Abstract

In shutdowns and turnarounds there are three groups interacting together during the event. The operation team (owners who get the equipment ready to work on), the mechanical maintenance team (typically made up of various contractors who perform the work) and the shared services team that support both of the above in getting their tasks completed, one of which is Safety Services. Items such as, Breathing air delivery, gas detection/testing, confined space entry monitoring, high angle rescue and other constitute the main bulk of the shared safety services typically used on site during the shutdowns and turnarounds.

In most places, these services are thought of as extra requirement and as a cost center, although necessary and supported, safety isn’t viewed as one of the productivity tools in a turnaround. They are typically left to the contractors to manage independently or in isolation creating redundancy in the amount of equipment available, incompatibility in the variety of brands and systems and duplication of efforts resulting in delays in tasks and a general poor perception of safety.

This paper demonstrates the effective use of a system of a QA/QC process and a centralized distribution and dispatch for on site safety services such as Q-Cycle™, Resource Track™ and Site Courier™ of United Safety, in achieving safety goals as well as schedule productivity gains. This system and process can benefit both the owner/ operating companies as well as the general contractors as either or both can use it. It reviews an electronic method of tracking, reporting and data capture of the distribution and management of site safety services. Centralized distribution and dispatch system can manage daily needs as well as provide data for future planning. In addition, the paper covers the case study and results of this system used in a large, major IOC turnaround; how the data benefited the operator and the mechanical contracting group as well as saved time and money through service quality and inventory management.

Introduction:

Successful Turnarounds and Shutdowns rely on Safety Performance, planning and efficiency. As costs are getting tighter, price of Oil is getting higher and in general the industry is getting busier, manpower availability is getting scarer and productivity becomes a critical component of a turnaround. Pre-job requirements are increasing affecting job start times (Mobilization, permitting, pre job meetings, Critical Task Analysis, etc.). In addition, Blast zone protection coverage has extended the proximity (distance) of support services from the task location. (Tool cribs, consumable cribs and general warehouse) therefore Maximizing “Tool Time” is more important than ever!

It is achieved through a proper implementation of a QA/AC process and Centralized Dispatch/Delivery of Safety services.
1. QA/QC of Safety Equipment:

The workflow starts from the on-site QA/QC facility where the equipment has been thoroughly cleaned, prepared and inspected. It is tagged ready. This process has to be efficient and trustworthy. Equipment once deployed and returned back to the on-site QA/QC facility has to be turned around with a complete field maintenance cycle in short period of time, ready to be redeployed at a moment notice. The second key element of the workflow is Distribution. This manages the staging, delivery, and retrieval of safety equipment required for permitted activities.

There are numerous benefits acknowledged when the QA/QC process have been implemented efficiently. Namely:

1. The onsite QA/QC process greatly reduces equipment rentals;
   - Equipment is used multiple times per shift (quicker QA/QC cycles).
   - Losses and damages are greatly reduced by active asset management, reducing back end billing costs.

2. Clean and problem free equipment increases worker confidence in equipment, improving moral, which will affect productivity.

3. Efficiency in the process of delivery and retrieval increases tool time as no one waits for equipment.

These systems can be custom-designed so the distribution and QA/QC process meets the scope and requirements of the turnaround. The system can also generate utilization per shift report, offering a real-time insight into workflow during the TA. Further, this effective inventory control results in zero shrinkage and a loss & damage report.

2. Centralized Dispatch/Delivery

Safety Services, much like other services such as scaffolding, cranes, mobile equipment etc., are typically in place to support the mechanical task required in a turnaround. As the life cycle of the project progresses, support requirements change day to day and unit to unit. As one unit/area requires safety services at a high level, another may require minimal. As one peak starts to decline, another grows, thus enabling the shift of resources to that area.

If each unit supplies a dedicated safety service, independent of the other units, replication and stock piling can occur. A common practice is to have mechanical contractors go to a site location to pick up the required safety equipment for the job. (Figure 1)

Since this is typically outside of the blast zone and the operating unit, the distance and time can be lengthy. Once there, the contractor will face a line up as others do the same.

Once the job is complete, it is up to the contractor to return this equipment, again, tying up valuable time walking or moving throughout the plant. This is not always a priority; therefore equipment can sit unused, ultimately requiring more resources to supply the ongoing requests for resources.

The introduction of a centralized distribution / dispatch has resolved many of the issues facing the contractors in idle time, lost productivity, duplication of equipment and exposure to more risk.
Figure 1: Typical Contractors working with tools without centralized dispatch / distribution

The Centralized Distribution/Dispatch system works by allocating personnel and equipment to the work location when needed. The resource (personnel and/or equipment) is delivered to the actual work location (i.e., vessel, column), delivery is confirmed, and then the personnel/equipment is picked up or redeployed at the conclusion of the work. The work crews just go directly to the actual work location, no one has to walk to another area to get equipment and then walk back as the remaining crew waits.

Through 24/12 hr look a heads, the safety services can be planned and allocated through prioritization. This immediately gives you a “supply & Demand” snapshot for upcoming shifts. Any gaps can then be addressed by altering schedule, adding resource or modifying priorities. Even with the look a heads, as we all know, plans change. By tracking all movement and allocation of resources, you are in a much better position to shift or access underutilized resources to meet the “on demand” needs.

The key element in the system is to train contractors and owners on the dispatch system prior to the turnaround to ensure a smooth operation and turnaround. Contractors are then free to arrive at the actual worksite, are instructed on proper fit for the breathing air as example and are free to move to the next job at the end of the job, not having to return the equipment. (Figure 2)

Figure 2: Centralized dispatch / distribution system
For instance, when jobs requiring air are scheduled, the contractor contacts the on-site dispatch center and places an order for safety watch and the equipment required (size, quantity, etc…). (Figure 2) The equipment runners will deliver the equipment to the work location, issues it to the contractor and ensure they are familiar with its use.
When the job is completed, the safety attendant with the job radios the runner to pick up the equipment at the worksite to return it to the dispatch trailer. (Figure 3)

![Workflow in Centralized dispatch / distribution](image)

Utilizing the dispatch system reduces the time contractors spend out of the work area. It is estimated contractors conservatively spend an hour each shift obtaining or returning safety equipment. By delivering the equipment to the vessel, Safety can improve contractor tool time.

The system can also accomplish the same results with manpower as well by using the system to track the deployment and information gathered by safety personnel in the field. As an example, the following information is communicated to the dispatch control center:

- Confined Space personnel radio to dispatch.
- Arrival
- Contractor arrival
- Contractor in/out vessel
- Departure/job completion

This in turn allows for the real time reporting of the status and allocation of resources on the project. It is also able to be sorted by many data points including what unit, contractor, equipment number or shift.

The collected information provides the ability for:

- On-site personnel summarize and report on progress of work daily.
Data can be used to look for issues affecting productivity

If contractors are not in the work area, they are not working on the tools.

The system can have automated reports that can report on utilization, number of active or ongoing jobs, and the time difference between when a resource was requested for and the time the job actually started. Knowing this information will help the supervision be able to pinpoint areas that may be experiencing difficulty getting the jobs started and keeping them going.

Figure 4 illustrates a sample report of the time difference between requested time and actual time. Any job exceeding an hour is automatically in red to highlight it. Depending on the desired outcomes, this time difference report can be modified to flag any amount of time.

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<th>Actual Start Time</th>
<th>Time Difference</th>
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<td>8:50:00</td>
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Figure 4: Time tracker
The data can then be trended in any customizable formats to reveal areas within the project that may need investigation. Figure 5 is an example of trending by job number to indicate what duration of time each job is taken to start the work.

Figure 5: trending of time tracking

3. Case Study

The Event:

A Major Maintenance turnaround of a Heavy Oil Upgrading Facility with 60 days in duration and over 3500 contractors on location. The event was the single largest maintenance undertaking in the company's history. In addition to the base plant turnaround, there were 8 additional capital projects being executed simultaneously on the same location.

Project Description (by the numbers)

An 8 Week event that saw 9 concurrent site projects. The Up-grader Turnaround required the following safety resources:

- 1 Project Manager,
- 4 Project Coordinators,
- 2 Site Dispatchers,
- 4 EH&S Techs,
- 16 Leads,
- 12 QA/QC Equipment Techs,
- 6 Equipment Delivery Techs,
• 4 Site Administration,  
• 206 Safety Watch  
• 4 gas testers for a green field project  
• 5 Safety personnel for an Acid gas flare project  
• 24 personnel for Special Projects Group (SPG) projects  
• 10 personnel for SPG Gas Detection projects  
• 38 personnel for RHC support gas testing.

Additionally;  
Breathing apparatus training and fit testing to 1200 contractor personnel,  
Safety orientations for 500 general contractor personnel

Key Challenges:

The project presents some key challenges that are critical to the success of the turnaround while minimizing the risk and ensuring the safety to everyone involved. Some of the challenges were:

• Plan and Supply of Shared Safety Services across site to achieve quality and efficiency of delivery  
• Reduce the overall requirements with Centralized Dispatch and management of Safety Services  
• Maximize localization of personnel required  
• Support contractor readiness by managing the delivery of required safety training  
• 336 safety personnel deployed  
• 100% compliant with 6:1 rotation of personnel for days of rest  
• 1200 units of specialized safety equipment (SCBA, SABA, portable/fixed gas monitor, air supply)  
• 3900 jobs dispatched from “central dispatch” using delivery system  
• “0” asset shrinkage. No back billing for lost equipment

Solution:

To meet the requirements of the project the following key elements or steps need to be in place:

1. Needs Assessment  
2. Continuous review of planning and requirements  
3. QA/QC and Centralized Dispatch and Distribution

For the benefit of this paper we will only focusing on the QA/QC process and Centralized Dispatch and Distribution system

During this turnaround, a proprietory process of QA/QC called Q-Cycle was implemented, followed by the implementation of the centralized dispatch and distribution.  
A direct benefit of the Dispatch system is the constant communication with user groups it affords for the coordination of what, when and where equipment and personnel is needed. Instead of visiting a distribution trailer on the other side of the site to retrieve necessary equipment, craft labor go directly to work site where safety resources are waiting. Critically the system gives real-time monitoring and reporting of resources available to respond to ongoing or emergency requests.  
Safety equipment (and personnel) is ready to go. The Dispatch System allows for the re-issue of equipment multiple times per shift reducing overall strain on inventory/supply. The safety specialists are incorporated into our Dispatch System to ensure mitigation of work stoppages caused by equipment and or safety personnel not being at the right place at the right time.  
Through distribution, owners can obtain detailed, daily data on the usage rates, outstanding rental items, and equipment utilization.(Figure 6). This is not only used to monitor usage throughout the project, but also it very valuable for planning future work with similar scope. The graph in Fig 2 shows tracking by number of units, by date range, and type of units. However the tracking can be configured in many different ways to suite the specific needs of the project.
Benefits:

During this event, the use of Q-Cycle™, Resource Track™ and Site Courier™, the proprietary QA/QC and the centralized dispatch and distribution systems and processes of United Safety, the project managed over 341 personnel, over 1200 pieces of specialized safety equipment such as breathing air and gas detection. The centralized system tracked the delivery of over 4500 requests over a 60 day period.

The results were:

- Zero asset shrinkage (no lost equipment/no billing for such)
- Work crews did not wait for scheduled/planned task requests (100%).
- Unplanned work was prioritized quickly and requests met with minimal wait time.
- Billing was reconciled on a daily basis for accuracy.
- Utilization was tracked giving ability to ramp down inventories in proactive method.
- Usage and project history captured for future planning ability.
- Over the duration of the project, the combined equipment and personnel management saved the project +/- $1,000,000.00 Cnd.

4. Conclusion

The benefits to the project of developing and utilizing a systematic QA/QC process and a Centralized Distribution and Dispatch system are numerous, namely:

- Daily inventory control and monitoring
- No lost equipment charges to the owner
- No back end billing of missing items
- Management of peak loading/releasing of equip and personnel from billing
- Skilled and Craft labor is made more efficient by eliminating the lines at trailers waiting for equipment, and time spent retiring equipment:
- Proven track record reducing costs
- Craft labor can focus on the work
- Safety is reconciled to the flow of work
- Safety requirements are no longer a bottleneck, but an efficiency driver
- More efficient use of safety watch personnel
- Communicated and accountable directly back to the stakeholders
- Dispatch provides the owner with reporting tools
- Stewardship reports can highlight specific examples of cost savings, positive processes witness and opportunities for improvement which can be transferred to the next outage or turnaround.