



**Contractors: A Good Source of Defect Eliminators**

With the downturn in the economy, more and more companies are using contractors to do the jobs previously done by inhouse maintenance department employees. CH2MHill’s work in Prudhoe Bay, Alaska is an excellent example of how long term contractors can help a company eliminate defects and make improvements, while still lowering costs and improving efficiency and safety. The following are several small defect elimination or improvement projects taken on by CH2MHill through their Solutions Without Boundaries program.

**Back Up Camera for Box Vans**

Back pressure valve crews often work in groups of two vehicles. When they have to back up the box vans a spotter has been required. Even with the use of cones and rear view mirrors there were blind spots, and it was difficult to back up, especially directly to a trailer. In order to eliminate the potential of Line of Fire injuries and protect the infrastructure the Action Team of Peter Malutin, Brad Bailey and Barry Bunnell recommended that the 32 box trucks be outfitted with backup cameras, having infrared capability. The seven inch screen allows the driver to view from 3 feet directly behind vehicle, up to 25 feet behind the vehicle. The Action Team coordinated with the Valve Maintenance Shop to install the back up cameras and provide training to key personnel.

**Contractors ... continued on page 3**

## Fluctuating Temperatures Increase Need for Reliable Gas Transmission

Constant fluctuations in seasonal temperatures require interstate gas transmission service to be highly reliable. NiSource Gas Transmission & Storage has sought to meet those needs by evaluating their present position, identifying what their future needs will be and defining a means to meet those requirements thereby pursuing best in class reliability.



*Typical pipeline right-of-way*

They decided to begin by empowering their workforce through defect elimination. Beginning with Manufacturing Game workshops, they are educating their workforce on how to search out and eliminate defects using a “Don’t Just Fix It, Improve It” philosophy. Then cross functional action teams are formed to identify real defects and potential solutions. Management empowers and encourages the teams to execute the projects and report their results.

Since November 2010 over 150 employees have been put through workshops at 30 locations and additional workshops are planned throughout the company. Some of the defects eliminated include:

- Changing out a section of rigid conduit to eliminate shorted wiring caused by a vibration.
- Adding capacity to a

compressed air system to improve system reliability and eliminate call-outs to the station.

They recognize that eliminating small defects leads to less unplanned work in the future.

The second part of NiSource’s strategy involves reliability growth through daily procedure and protocols.

The first focus is **Critical Assessment and System Strategy (CASS)**. At any given time customer demand can change and a multitude of various scenarios must be available to meet that demand. If the systems are reliable there is no concern that the demand can be met.

**Core Reliability Protocol** is essential to establish guidelines for all work orders and improvement projects in the CMMS system. All preventative and predictive work, planned and unplanned work needs to be documented and communicated. Then all system users are trained in the use of that process.

**Real-Time Data Systems (RTDS)**. Real time availability, pipeline distribution and receipt points are critical not only from a business management point of view but also because of regulatory mandates. It is important that the data

**Fluctuating ... continued on page 2**

<b>What's Inside?</b>	<b>Fluctuating Temperatures...</b>	<b>1-2</b>	<b>Contractors: A Good Source...</b>	<b>1, 3-4</b>
	<b>5 Major Sources of Defects</b>	<b>2</b>	<b>Calendar</b>	<b>2</b>

# 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)

## Conferences of Interest



### TCC/ACIT EHS Seminar

Moody Gardens, Galveston, TX  
June 6–9, 2011  
For more information or to register visit [www.ehs-seminar.com](http://www.ehs-seminar.com)



### The 29th International Conference of The System Dynamics Society

Washington, DC  
July 24–28, 2011

To register or for more information please visit: [www.systemdynamics.org](http://www.systemdynamics.org)



### Houston Chapter of SMRP Maintenance and Reliability Symposium

Moody Gardens, Galveston, TX  
August 18–19, 2011  
For more information or to register visit: [www.smrphouston.org](http://www.smrphouston.org)



**SMRP 19th Annual Conference**  
Greensboro, NC  
October 17–20, 2011

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

**Mark Your Calendar!**



**Fluctuating...continued from page 1** system works properly to manage the risk of high value asset loss and system impact.

**Modernization and Automation** are addressed to support the other three areas. Asset upgrades and short and long-term improvements are vital to maintaining and growing any industry.

NiSource Gas Transmission & Storage works daily not only to remain a top natural gas transmission system in the United States but also gain important ground in continuously improving reliability, minimizing operations costs, and mitigating issues with service to their customers.\*



**Operator personnel monitoring turbine engine performance.**

*\*This is a condensed version of an article, "Cooking Reliability with Gas" written by Matt Parks, Bill Buttenworth and John Cox from NiSource and Winston P. Ledet from The Manufacturing Game®. To read the entire article visit [Reliabilityweb.com](http://Reliabilityweb.com)'s Uptime Magazine February/March 2011 issue.*

## The 5 Major Sources of Defects

A defect is defined as any deviation from perfection. Defects come from several different sources and the greater the level of defects the more reliability issues a site will have. Defects are removed through maintenance work either reactively during equipment failure or pro-actively through preventative or predictive maintenance. However, the most effective

way to remove defects is early on, before they infect the equipment. In order to eliminate defects it is important to know where they come from.

**1. Defects from quality of materials** are found in spare parts. Some defects come directly from the vendor but often are caused by the way they are stored, handled and sourced.

**2. Defects from workmanship** are the results of doing an improper repair job. Not necessarily because of the skill set of the worker, but in a reactive environment there often is a push to get the equipment up and running as soon as possible and not perform any additional work that would

improve or prolong its performance.

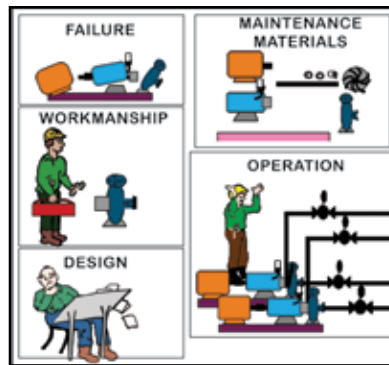
**3. Defects from failure events**—When a failure occurs commonly there is strain put on other parts of the system that could cause them to fail. (Example: a bearing seizes causing a slight bow in the shaft.)

**4. Defects from design** includes not only the original design of the equipment, but as the needs of business change, the design of the equipment is not updated and modified to fit the current requirements.

**5. Defects from operation**—How the equipment is operated has a tremendous impact on the introduction of defects. Operators can often detect defects long before they cause failures. (Examples: cavitating a pump; ignoring excessive vibration.)

A traditional approach focuses on the first three through preventative and predictive maintenance, etc. By focusing on defects from all the sources and making defect elimination a way of everyday work for everyone the most dramatic improvements can be made.

*The Sources of Defects*



**Contractors...continued from page 1**

Feedback from the personnel is positive. The ability to see and hear someone behind you via the built in speaker is tremendously beneficial. The spotter is no longer required. The back up cameras save man hours and definitely contribute to the safety of all involved.

**Dyno for Weighing**

There are safety rules for lifting heavy tools and moving equipment. An Action Team of Simon Butterfield, Robert Hauser, Jim McDevit, Joe Shaw and Matt Roberts from CH2MHill came up with an idea to use a dyno for weighing tools and equipment. Previously for any kind of lift involving a boom truck or an overhead crane, an engineer would have to calculate the weight of the equipment or they would have to call the vendor to find out what the shipping weight was for materials such as valves. The weights were not always accurate, and the employees could use the wrong rigging. Sprains and strains, falling objects or improper riggings could ensue.

Dynamometers are used for measuring tension, traction, and weight. The rules state that anything over 40 lbs requires assistance, so they purchased both a small dyno that can weigh anything 40 through 100 pounds and a large dyno that can weigh



*Dyno*

objects up to 100,000 lbs. The dyno consists of two 50lb. shackles that attach to a crane and digitally tell you what the object

weighs. This saves man hours, because the weight is than stenciled on the tools and materials so they don't have to be weighed numerous times. The dynos are calibrated yearly to make sure of their accuracy.

**Yo Yo**

In a similar circumstance anytime a tool weighs over 40 pounds safety rules delegate that two men have to carry it. Travis Jacobson, Chase Griffith and Chad Stigen from CH2MHill work for the fabrication and hydro shop in Prudhoe Bay, Alaska. The flange gun with a socket weighs approximately 85 lbs. Previously two people had to carry it and tighten the fittings around a flange. They often got in each others way, and this made it difficult to get the



*John Minge and Travis Jacobson demonstrating the "Yo Yo"*

job done. The team implemented a "Yo Yo", which when attached to a crane gives them access to the entire shop. The "Yo Yo" can be attached to any tool like the flange gun. The cable clips onto the tool taking the weight off the tool and allowing for more freedom of movement. The "Yo Yo" can lift just about any tool making it almost weightless and maneuverable. The results are less back strain and sore arms causing a lower chance of injury, fewer personnel needed to complete each job, and therefore more efficiency.

**Nitrogen Cylinder Rack**

Previously when a tech needed

to obtain a fluid level on an annuli with 0 psi, and no pressure was available to charge the Echometer gun in the well house, the tech contacted the Drill Site/Pad Operator and searched nearby wells for stacked out tubing pressure or artificial lift pressure. When the gas pressure was found the cylinder on the Echometer gun was charged, then transported back to the well to obtain the fluid level.

Employees are put at risk while carrying the gas cylinder between well houses having to avoid tripping hazards and icy conditions. Searching for a well with artificial lift gas, or one that is stacked out, can easily double the time required to obtain a fluid level.

The Action Team of Josh Prowant, Brad Bailey and Barry Bunnell had an idea to put a nitrogen cylinder rack on the back of their box vans. The nitrogen cylinder rack provides an easy way to transport small nitrogen cylinders to the work area and a safer way to charge the echometer gun for shooting fluid levels. Cost of implementation- \$700.00; end results-increased productivity and safety.

**Scratcher Implementation**

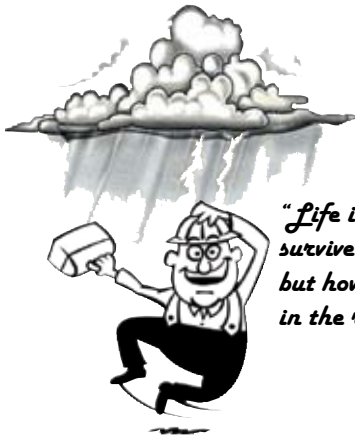
Heavy equipment is of a premium to clear and scratch the icy, slick conditions of many of the sites in Alaska. There are often long delays as the work crews wait for the area to be scratched so they have easier, safer access to the work area.

Brian Brott headed the team that had a blade scratcher installed on two of their trucks so either the foremen can come with them and clear the way or they can come ahead of time and prepare the site to make it safer for the box vans to get to the location. They have passed the information on to the rest of the field. Many of the

**Contractors ... continued on page 4**



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)



*"Life is not how you  
 survive the storm,  
 but how you dance  
 in the rain."  
 ~ ~ unknown*

*Spring*

## TMG News

**Contractors...continued from page 3**  
 other groups have also requested the blade scratchers for their sites.



*Blade Scratcher*

### **Circular Saw**

The group in charge of grating and decking originally used a 7.25" skill saw for installation and cutting of the decking and finished with a sawzall. By using two different saws the cutting hazards were doubled and the sawzall cuts are not very clean causing splinters. Additional cuts not only increase the chance of a safety hazard, but also create added waste and additional time to get the job done.

Adam St. Onge suggested they purchase a 10" circular saw. The circular saw makes a much cleaner cut and only one cut is necessary to slice through the flooring. For \$396.00 the team was able to increase safety, quality and productivity.

### **Hand Wringer**

How many of you remember the good old days when on laundry day your mother used to use a washing machine that had a wringer for getting the excess moisture out of the clothes before she hung them on the line to dry? Someone at Ch2MHill in Prudhoe Bay, Alaska did. The team of Paul Edwards and Brad Bailey from Wells Support had to deal with saturated oily waste that would come into the shop area in bags. Too much fluid in the bag was not acceptable to the recycling center, and the team had to wring the bags by hand and leave them on grates to drain. Wringing them by

hand was also irritable to the skin. So the CH2MHill group came up with an idea to use an old fashion laundry wringer attached to a drum to squeeze the excess moisture out of the bags.

These examples represent just a few of the many action team stories taking place every day on the North Slope of Alaska. During the 2010 sessions of the CI Celebrations in Prudhoe Bay, Alaska over 900 guests attended. They featured over 100 posters and several interactive demonstrations. CH2MHill presented 68 poster displays. The 60 plus champions and presenters clearly demonstrated their energy for Continuous Improvement Projects during those CI Celebrations. Proving that everyone including the contractors that work in your facility on a regular basis can make defects go away and improvements occur as part of their normal work.