

## **Industrial Maintenance Roundtable: 10 August 2005**

### **Implementing Change and Developing Culture**

#### **Report of Meeting and Site Visit: Zinifex Port Pirie Smelter,**

## **Presentations**

### ***Aligning Maintenance and Operations Culture***

**Raymond Bentley-Comins, Maintenance and Assets Manager, Zinifex Port Pirie Smelter**

Alignment of culture is the key to reliability. Even if a company does all the right things, if the culture between operations and maintenance people is not right, then you do not get reliability.

The right organization structure, aligned key performance indicators for maintenance and operations, good planning and analysis, central reliability systems, flying gangs for breakdowns, skilled trades and good supervision all contribute to reliability, but to be effective they all rely on a culture of team work between maintenance and operations.

The right culture can deliver reliability when some of these elements are missing. At Zinifex each major element in the plant, smelter, zinc and refinery has an operations manager. Maintenance line is managed centrally.

### **Principles for a Culture of Reliability**

The guiding principle for a reliability culture is:

- Operations plus Maintenance = Production

Maintenance and operations work in integrated teams.

Maintenance is not a service; maintenance is not subservient to operations. Both maintenance and operations understand the need for throughput and believe that stoppages are necessary to prevent failures.

The approach Zinifex takes to very old electrical systems illustrates the partnership with operations. Rather than allow budget to limit the capacity of maintenance to replace equipment necessary to reliable operations, Operations supports the spending necessary.

Operations and Maintenance have identical performance measures. For example, Zinifex has an objective to have 80% of maintenance work planned and scheduled one week in

advance. Achieving this goal will require improved reliability and Operations must schedule access to plant. When, in June, Zinifex achieved 60% of maintenance work planned and scheduled one week in advance, Operations inquired into how they could help Maintenance to get their planned work up to 80%.

## **Implementing TPM in the Sinter Plant**

Zinifex uses TPM because it emphasizes the importance of relationships.

Zinifex produces silver, gold, zinc, lead, cadmium and sulphuric acid. The plant is the largest lead smelter and the second largest silver refiner in the world.

The Sinter plant at Zinifex constrains throughput. The blast furnace runs 20% faster than the Sinter plant, and has to be slowed down to avoid running out of sinter. The operational goals for applying TPM to the Sinter plant are to improve reliability, improve production rate and improve sinter quality.

It takes a lot to get TPM self sustaining but Zinifex has achieved this through:

- Daily meetings between operators and maintainers to confirm the daily plan;
- Developing equipment ownership among operators;
- Ensuring that maintainers understand the process, not just the equipment;
- Placing production and maintenance supervisors in the same office, although they report separately;

Zinifex now conducts reliability studies on those critical items which account for most stoppages, identified through Pareto analysis of stoppages;

- Establishing a business improvement department across the whole site involving members of the production team and the maintenance team;
  - Encouraging Idea Generation: What can we do to improve these problems?
  - Introducing Operator Log Sheets and encouraging operators to monitor the condition of their equipment using Equipment Check Sheets and simple infra-red sensors;
  - Confirming and updating equipment capacity to take account of improvements in practice, rather than relaxing improvement efforts when name-plate capacity is reached;
- Strengthening variance analysis with a Root Cause Analysis focus. Operations initiate a Five Why analysis on the cause of each stop;
- A weekly Variance Analysis Meeting examines the downtime of every day and reviews why the stop occurred, how long it lasted and what was the stop for.

The secondary crusher at the Zinifex Sinter Plant is very old and has white metal bearings. It operates in an abrasive environment and the bearings had been a major source of stoppages. When operators began monitoring the condition of the bearings, using

infra-red sensors to detect temperature rises, they detected problems early enough to prevent failure and extended the period between stoppages to two years.

Improved Shutdown Management has extended the period between shutdowns from weekly to three or four weekly and aims to extend further by:

- improving cleanliness;
- better shutdown planning, including critical path planning, and
- conducting progress and review meetings away from the plant where respirators are not necessary.

Zinifex has aligned incentives towards ownership and reliability. Rather than pay overtime to people who are called in from standby to deal with a stoppage, Zinifex pays the overtime as part of regular pay and accumulates the hours for call-outs. The standby team voluntarily checks the plant before the weekend and fixes the problems to avoid being called out.

Monthly performance charts acknowledge improvements achieved. Managers regularly review variance and work as supervisors or coaches with the people at the appropriate level including owners of each key initiative.

The outcomes in the Sinter Plant have been

- A 20% increase in throughput to 90 tonnes per hour from 74 tonnes per hour in 2000;
- A 10% increase in availability to 94% (Zinifex uses an availability measure called OTE: Operating Time Efficiency).

## Summary

- Align teams and ownership of operations and maintenance
- Maintain good data on down time
- Engage operators in condition monitoring
- Develop committed leaders. Antagonism between operations and maintenance drives down performance. Reduce the number of superintendents to encourage people to take leadership in their workplace.
- Review performance frequently. Managers should support and involve people, not micro manage them. Show people that it is going to be better and let them talk to other about the successes they have.

## Questions and Discussion

The Zinifex reliability department has four people plus four in asset management and three plant engineers in continuous improvement. Most planning is conducted through SAP. Condition Monitoring is outsourced.

The rate of implementation of the improvement process differs between plant items and sites. The value of long experience on a particular plant item can be lost if procedures become fixed or people with long experience come to accept things as they are and lose their interest in improvement. Variations in practices between different plants on the same site create opportunities for learning and improvement.

Zinifex provides leadership training and emphasizes working at the right levels, communicating and building awareness of what constrains performance each day. The morning meeting between operations and maintainers is vital to leadership.

An integrated culture of operations and maintenance teams chasing variance and analysing root causes can generate continued and significant improvement in reliability. Effective asset management rests on good work flow planning and scheduling. Maintainers still need to plan weekly and daily to secure access spares and tools.

The process can be less flexible with a contract workforce, because investment in training in site systems is lost when the contract employee leaves.

At OneSteel the Pellet Plant has a contract workforce which is less flexible but is getting the asset strategy right through the planning and work flow processes and is building a focus on reliability through an analysis of all variation. The contract workforce was introduced to reduce labour cost and while effective has reduced the analysis of reliability and production capacity has fallen. The Rolling Mill retained the core of the maintenance team and managed to keep plant knowledge. The task is to get right the relationship with operations. With a contract workforce the site loses plant knowledge and has to continually train new people in the contract workforce.

## ***Improving Culture and Managing Perceptions***

**Roger Kennett, Maintenance Manager, Santos Limited**

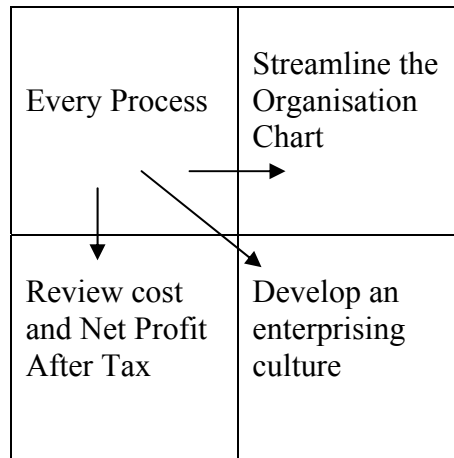
The maintenance role at Santos covers all on-shore and nearby off-shore facilities. The off-shore West Australian facilities produce 90,000 barrels per day and paid back the establishment cost of \$500 million in 6 months. Other fields are yet to turn cash positive and some fields will close before they recover their establishment and operating cost. Diverse assets require alternative approaches. While the fundamentals of maintenance remain, the philosophy for their application may be very different. A future goal is to explore and develop more fields and to improve the management of existing facilities.

What happens between the functional reporting lines of an organisation chart will largely determine success, a leaders challenge is to link functional lines. Maintenance normally sits best in organisations using asset reporting lines, where assets are managed along clear organisational lines. Santos moved to a functionally aligned organisation from a regional asset business unit model which presents new challenges.

## Background to the Santos Continuous Improvement Program (SCIP)

The SCIP program was introduced four years ago and took 2 years to build.


The program reviewed every value adding process in the business, defined how each process contributes to cost and net profit after tax, redefined the organisation to streamline the key value adding processes, and defined the vision and culture required to drive value across the business.



### Processes

The processes of Santos can be seen as a conveyor belt running from prospects to production. Project ownership makes a smooth transition along this line.

All Basins Ventures Prospects	Resources Is it there?	Reserves Demonstrated Extractable Saleable	Fields	Production
Geoscience	Explore	Commercialise Create value	Develop	Operate



### Culture

Culture is the way we do things around here. An acceptable culture supports the processes and behaviours required to perform and generate value.

Values and beliefs determine culture and so drive acceptable behaviour.

Unless we work at developing values and beliefs in our workplace, culture will be driven by the practices which have worked in the past. Schoolyard bullies prosper when the practices of bullies have worked in the past. The culture we have determines how we will behave when we are in trouble.

## *Leaders and Culture*

Leaders shape culture by the way they solve problems. Leaders develop the shared basic assumptions which groups use to solve problems. Where the group experiences success in solving initial problems these basic assumptions are confirmed and the group continues to approach problems using the same assumptions. [Edgar Schein]. Over time people forget the reasons behind their choice of problem solving assumptions and people simply fall in line to retain harmony.

Leaders change culture by changing assumptions and being willing to change.

There are risks in change:

- Past disappointments lead to scepticism
- Competing initiatives may be popular
- Expectations may have been raised too high
- External shocks, such as a falling share price, may change the situation

Leaders must walk the talk, demonstrating the required culture.

The roles of leaders and managers are not the same.

Leaders deal with vision, encouragement and alignment of goals. They are about people, measuring opportunity, leaving the heritage behind and working on the edge, not on the parochial issues.

Managers deal with plans, problem solving, organisation and maintenance. They are about things, not people.

## **Planning the Santos Culture Change Program**

The key steps in planning the culture change program were similar to those required for any change program:

1. Define the desired culture
2. Identify leaders (not managers) to act as change champions
3. Diagnose the existing culture
4. Plan the culture change program
5. Roll out implementation

## *Defining the Desired Culture*

The desired culture should find expression in the company vision. A brief phrase cannot convey complex values and a culture of living those values. Santos had a vision to be a leading energy company. The company wants to be a partner of choice for businesses and people interested in developing energy prospects around the world.

Santos now has an 8 page statement, written by the Chief Executive after extended consultation across the company. This document states what the company wants to stand for and do in 10 years, and providing enough detail to allow everyone to find it relevant to their lives. This vision has a parallel in sporting life: it visualises future success and so helps to build the practices leading to success.

## *Identifying Change Leaders*

The process puts leaders into roles where they can influence change. You can recognise leaders by observation. What values drive their behaviours? What influence do they have in a group? How well do they influence team performance? What happens when they spend time with five strangers in a room? What do referees and work colleagues say about their leadership and values? Santos uses leadership training which involves role playing exercises requiring several days to prepare.

## *Diagnosing the Culture*

The process for developing this vision statement put identified change champions into teams each with a brief to write the vision. These teams began the process of diagnosing the existing culture. Once the initial teams had completed their views on the existing culture, the teams were mixed up again and asked to re-evaluate the existing culture.

Then, in turn, young graduates and more experienced people were asked to have their say, getting out all the issues created for people in the company by behaviours endorsed or tolerated by the existing culture.

Finally the company commissioned a 65 question survey of the whole company seeking views on what was good and bad about the company. The survey received responses from 65% of employees.

The culture survey asked a series of questions about

- Job satisfaction (61% were satisfied)
- The quality of support received in doing the job
- Whether managers were providing leadership (45% thought so)
- Whether change is managed well (25% thought so)
- Whether the culture was open to change

Questions about the attitudes of the individual received favourable scores. These questions covered issues like: Do people cooperate with you? Are your skills well used? Have you sufficient authority to do the job? Do you have a sense of achievement?

Questions about the health of the group received less favourable scores. These questions covered issues like: Have we enough people to do the job?

There are a number of providers of culture surveys that have comparative Australian data. National Institute of Labour Studies at Flinders University of South Australia is one.

## **Implementing the Santos Culture Change Program**

The results of the culture survey informed the planning of the culture change program and the reorganisation and restructuring of Santos.

The aim of the reorganisation was to get leadership into the right places. Two levels of management were removed in the field. At Head Office General Managers disappeared and each key process has a Vice President and reporting Managers with functional roles, such as Maintenance. In the field each site has functional Superintendents and reporting Supervisors with reporting shop floor people. Every staff position changed and was contested. Thirty per cent of people left or changed roles during the change program.

Maintenance and Production report to the Executive Vice President for Operations, who reports to the Chief Executive. This is the first level at which the organisation structure provides for the resolution of issues between maintenance and operations; the new structure requires local leaders to lead, not refer disputes up the chain. This requires the development of local leaders who will work across functions.

Maintenance people must understand their role in operations. What is important to operations? What constitutes operational excellence: good planning, few disruptions to production, low risk, team work, Earnings Before Interest and Tax? In which areas does maintenance contribute: Environment Health and Safety, Cost, Production, Technology and Infrastructure?

Every field site conducts Role Clarity Workshops bringing together maintenance, production and other functions to define their roles and to determine:

- What are the mission critical items for the next sixty days?
- A scorecard for every person defining their required deliverables.

## **Questions and Discussion**

Culture has impacts on all functions. There is scope for culture improvement in every company.

The new structure has clearly defined functional lines at head office. There remains scope for building leadership by regularly interchanging positions at head office level. Santos is moving maintenance fitters into operating roles, building future leadership.

The reasons for the change were to reduce the levels in the organisation, reducing the approvals chain from 15 to 5 at maximum; to improve productivity by attracting attention to the cultural barriers to improvement at the company, and to give shop floor teams the power to lead change.

## ***Common Interest Work Group on Planning and Scheduling***

Members of the Common Interest Work Group presented a summary of their report. A full text of this report will be distributed separately. Their presentation is available to members.

The key points of the summary are:

The vision and goals of the business should inform maintenance strategies to maintain and grow the available capacity of critical assets. Analysis and management of the consequences and risk of failure of every asset and piece of equipment is central to maintenance strategy and planning. This requires accurate data on the condition, history and performance of assets and alignment of operations and maintenance plans.

All companies require a system to capture these data and to generate reports and information for maintainers; the maintenance strategy will define the selection and design of the required system and the resources required to support it. Key analytical tools include failure mode and criticality analysis, root cause analysis and Pareto analysis of stoppages.

Each shutdown project requires risk analysis for each included task and critical path planning for the whole project in order to avoid unnecessary interruptions to operations. Similarly planned, preventive and predictive maintenance should be visible and transparent to operations.

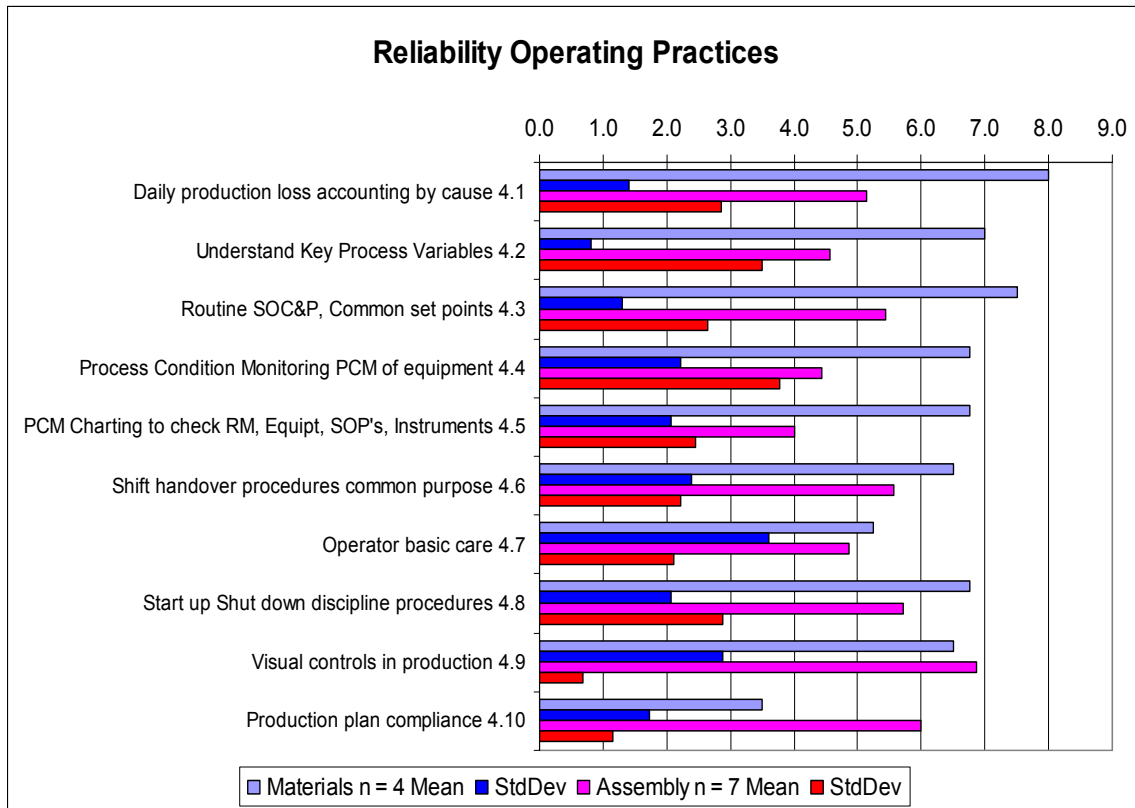
Maintaining best practice requires continuous training and auditing of practices. Pooling of maintenance resources usually produces flexibility of response. Planners need to understand the trades tasks involved in planned jobs. Backlogs of work should be reviewed and replanned. Use regular meetings and performance reviews to align production and maintenance culture.

## Benchmarking Reliability Practices

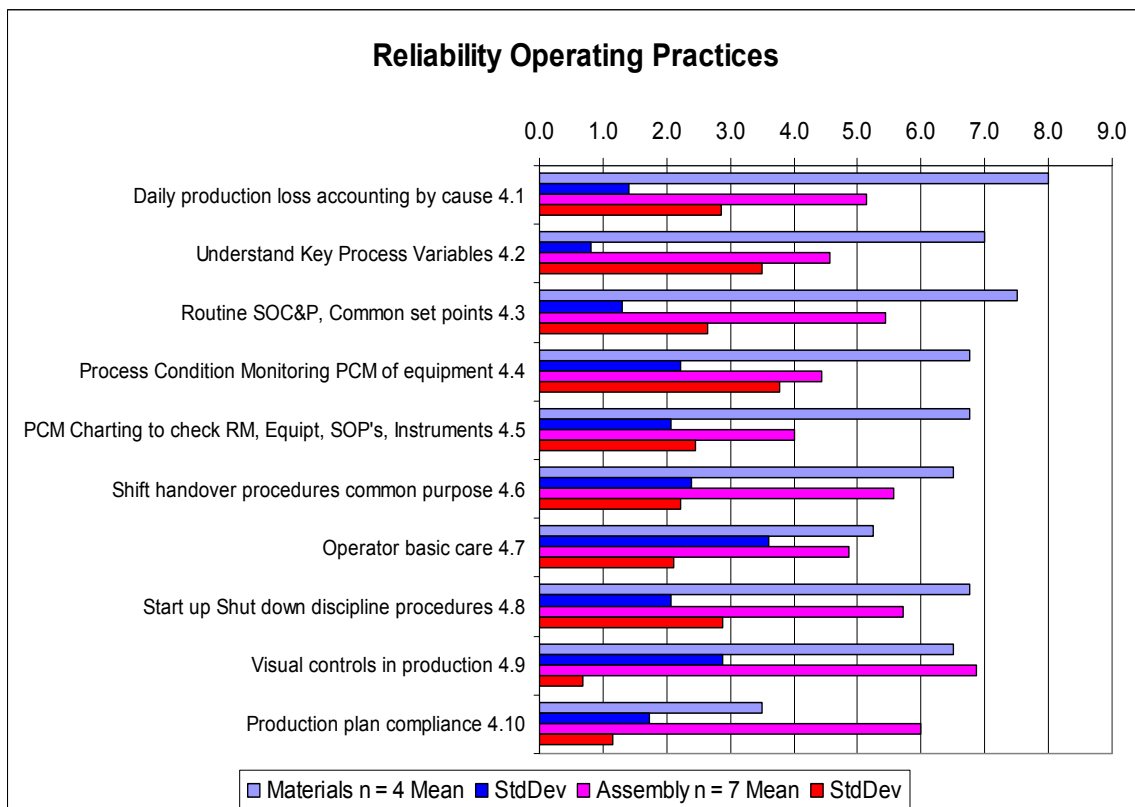
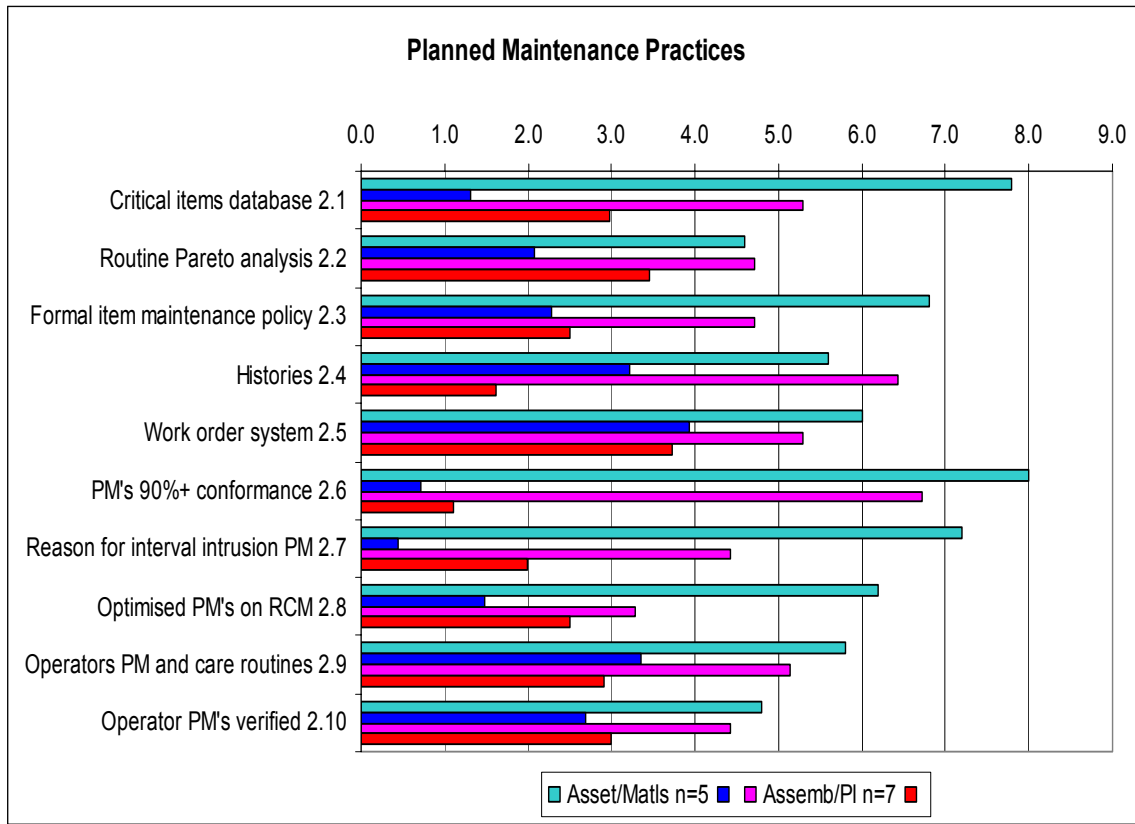
SIRF Roundtables has been offering participants in Common Interest Work Groups an opportunity to conduct a self audit of their reliability practices and assembling the results to provide comparators for members. The self audit pack is based on material from Ron Moore.

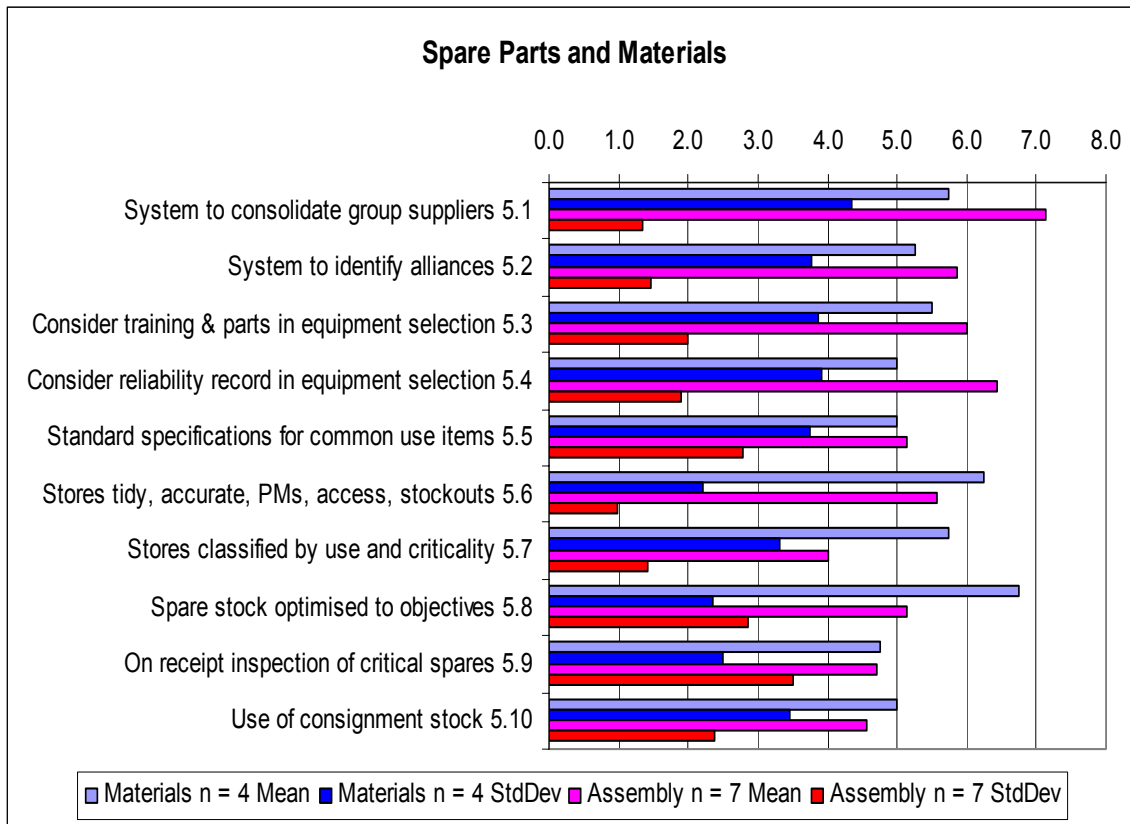
The following four summary charts cover 12 responses from seven companies.

Each self audit question is scored from 1 to 10. In these charts there are four bars adjacent to each question. The top two of these four are blue and give the scores of the materials processing and asset management businesses. The number of responses for each type of business is given in the legend. The bottom two of these four are red and give the scores of the assembly businesses. The top and third from top (longer) bars are mean (average) scores and the second from top and bottom (shorter bars) are the standard deviation of the scores.



The charts suggest that assembly businesses could improve their reliability and planned maintenance practices by adapting to their needs some practices of the large scale materials processing businesses. On the other hand the large scale materials processing businesses could benefit from adapting to their needs the visual controls, production plan compliance, histories and supply management practices of the assembly businesses.





To date there are too few responses to provide an adequate base for benchmarking. We invite members interested in this process to inquire and obtain the self audit pack. We will add their data and return updated mean and standard deviation data.

## Breakout Groups

Five small groups discussed the following questions.

### *List some best practices for developing culture?*

Develop and communicate vision, objectives and expectations. Chief Executive Officer gets involved and walks the talk. Include all levels in the organization and provide quality feedback mechanisms. Developing culture is a top down process. Diagnosis is listening.

People dependent: Ensure that the right people are in the right box and that people with leadership qualities are engaged and respected. Understand what motivates and what reduces motivation people. Ensure that measurements are relevant and drive the right behaviour.

Ensure that people are accountable and understand the consequences and incentives for the right behaviour: What are the consequences of not achieving? What are the rewards for achieving?

Identify reasons for change. Build engagement through explanation, clear communication and direction, open consultation involving all people in decisions and communication.

Build a partnership based on a shared vision and common goals supported by relevant KPI's and incentives aligned with goals. Align local goals and KPI's with business goals and KPI's and encourage leaders to break down the silos. Ensure that the KPI's are understood, accepted and aligned with values.

Team work rests on common goals and good communication.

***What questions should you ask when visiting sites and communicating with people to assess the culture?***

While it is helpful to engage an independent to assess the culture especially where rapid change or history has created distrust, every manager needs to show interest and be able to assess the local culture.

Some questions to consider include:

Do you have a vision?  
What are your key goals?  
Are we your employer of choice?  
Do you feel part of the team?  
Do you enjoy your job? If not, why not? If so, why so?  
Why do you come to work?

What is your role what are you responsible to influence?  
What impact do you have on "productivity"?  
Do you have freedom to do the job effectively?  
How many decisions have to be referred to others?

What are the high level company performance measures? [eg share price]  
What is the company vision and what are the goals?  
How are you expected to contribute to the vision?  
How does the organization structure compare with how things get done around here?  
How are things done around here?

***How do you ensure that the workforce engages with the vision and how do you ensure that you understand what is in it for them?***

Facilitate and deliver vision through simple and beneficial workforce engagement. Provide a tangible opportunity in which the local group can become engaged in

implementing the vision. Manufacturers often use 5S to engage people in a lean culture; everyone can become engaged in cleaning up their workplace and benefit from the clean up. Engagement requires more and more effort at communication. Ask for help and encourage involvement in delivery.

Promote vision, goals, KPI's, incentives and benefits together. Provide feedback which ties the Vision into KPI's and scorecards. Listen and respond with empathy at every opportunity. Maintain and enhance self esteem. Provide support without removing responsibility for delivery.

“Sell the vision” through the hierarchy not by consultant.

Walk the talk: live the values of the vision.

Communicate the vision. Communicate what is in it for the workforce. Sell the benefits – involve key players who are approved by their peers and willing to move forward. Some individual benefits include:

- Job satisfaction
- Job stability
- Continued employment
- Company profits and continues to exist

Persuade, monitor and communicate.

### ***How do you monitor workforce opinion, capabilities and life situation?***

Use formal surveys such as in the performance review. Surveys and audits help a lot. When they are done by a third party, it is important that it provides comparable information from other businesses. This gives credibility. The National Institute of Labour Studies at Flinders University do this well. Beware of the survey norm.

While the survey is being conducted reassure the community that the survey is not conducted or edited by management.

Once it is done, company leadership must describe the findings and the responses of the company, and must facilitate, chair and conduct meetings and involve itself in decisions that respond to the survey. Complement the formal survey with informal one on one information discussions at every opportunity. Monitor active participation and involvement in meetings and forums.

Monitor work force departures. Preferably use exit interviews conducted in confidence by Human Resources with general results reported to operations. Also consider asking workforce colleagues why the person left. Unfortunately, often people just leave or are rushed out, reducing the chances that the person will return in future.

Monitor absences, Lost Time Incidents, Medical Time lost Injuries and formal KPI's. Maintain performance measurement and periodic personal performance appraisals and reviews. Continue benchmarking.

Listen for topics in safety and communication meetings. Also listen for informal communications. Read the back of the toilet door.

### ***How do you select and introduce new technology and procedures in ways that build the culture?***

Lead by walking around. Consult and seek the participation and involvement of key players and stakeholders to establish wider ownership of decisions about procedures and selection of new technologies.

New technology and procedures should not be the change agent but rather should enable and support desired change. Develop the procedures to drive and implement the required change.

Use new technology and new procedures as an expression of the change in culture. Take every opportunity to influence people to suggest what needs to change.

Provide training and understanding of the new technology and procedure. Communicate benefits to individuals and to the business. Make the introduction transparent and avoid any reduction in numbers but rather focus on learning and developing new skills.

Ensure that the new procedures are applicable and are applied.

### ***How do you identify leaders?***

Use the appraisals approach: Include formal and informal methods of appraisal. Observe people under pressure on the job and in exercises. Observe the level of influence the person has in teams. Observe attitudes, aptitude for change and willingness to challenge to the norm. Leaders do and should challenge the status quo.

Ask the workforce "Who do you look up to?" Identify those who are not just noisy but who are informal leaders who can talk about their long term vision and their ideas for the group and the future. Be prepared for leaders to disagree and to resist buying in to change. [Listen for why and respond]. Leaders can be identified by gut feel and by observation of who naturally rises to the surface.

Consider promoting the troublemaker who wants positive change. Natural leaders not picked up inside the firm are often become shop stewards.

Recognise and reinforce change leaders by involving them in decisions.

Culture development requires

- Vision
- Planning
- Appropriate Training
- Appropriate Tools
- Implementation

## **Culture Surveys**

How frequently should we do employee culture surveys, annually or less often? After five years of annual surveys we wonder whether we should be backing off or continuing.

Set the frequency of surveys to the time required to complete responding to the previous surveys. People will cease responding if nothing results.

The company must report the significant results of culture surveys and respond to all of the workforce, and in groups of 15 or more. Some businesses use signed surveys, and respond directly to individuals making signed comments.

Management should avoid reacting against individual managers following isolated critical responses. These responses may not be significant. Critical reviews from single individuals may appear to be significant in small work groups. Negative responses in a first survey may reflect past events. Managers who are subject to negative responses should be encouraged to assess the significance of the issue with their team before taking any action.

Culture surveys are a powerful tool for getting change and providing an avenue for people to send messages. The survey should provide room for quality feedback, action and follow up.

It is important to ensure that employees understand the questions used in these surveys.

## **Lessons Learned**

- Practice good collaboration between production and maintenance. Focus on getting the operations and maintenance groups together physically and mentally.
- Operations + Maintenance = Production
- Stress the relationship as the central element in rolling out culture change as in customer service. Get the relationship right.

- Zinifex management teams use the 50/50 rule in relationships. 50% of the problem is on both sides, so fix your side first. When you get a difficult response, ask what did I do to create that reaction.
- Understand the distinction between management and leadership:
  - Leadership provides vision, encouragement and alignment. Leaders are about people. They are measured by opportunity. They leave the heritage behind. They are on the edge, not parochial.
  - Management is about planning, problem solving, organizing and maintaining. Managers are about things.
- Managers are not always leaders.
- Have confidence in leadership styles which focus on people, team development, culture and working with people.
- What are the mission critical things you have to manage for the next 60 days?  
You can use the rest of your time on change.
- Implement change at different levels