Practical Outsourcing Of Engineering Support And Maintenance

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1. AN ABSTRACT ART

In the past, during interviews, job candidates were sometimes shown a picture that resembled an ink blotch and then asked to elaborate on what they saw. From these comments, through some clever science, the candidate was then assessed. It is therefore clear that, for this exercise to have any meaning, different people see different things. This part is further demonstrated by Stephen Covey's example of the picture of a woman in the "Seven Habits of Highly Successful People".

To a very large extent our business and in this case the after sales service business, is also subject to largely different interpretations of the same picture.

2. THE PICTURE

The current scenario, seen from the contractor's side, is seen as follows*:*

2.1 Industry Scenario - Customers/End Users

2.1.1 Financial Pinch

The mining and industrial houses, like most other industries, are under extreme financial pressure with production costs increasing and revenue from products decreasing.

2.1.2 Time Pressure

High interest rates in South Africa and varying external factors in the sub-region (political instability, exchange rate variations, etc) have resulted in extremely short contract duration being requested. It is not uncommon nowadays to be required to complete a total system, from clean sheet of paper stage, in as short a time as six months (including the Christmas break).

2.1.3 Resource Limitations

Our customers have also experienced the brain drain and the general lack of skills in the industry due to lack of training leading up to the transition period, combined with their endeavours to support the conditions of the new skills development plans. Furthermore the younger generation of engineers seem to prefer the softer sciences such as IT and telecommunications.

2.1.4 Increased Technical Complexity

The principle of competitive tendering and pressures on cost reduction, as well as the development of new technologies, have resulted in increasingly complex design methods resulting in designs to just meet the minimum criteria specified. Components are designed using finite element design methods and plants and machinery are protected and controlled by sophisticated instrumentation and computers.

2.1.5 Age of Operating Plant and Equipment

During the 1970's and the early 1980's, the industry experienced a boom time with new mines, plants and power stations being built faster than the local industry could supply. Maintenance and refurbishment work over the last 20 years usually involved the replacement of parts, mechanical, electrical and instrumentation components only. The fact remains that the superstructures are 20 to 30 years old and could be well into their fatigue life limits. Closer inspections of many machines have revealed cracks in critical areas and signs of non-engineered, patched repairs are widely seen.

2.1.6 Change in Support Structures

Major organisations, mining houses and others, have virtually disbanded their head office technical support structures, or have at least decentralised major engineering functions. This has resulted in inexperienced plant engineers being left without technical mentors or higher level assistance directly on hand. At the same time, staff turnover rates are high and experienced personnel are often promoted before the same major maintenance tasks are repeated again.

2.2 The Contractors/Suppliers Scenario

In addition to the above changes in the industry, the suppliers' market is also experiencing changes.

2.2.1 Reduction in Local Suppliers' Base

Whereas a number of local materials handling organisations have shrunk in size, we have also seen a reduction in the numbers of major competitors, either through the closing of local offices or through local and worldwide mergers. The bulk materials handling businesses of Krupp, O&K, PHB Weserhütte and Mannesmann Demag are now under one roof, as are Svedala, Strachan Henshaw and Nordberg, to name only two examples.

2.2.2 Increase in International Suppliers' Base

This does not mean that business has become easier for the local suppliers. On the contrary, the opening up of world markets to South Africa and the communications technology revolution have together resulted in a huge influx of new international suppliers.

Tenders are usually submitted through a small organisation or an entrepreneurial local company. Expertise is then brought in from overseas for the required duration and supplemented by local resources hired in for the contract duration.

First time quotes from these companies are often up to 25% below market value. Then the local office (end users) finds out that international companies do not send their best people to South Africa (of all places) and that there is not an army of really competent people walking in the streets looking for short-term employment.

This results in losses measured in millions, lateness measured in years and sub-suppliers having to fight for every cent that they are owed.

Customer pitfalls generally include:
- Complete disintegration of the contract team upon contract completion;
- Lack of competent after sales support;
- Lack of understanding of customer's culture and detail requirements;
- Lack of understanding of relative competencies of local suppliers;
- Freely translated manuals and operating instructions.

2.3 Comparison of the Pictures

The difference in interpretation of the same picture by customers and suppliers is clearly demonstrated by the following facts:

- Instead of increasing, customers are decreasing their own levels of expertise;

- There does not seem to be increased emphasis on local company size or after sales service in general tender evaluation. There are certainly no customers who have openly expressed what premiums they are prepared to pay in order to get such service.

The indications from our customers clearly show that their views on the same issue look different. Although suppliers may never fully understand the other viewpoint, all contractors have heard that they are no better than anybody else; that they are expensive, especially that their spares prices are a rip-off; that they are inflexible; that response times are bad, etc.

3. THE BUSINESS VIEW

The emphasis on big businesses to refocus on their core business activities means that everyone is interested in outsourcing certain functions.

These intentions or strategies, combined with the background situation as just described, indicate, at first glance, a tremendous business opportunity. This again, looks like a pretty picture.

We may therefore ask the question as to why these opportunities have not been followed up aggressively by suppliers of materials handling plants and equipment, despite plenty of examples of success stories on the mining side. Most earth moving equipment, trucks, shovels and even drag-lines, are subject to some form of outsourced activities.

Although this sort of outsourcing is inevitable in this world of increased specialisation, we believe that the major reasons for delay or reluctance in the outsourcing of operations and maintenance on materials handling plants and equipment are as summarised below:

3.1 Reasons for Delay/Reluctance

- System Complexity and Integration
  Unlike trucks, shovels, etc which are individual units of equipment that can be easily separated and measured, materials handling equipment is usually part of an integrated plant with process equipment and other operational bottlenecks (typically, oversize lumps blocking chutes).

- Customers' Own Competence and Infrastructure
  Although operators may not always have the specialist knowledge of the machine designer, they usually have a lot more experience in managing field resources. Unless it is a completely new project, the customer would have human resources and support structures (housing, transport, etc) in place and would require some of these anyway. The overall cost benefit may not be large or easy to demonstrate at the initial stage.

- Use of Different Cost Calculation Methods
  Cost comparisons may be difficult as it is often not clear what is costed in, if a figure of total cost is discussed. Where the supplier would have to cost everything in, the operator's own cost seldom includes a portion of the chief executive's helicopter or lear jet. Historical data from the customer may therefore not be of much use to the process

- Operational Risk
  The operator's cost of production failure could easily outweigh any maximum penalty the supplier would accept (eg, Sasol's feed into the gassifiers). Plant operators in this situation are certainly not comfortable with the thought that their plant is being operated and maintained with short-term profit goals in mind!

- Technical Uncertainties
  Plants and equipment could be old and abused, maintained with pirate parts and modified without proper engineering input. In addition to this, historical data may be vague and documentation may be lost or outdated (eg, proper updates of as-built drawings with each modification).

All of a sudden, this pretty picture of a few minutes ago has changed shape yet again.

4. THE SOLUTION

As is often the case in life, we have two opposing sets of criteria that have to be put together without compromising either.

The proposed model is that of a joint development process. The basis of this model stands on two legs. Firstly, it assumes that the customer has a long-term strategy to focus on core business and to outsource certain operating and maintenance functions.

Secondly, the suppliers must have specialist expertise and know-how without which they will not be able to add value to what the customer is already doing.

The aim of this process is for the supplier to work together with the customer in order to immediately improve overall performance. The supplier therefore starts by providing expert and know-how services to the customer whilst both parties measure performance and log data.

The information and experience gained during this phase, which should last at least 2 years, will create mutual confidence and result in a realistic basis for further commitments such as long-term operating and maintenance contracts.

This entire process has to be executed without becoming a threat to current resources. Engineers and foremen must be assisted in their tasks and remain to manage the supplier as well as the field force. The idea being that the plant engineer is strengthened and not threatened in his position.

5. VALUE ADDED BY SUPPLIER

Depending on the customer's infrastructure, own management and expertise, input requirements from the supplier can vary widely. The supplier should be able to offer at least the following services on an expert basis, with the customer choosing those services that are needed.

5.1 Equipment Status Update

This involves a detailed inspection and report on the status of the equipment. Critical repairs and priority maintenance areas are to be identified. This information must then be incorporated into the formal maintenance programme.

5.2 Preventive Maintenance Programme

A formal preventive maintenance programme should be agreed. This must include equipment and component identification as well as preventive maintenance task schedules. Physical and measurable deliverables should be produced from this exercise. The use of a Predictive Maintenance or Condition Based Maintenance system such as RCM, or similar, is recommended.

5.3 Assistance with Maintenance Projects and Shutdowns

Technical input from the supplier is vital for detail task planning to ensure the correct sequence of activities and that all necessary spares and equipment are available. Project risk areas can be identified and contingency measures planned.

The supplier's representative can provide a supervisory and inspection service, approve the final installation and assist with, if not lead the recommissioning.

5.4 Engineering Support

Ongoing design engineering input is needed to correctly analyse unexpected or repetitive failures. Data should be updated to "as-built" status continuously.

Often personnel changes in the customer organisation result in the people previously involved in a specific task, no longer being available when a similar task has to be executed again. The supplier could provide continuity of this know-how and information.

It is furthermore an accepted fact that in most cases of breakdown, up to 50% of the engineering hours go into finding the information, rather than into analysis and remedial planning. This is mainly due to a combination of unrecorded and undesigned modifications and the use of inferior parts or repairs. In this case it is not the cost of the engineering man hours that is an issue, but really the extended downtime.

For the supplier, all of this information forms important feedback for incorporation into new designs.

5.5 Continuous Cost Reduction and Monitoring

The supplier must initiate improvement projects, using benchmarking against other customers and his own experience. Performance must be measured and charted, and unbiased feedback given to management. Follow-up sessions with the customer's management should be entrenched in the procedure.

Where possible, the supplier should organise user groups for similar equipment, whereby users can discuss common areas of interest, eg, problems, joint spare parts keeping and exchange.

5.6 Visits and Inspections

The supplier should visit the equipment regularly and monitor key aspects and components. During these visits, general operational as well as technical aspects should be addressed and measurements taken. Parallel condition monitoring of critical aspects should be done and visit reports submitted. These reports will form the basis for follow-up inspections

5.7 Support from Principals

In cases where local suppliers represent international principals, it would be a good idea to include periodic visits from these specialists. During such visits, specific problems could be addressed and performance compared against international benchmarks. The visiting specialist should comment on the general operation of the machine and operator efficiency. This could also be a good opportunity to discuss new design trends and upgrade possibilities of the equipment.

5.8 On-Site Services

This is the business avenue though which most people think that this business should be started. The approach is widely supported by labour suppliers/brokers as well as local steelwork fabricators and erectors. On-site services, without the technology and know-how support, can merely supplement the customer's resources. Although this can be a lucrative business, it does not address the technical value added needs of the industry.

However, as part of a total package that includes expert support, an on-site labour force that makes regular inspections and adjustments, and does spare part replacement and normal maintenance repairs, makes sense and will eventually form part of all total outsourcing solutions.

5.9 Spare Parts

Although an effective maintenance contract with the original equipment supplier would reduce spare parts stock holding and usage, and make spares requirements more predictable, the customer may feel very vulnerable and in the hands of the supplier. This locked-in situation could be seen as a good opportunity for the supplier to make an abnormally high profit on spare parts.

For this reason the negotiation of maintenance contracts should include standard spares lists, specifying insurance/strategic, critical and consumable spares.

The agreement could include a transparent differentiated cost plus spares agreement and would mean that the customer would pay a higher mark-up for technology and know-how parts, and a smaller margin on standard bought out parts.

6.0 IMPLEMENTATION

Ideally, the principles of the eventual total agreement should be agreed upon from the outset. The scope of services to be supplied during the joint process and the milestones towards the total operating and maintenance contract, should be defined up front. This means that in order to plan the process, the final method of payment must also be defined.

Payment could be structured on a rate-per-ton-handled basis, but it is debatable as to whether this method can be used for integrated plants where the performance of the plant or equipment subject to this agreement, is reliant on the performance of other upstream or downstream plants. In these cases, a cost structure that has a fixed retainer component (fixed cost) and a cost-per-ton component (variable cost) would be a better idea.

Another reason for ensuring that the long-term contract is implemented up front is that the customer may show signs of selective memory as soon as his plant is performing better and the bottlenecks and priorities have moved elsewhere.

In practise, real examples exist where the joint development procedure was started, equipment upgraded and production improved through the joint efforts. The next step of implementation was then not done simply because the customer no longer needed it as badly anymore at that time.

Finally, please remember:

"When an idea enters an empty head, it fills it completely." - Edgar Allen Poe

BIBLIOGRAPHY AND ACKNOWLEDGEMENTS

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Work experience includes over 10 years of general management, comprising company restructuring, business planning and development, and contract control. Prior to that, design engineer and consultant in the materials handling business for over 10 years.

Obtained a B.Sc. (Eng) degree at the University of Stellenbosch and an Advanced Management Diploma at the Wits Business School.

Previous Beltcon papers presented:

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