unknown to Craig, after the workshop, he was not in contact with them, but it didn’t slow him down. He continued the investigation into the problem. After many more vehicle inspections, he discovered that the problem seemed to be a systemic, company-wide issue affecting several hundred vehicles.

And not only was it a safety issue if someone accidentally touched a blade while it was running, but he discovered another problem in the course of his investigation. Upon closer inspection, he discovered that many of the heaters he checked had apparently sucked in all kinds of debris such as cellophane wrappers

and other small objects. Craig knew the trash being sucked into the heaters had to be clogging up the units and affecting their ability to run properly; hence employees were probably driving around in the arctic conditions wondering why their vehicles were so cold.

His next course of action was to call the manufacturer and simply ask for auxiliary heater guards. The customer service agent he spoke with seemed confused. He stated that not only had nobody ever asked for one, but that they didn’t even make them. He suggested that they should simply make their own heater guards if they felt they were necessary.

Craig, knowing that he had to offer a solution before bringing up the issue to management, did exactly what the manufacturer suggested. He conceived a way to create his own prototype heater guard. When his prototype was finished, he installed it in his company vehicle and took pictures of it and submitted the pictures along with all of the other information his investigation uncovered to Richard Widdows, a CI

Specialist. He suggested to Richard that if he could obtain funding, they could start out with fifty guards to stock the maintenance shop, and systematically inspect the heaters and install the guards when needed as vehicles came in for routine service. This approach would keep the maintenance shop employees from being inundated with numerous installations all at once. They are currently waiting for the funding approval to fabricate the guards for a full, systematic implementation.

Craig’s tenacity and devotion to defect elimination will improve both safety to the employees and efficiency in the way that the auxiliary heaters run. Once these guards are installed, employees should feel safer and warmer.



After fan guard installation



7702 FM 1960 East, Ste. 226  
Humble, TX 77346  
(281) 812-4148  
(281) 812-4149 Fax  
<http://www.ManufacturingGame.com>  
email: [info@ManufacturingGame.com](mailto:info@ManufacturingGame.com)



## TMG News

### When the Right Person Asks the Right Question, Everyone Wins



Ben Hamza, a maintenance contractor at a site in Alaska, was called in to make repairs to the Sulzer. The Sulzer turbine was down once again because it was leaking gases. This was the second time that Ben had been sent out to make the same repair to this particular turbine. When Ben made the repair the first time he observed that the root cause of the exhaust leak was that the Sulzer was offset. The usual procedure to repair the turbine required the insulation to be removed and the exhaust to be disassembled. Then core-ten metal was wired together and wrapped around the misaligned sections where the two large exhaust pieces met, and insulation blankets were installed over the metal.

On Ben's second day of the repair

he had just laid out the hi-temperature blankets when the Maintenance Team Lead (MTL) walked into the mod and observed

Ben sitting on the scaffold. When he proceeded to ask Ben what the problem was he could see all the drawings spread out and immediately realized that Ben was working on the Sulzer repair again.

The MTL asked about the progress and then expressed frustration about the recurring failure. He asked, "So, what do you think? Is it going to work this time?"

Ben took a deep breath deciding to be honest and replied, "Probably not. I think it is just a bad design. You've got a turbine with an exhaust that is offset because it was not installed correctly. The exhaust does not line up and when we install metal over it, it's at an angle, which leaves air gaps allowing it to leak. Factor in the vibration that occurs when the unit

runs, and it will leak simply because it cannot seal properly."

Ben followed up his explanation with a solution. "We could install a six-inch wide one-inch thick strip of insulation on each end of the misaligned exhaust, and then install the core-ten metal over the top as was done previously. This time, make the bottom with twelve-inch breaks so they overlap and lock into each other. Then we could band them together with stainless steel bands with springs on them. This would allow for a tight seal and also be able to sustain the vibration."

Fortunately, the MTL agreed to let Ben repair it his way. He let the crew work overtime to accomplish this. The turbine has come down only once since then, however, there have been no additional problems with leakage from the Sulzer.

It took the right person to ask the right question to finally resolve a reoccurring failure.