# INNOVATIVE STOCK MANAGEMENT

***Paper Presented by:***

**Chris Evans**

***Author:***

**Chris Evans,** *Operations Manager,*

Thiess Asset and Infrastructure Services

*39th Annual WIOA*
*Queensland Water Industry Operations Conference and Exhibition*
*Logan Metro Indoor Sports Centre, Logan*
*3 to 5 June, 2014*

# INNOVATIVE STOCK MANAGEMENT

**Chris Evans,** *Operations Manager,* Thiess Asset and Infrastructure Services

## ABSTRACT

Thiess Asset and Infrastructure Services regularly provides advice to clients on how to best operate and maintain its assets to maximise value for the short and long term. This improves the performance and reliability of assets and develops innovative strategies to manage its spares and critical stocks.

In 2013, Thiess embarked upon a series of initiatives to understand the rationale behind existing stock levels and types of stock held for a Queensland water services provider. Following a review of the stock items and remaining asset life, Thiess identified potential savings for the client of around $500,000 for the 2014-2015 financial year.

## 1.0 INTRODUCTION

In September 2013, Thiess Services was awarded an O&M contract with a large Queensland water services provider. A key part of the contract involved a comprehensive review of stock and spare parts worth approximately $2.5m. The client suspected that their stock levels were more than what they required and that cost savings could be made. In addition, their stock levels needed to support a new maintenance plan across the business.

Having extensive experience working with similar water providers across Australia, Thiess began a process that involved:

- Reducing the value of stock
- Providing a strategy regarding re-order levels
- Mitigating risks associated with stock control
- Identifying essential spare parts and mapping assets.

Due to the relatively short lead time, Thiess transferred the stock items from the incumbent's warehouse in Archerfield while carrying out planned, breakdown and corrective works on behalf of the client. A key challenge was that all stock items had minimal information, apart from part numbers and brief descriptions. In addition, the information relating to the stock was held in SAP, recently mothballed by the client.

Prior to transfer, more than 3,000 items were held in the incumbent's facility on behalf of the client. The challenge for Thiess was to check, review and package all items for transport into the new stores within 24 hours, without impacting upon the client's operations.

## 2.0 DISCUSSION

Following the transfer of stock, Thiess created part numbers for all 3,000 items. This information was then uploaded to the Thiess CMMS (Maximo). With little or no previous history on usage and frequencies, the Thiess maintenance team reviewed the client's Annual Maintenance Plan (AMP) and held a series of discussions with stakeholders.

In order for the plan to be executed correctly, a Project Management Plan was created with milestones and resources required and subsequently allocated.

The plan was broken down into a number of key elements and the responsibility for the project was given to the Thiess Maintenance Manager for delivery against key milestones.

The key elements of the plan were:

1. Identification of spares and manufacturer
2. Development of a list of spares by type (e.g. mechanical/electrical)
3. Map the spares against assets
4. Map spares against the Annual Maintenance Plan (AMP) requirements
5. Discuss with suppliers lead-in times and availability
6. Develop a Bill of Materials for assets
7. Build workflow notifications into Maximo.

## 2.1 Spares Identification

In order to understand the variety of spares held by Thiess, key operational staff conducted a walkthrough of the items and identified items and manufacturer. These items were then photographed and Maximo updated. However, over 40% of items (mostly electrical) were undefined and required further investigation.

Thiess contacted its suppliers from various fields (mechanical/electrical and instrumentation) and invited them into the stores warehouse for a review of items.

Over three weeks, various suppliers attended and gave feedback on the items and their most likely use. In addition they provided valuable feedback on the quantities of items and if the items were out of date, obsolete or held elsewhere. For example, a number of heavy duty generator batteries were held in stock (at a cost of $200 per battery), and eight of these held since 2008 were flat and beyond repair. Multiple retail outlets have these items in stock and have no lead-in time.

Further cost savings were identified and outlined in Table 1.

**Table 1:** ***Obsolete or redundant spares – Example of the types of items in review and the savings identified are ongoing at the time of writing***

| Item | Cost per unit | Usage | Cost |
|---|---|---|---|
| Heavy duty batteries | $200 | 0 | $1,600 |
| Water Quality Probes | $1,100 | <1 per year | $65,000 |
| Flow meters | $10,000 | 0 | $30,000 |
| Analogue transmitters | $3,500 | 0 | $11,000 |

Suppliers also provided feedback on usage through previous commercial relationships. This highlighted that a large number of spares were held in water quality and pipe fittings. In some instances, the transferred stock was over and above a supply kept by either the manufacturer or the local supplier. One supplier indicated that over five years' worth of stock was being held for items that were available with a seven day lead-in period.

## 2.2 Spares by Type

Following the spares evaluation, items were categorised into the following;

- Mechanical
- Electrical
- Civil
- Water quality.

The average value costs were used and the stock listed as per Table 2:

**Table 2:** ***Stock Values***

| Item | Maximum total cost | Minimum total cost | Value of stock on hand (March 2014) |
|---|---|---|---|
| Mechanical | $1,400,000 | $880,000 | $1,240,000 |
| Electrical | $750,000 | $235,000 | $211,000 |
| Civil | $10,000 | $2,000 | $4,400 |
| Water Quality | $400,000 | $225,000 | $93,000 |
| Total | $2,560,000 | $1,360,000 | $1,464,000 |

Based on the previous re-order levels, over 600 items were deemed to be below the minimum re-order levels. Assuming the re-order points were followed, the cost to bring back the items to a maximum level was estimated to be $900,000. As noted above, the electrical spares and water quality spares are considerably below the previously specified minimum levels.

## 2.3 Spares Mapping

Using knowledge of the spare items use and likely frequency, the Thiess Maintenance Team set about reviewing the AMP. The AMP was based on a RCM approach using the Failure Mode and Effects Analysis (FMEA) philosophy. With the most likely failure modes analysed, the team then reviewed the spares required, their availability and likely effect on production.

The criticality of the failure was also reviewed and the impact of a failure also updated within the AMP. The data was entered into Maximo and the part number and aisle location was recorded against the asset.

The AMP was also profiled over the financial year, and for planned maintenance requirements such as filters, probes, diaphragms and chemical solutions which were itemised for usage requirements.

These items were compared to the number of items being held within the stores and shortfalls identified along with oversupply of items with a use-by-date. All items with a use-by-date that had expired or were not required were raised with the client for disposal and write off.

Items that were in danger of becoming out-of-date were moved into a priority area for dispatch against maintenance routines to ensure they would be used prior to expiry.

During the review it was also identified that a number of spare items were being stored incorrectly, therefore their life expectancy was going to be significantly compromised. A new process was introduced to reduce this risk into the future.

## 2.4 Supplier Discussions

Using the information captured above, Thiess liaised with suppliers in the Brisbane and South East Queensland pipeline corridor. By reviewing the information in Maximo, the asset location and part requirements, Thiess discussed availability of the item and its criticality with suppliers. This included a discussion about the location of the spares to ensure these were located within the closest proximity to either the relevant asset (pumping station where the part may be used) or where the most likely Thiess Technician lived.

Suppliers were receptive to holding Thiess stock within their outlets and provided updates on revised lead-in times. This information was again updated in Maximo for use by the Maintenance Teams. As a result, over an additional $300,000 worth of stock could be reduced from the Eagle Farm inventory.

For items identified as 'critical' within the AMP, items were still held within Thiess but the minimum and maximum levels were revised based on supplier and manufacturer's input.

**Table 3:** ***Philosophy for usage and minimum and maximum levels***

| Item | Original lead -days | Item cost | Revised lead | Max stock | New stock | Cost saving |
|---|---|---|---|---|---|---|
| Level Transmitter | 30 | $3,440 | 2 | 4 | 1 | $10,000 |
| LED Modules | 20 | $158 | 1 day max | 10 | 0 | $1,580 |
| Mech pump seal | 90 | $17,000 | 20 | 2 | 1 | $17,000 |

Table 3 outlines the philosophy for usage and minimum and maximum levels. Within the plan there are approximately 2,500 line items which require review. A sizable task but is being prioritised on criticality and unit cost.

## 2.5 Workflow and Maximo

With the work flows now being fully understood, a bill of materials is being developed against each asset item with the AMP. Schedulers are now able to see the availability of materials and which work orders are awaiting materials to be delivered.

Maximo has the ability to review the lead-in times and notify when the lead-in time and the PM activity is required allowing the schedulers and suppliers to order the parts without delays.

Moving forward armed with failure data, the average asset component life span is being built into the system to directly order the parts from the supplier or manufacturer prior to the anticipated failure date.

# 3.0 CONCLUSION

Using all the information provided by manufacturers, suppliers and field teams, Thiess has identified savings in stock items of approximately $500,000 for the upcoming financial year in-stock purchases. These savings represent a significant reduction in cost for the client who can reallocate the items elsewhere in its business.

With more usage and failure data, the Thiess team believes further savings can be made in subsequent financial years. Using technology, supplier relationships and operational best practice, Thiess can offer significant savings to the overall cost of business while reducing risks and improving asset knowledge.

## 4.0 ACKNOWLEDGEMENTS

The author wishes to thank the following for their contribution to this project;

- Greg Kemp Maintenance Strategy Manager Thiess Services
- Malcolm Potts QLD Operations Manager. Thiess Services
- Craig Ashdown, Submissions and Facilitation Manager Thiess Service