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The 2012-2013 Maintenance in China Survey Report

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THE 2012-2013 "MAINTENANCE IN CHINA" SURVEY

This fourth edition of the "Maintenance in China" survey was conducted by Siveco, China's largest maintenance consultancy, with academic partners Beihang Sino-French Engineering School and the Sino-European School of Technology of Shanghai University. It was distributed by various international chambers of commerce to an estimated 10,000 companies. It is by far the largest survey of its kind in the Chinese market.

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Executive summary

This survey report provides a snapshot of the current maintenance management practices of industrial companies in China and of their improvement plans in the near future.

Respondents

The survey covered **1,569 respondents**, **834 different companies**, a total estimated **1,200 sites** all over China.

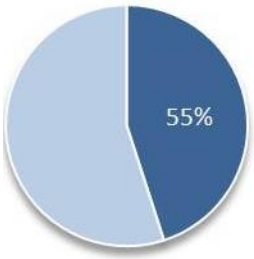
55% are process manufacturers (mostly chemicals), 39% discreet manufacturers and 6% non-manufacturers.

The survey is dominated by mid-size (72%) international (84%) manufacturers.

Findings

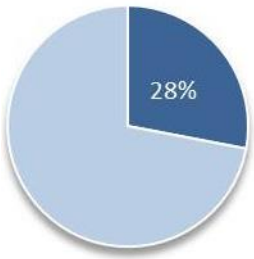
Overall, the maintenance function tends to be under-budgeted and under-staffed in China compared to international benchmarks.

Results show low levels of preventive maintenance (less than 1/4th of the maintenance activity for 55% of respondents) with correspondingly low staffing in the maintenance engineering and planning function.



Preventive maintenance: less than 1/4th of the maintenance activity

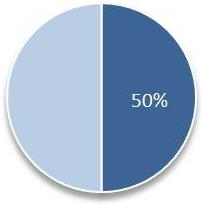
There is a significant increase in outsourcing compared to previous years (28% outsource more than 1/4th of their maintenance), with no observable impact on performance.



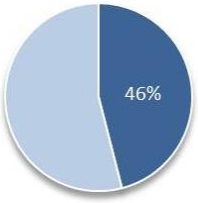
Outsource more than 1/4th of their maintenance

Respondents recognize the improvement potential, more particularly in terms of maintenance's impact on operations and productivity (half of the respondents believe that 20% or more failures could be prevented, 46% think

preventive maintenance could have a large – over 10% - impact on productivity).



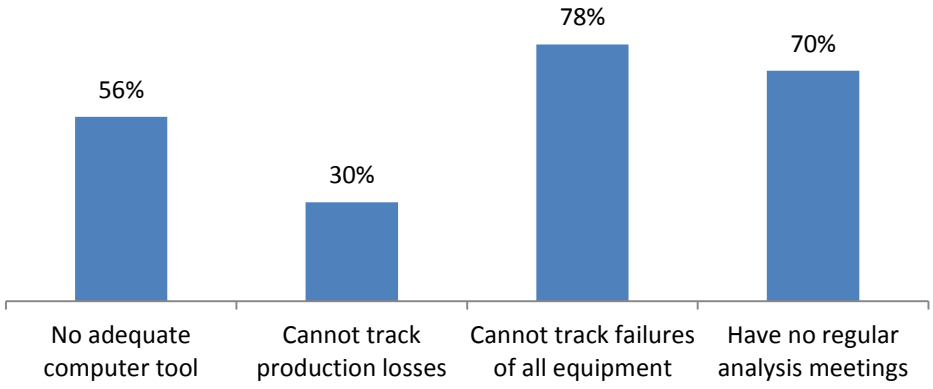
Failures: at least 20% could be prevented



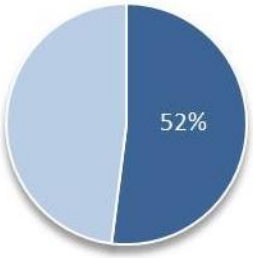
Preventive maintenance could have a large (over 10%) impact on productivity

Companies however lack the necessary skills, decision support and management tools (56% have no adequate computerized tool, 30% cannot track production losses due to breakdowns, only 22% track failures of all their equipment, only 30% have regular analysis meetings). This partly explains the very significant discrepancies in answers observed between respondents from the same company.

What is missing in order to improve?

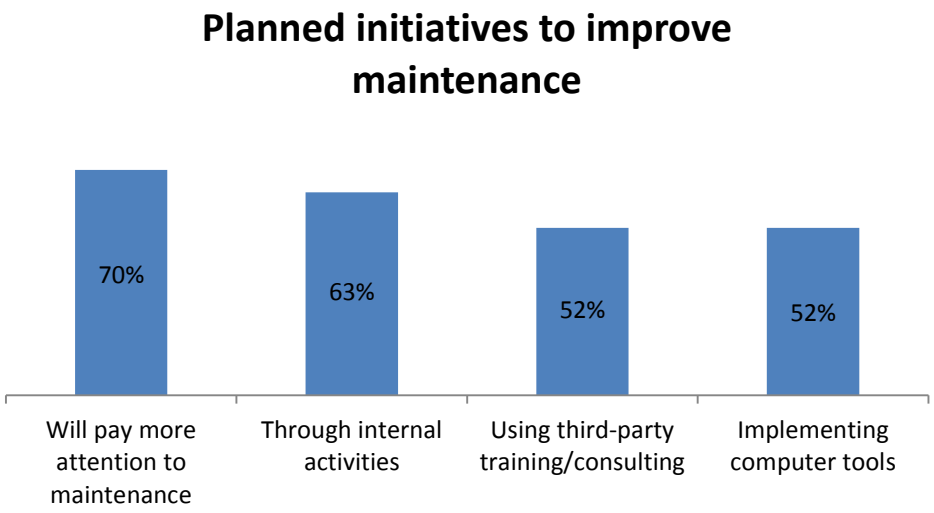


Spare parts represent another under-optimized area (more than half surveyed companies do not know the turnover rate of their most important parts), often not covered by corporate productivity improvement programs.



Do not know the turnover rate of their most important spare parts

70% of respondents indicate they will pay more attention to maintenance: 63% envision internal activities to improve maintenance, 52% external actions (training, consulting). 52% are considering the implementation of computerized-based tools, a figure significantly higher than in previous years.



Overall there is little change from previous years' results, apart from the increase in outsourcing, the growing interest in computerized tools and perhaps a better awareness of maintenance issues.

Conclusion

Maintenance remains vastly under-optimized in China, which presents a significant risk for manufacturers, in a context of slowing investments, existing facilities showing the effect of aging (often faster than expected due to construction issues and lack of preventive care) and growing skills shortages.

There is however an increasing awareness of the issue, with a clear need for management tools and for support currently not offered by corporate programs (WCM, ERP). Positive impact is expected from maintenance improvement initiatives, in terms of productivity and risk avoidance.

In 2013, maintenance improvement represents a new priority for manufacturers in China and a "low-hanging fruit" with good ROI potential.

Chapter

1

The Maintenance in China survey 2012-2013

This survey provides a snapshot of the current maintenance management practices of industrial companies in China and of their improvement plans in the near future.

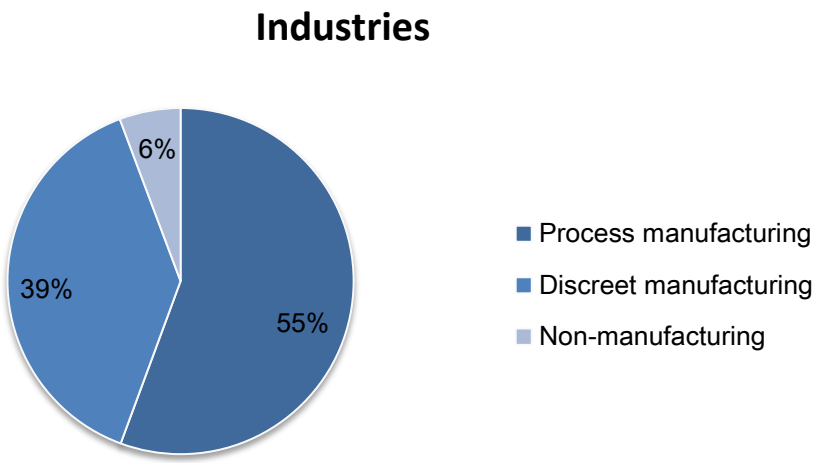
The "Maintenance in China" survey has been running every two years since 2006. From March to December 2012, Siveco China conducted the fourth edition of the survey in cooperation with academic partners Beihang Sino-French Engineering School (a joint program between Beijing University of Aeronautics and Astronautics and France's Centrale Graduate School) and the Sino-European School of Technology of Shanghai University (UTSEUS). Various international chambers of commerce and business associations, listed on the inside cover of the report, distributed the survey to their members. The survey was also distributed to attendees of two major industry events, the Annual Process Industry Engineering & Maintenance Congress held in Guangzhou in May and in Shanghai in September 2012. The survey was made available online in Chinese, English and Japanese and reached an estimated 10,000 companies.

The online questionnaire was designed for cross-referencing, with seemingly redundant questions in different parts of the survey. There is often more than one respondent per company, often providing very different answers. This approach has proven useful in previous years' survey and again this year. Analysis were conducted concurrently by both academic partners and later combined with the assistance of Siveco's maintenance experts.

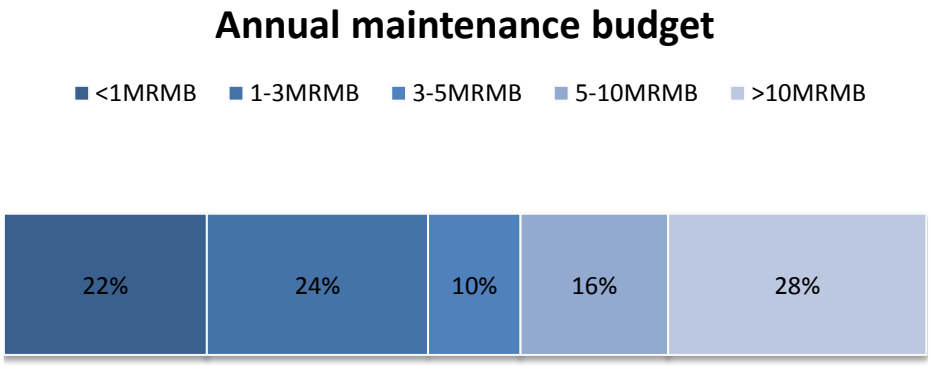
There were 1,569 qualified respondents in all (suppliers and incomplete questionnaires were excluded), from 834 different companies, some of them operating multiple locations across the country (a few respondents in retail and property management manage hundreds of sites). An estimated 1,200 sites were covered by responses to the survey.

Respondents' profile

As in previous years, we observe a strong predominance of manufacturing industries, with 55% of the companies surveyed classified as process industry (mostly chemicals) and 39% as discreet manufacturers. Non-manufacturers (6% of total) include facilities owners and technical service companies, as well as a few retailers.

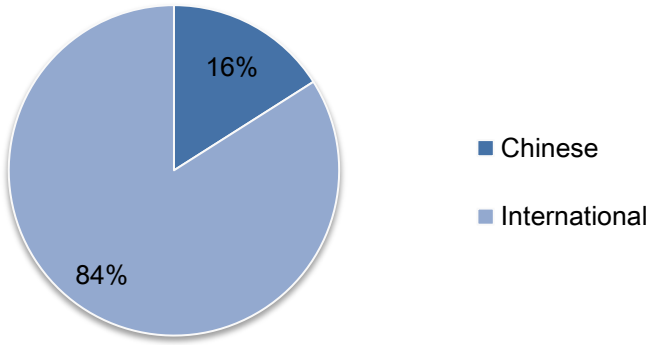


Analysis of companies' size based on their annual maintenance budget show most respondents were mid-size enterprises, with only 28% having budgets over 10 MRMB. 22% of the respondents have less than 1MRMB maintenance budget (small discreet manufacturing or assembly plants).



Only 16% of the respondents were local Chinese companies, 84% multinationals mostly of Western origins. Local companies that responded are all large scale manufacturers, equally split between chemicals and large equipment manufacturing.

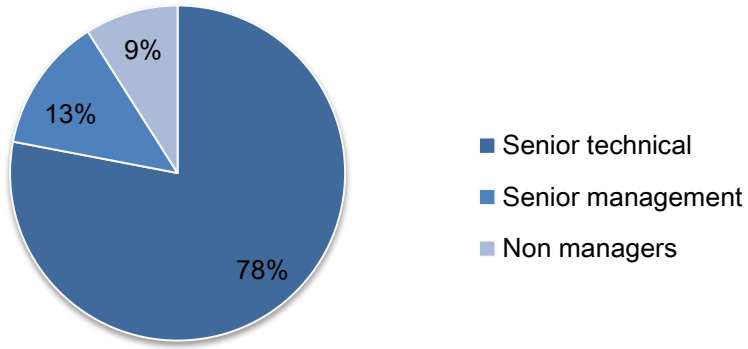
Companies origin



The bias towards mid-size international manufacturing plants can be attributed to the survey distribution process, mainly conducted through international business associations.

78% of the respondents were in senior technical positions (job titles ranging from Maintenance Manager to Plant Manager), 13% at senior management level (General Manager, Vice President, Division Manager), the remaining in various non-managerial positions.

Job positions

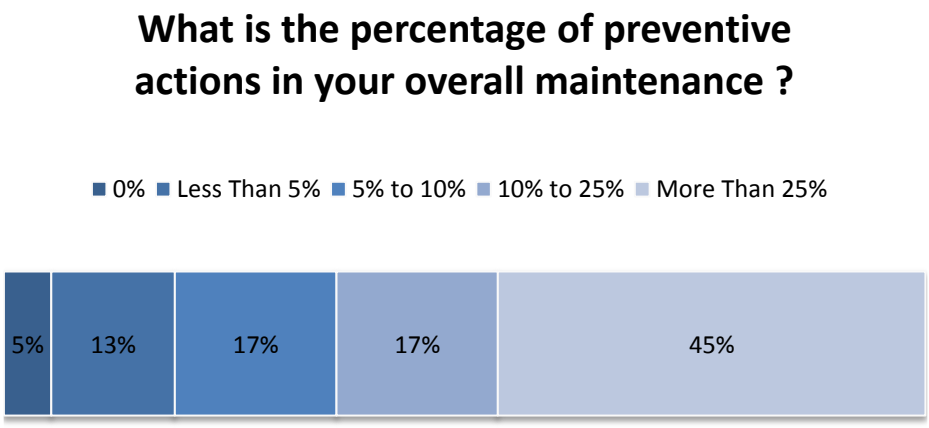


Chapter

2

Preventive maintenance

For 55% of the companies surveyed, preventive maintenance represents less than 1/4th of the maintenance activity, which may be considered abnormally low. For 45% of the respondents, however, preventive maintenance represents more than 1/4th of the activity, a significantly better result than in previous years.



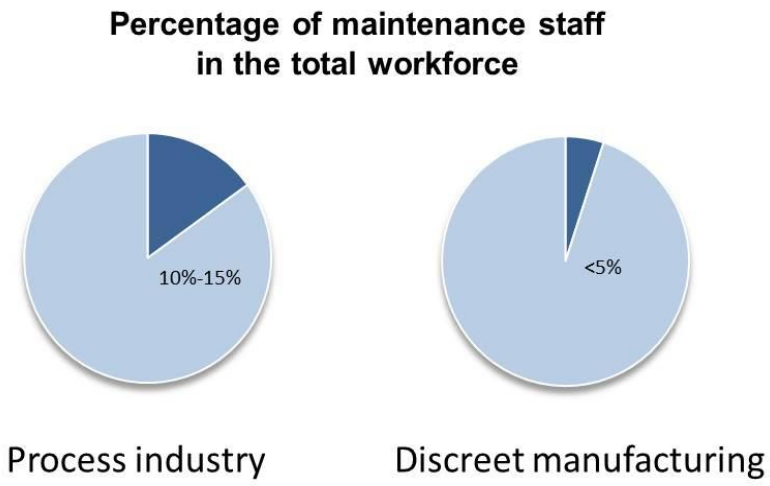
We note that misclassification is often an issue: what really constitutes preventive maintenance? Planned corrective maintenance or posting full-time staff next to a machine that breaks down every day do not qualify as preventive maintenance. International standards such as *EN 13306 – Maintenance terminology* constitute a useful reference.

Chapter

3

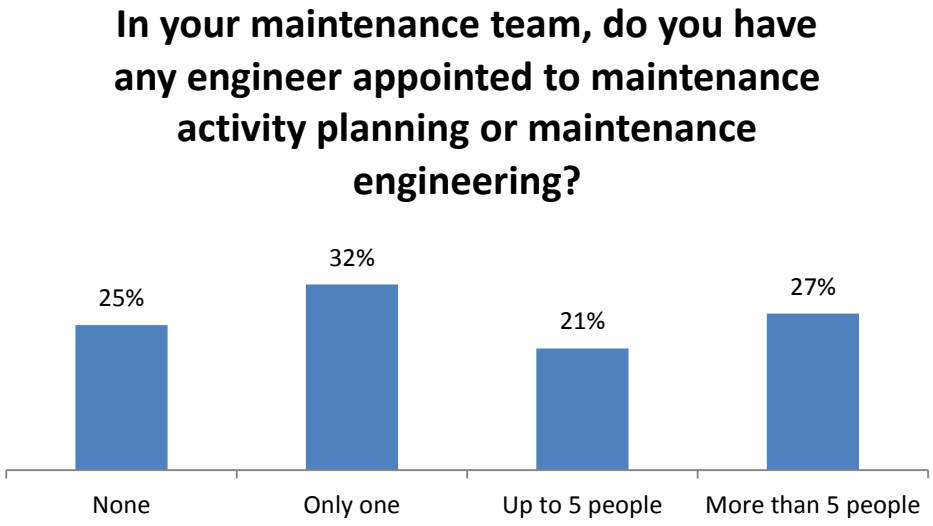
Staffing

In comparison to international benchmarks however, enterprises in China tend to be on the lower end of typical staffing ranges, with 10-15% of the workforce in maintenance for process plants (up to 20% internationally) and less than 5% in discreet manufacturing (5%). Chinese maintenance organizations are often slightly understaffed, in spite of the lower labor cost and the necessity to train inexperienced workers and to compensate for higher turnover.



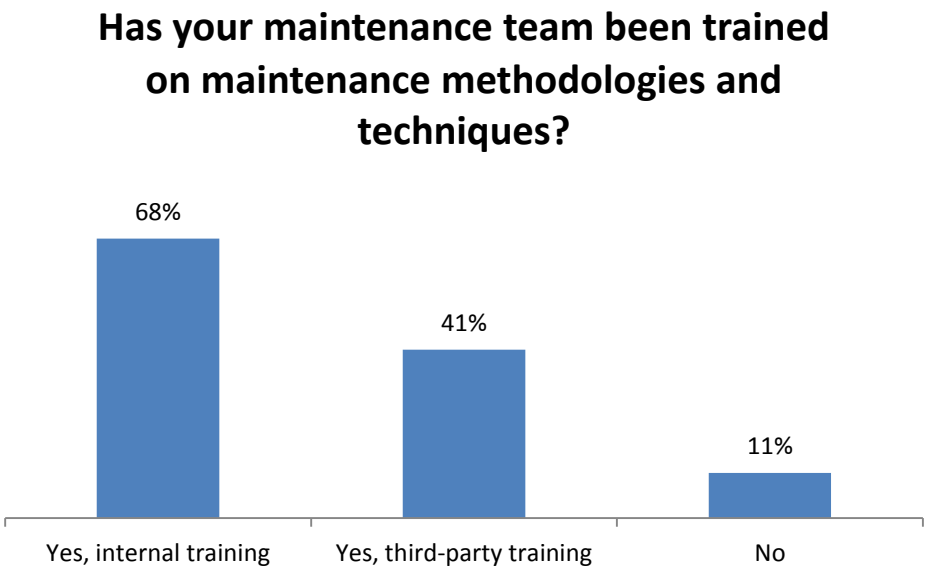
Planner

Close to 25% of respondents do not have anyone in charge of maintenance planning and 32% have only one, including many large process manufacturers. Every company should have maintenance planning and engineering activities (it could be a part-time activity for the maintenance supervisor or a position in the engineering or production department for smaller companies), otherwise no improvement is possible.



Training

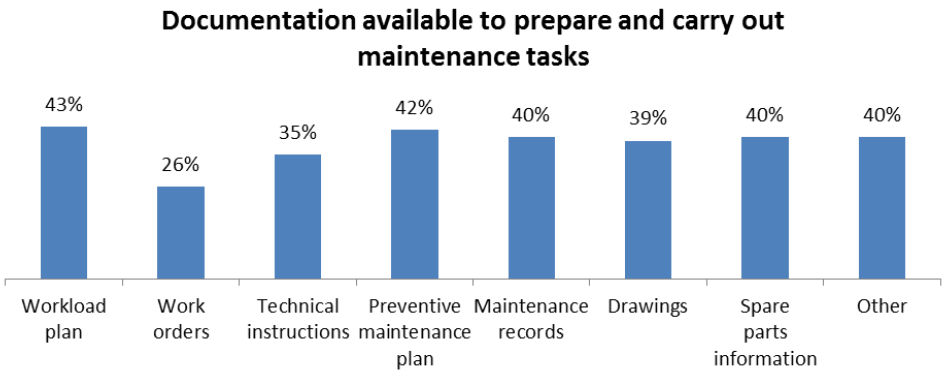
Most maintenance training is performed internally (often as part of Lean Manufacturing initiatives and other internal corporate programs). External training may bring new knowledge to the company and may also be better adapted to the needs of local staff (skills, culture), often not taken into account by global corporate programs. 11% of companies offered no training at all to their maintenance staff.



Chapter 4

Maintenance support tools

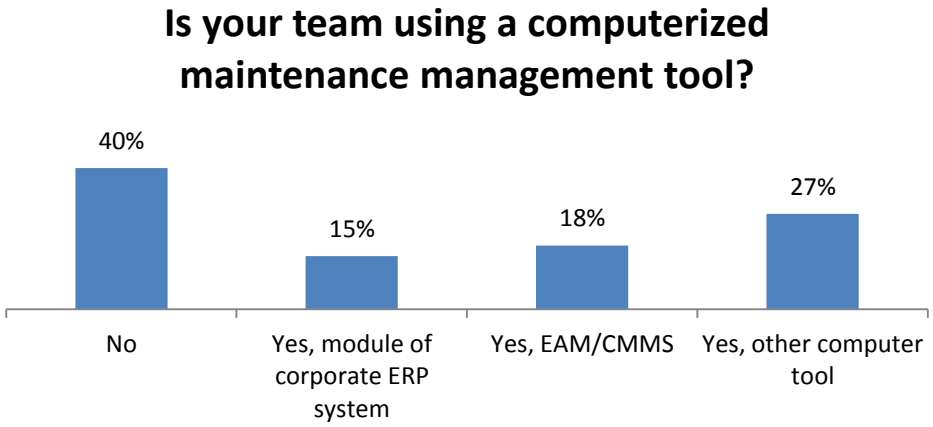
The survey shows generally low levels of documentation available for maintenance, with only around 40% of respondents having complete documentation, 60% having close to nothing.



Only 26% of companies surveyed use work orders.

Support system

40% of companies use no computer system for maintenance at all. 15% use a module of the ERP system and 18% a specialized CMMS/EAM system. The rate of CMMS/EAM penetration among Chinese companies is approximately half the rate among multinationals, at only 8%.



Many of the respondents using either their ERP or a CMMS/EAM to manage maintenance also declared not using work orders. This reflects the fact that most ERP projects are driven by finance or production and may not take maintenance needs into account, while CMMS/EAM systems are often deployed by corporate IT. 27% of respondents list various tools under "Others" including automation systems such as DCS/SCADA, but also Condition Monitoring Systems and Excel sheets, which may not be considered "management tools".

A good maintenance software tool is important for capitalizing experience based on historical records, allowing analysis to support improvement decisions and has also proven useful in China for introducing good working habits: the technological aspect is often well-appreciated by local teams.

Chapter

5

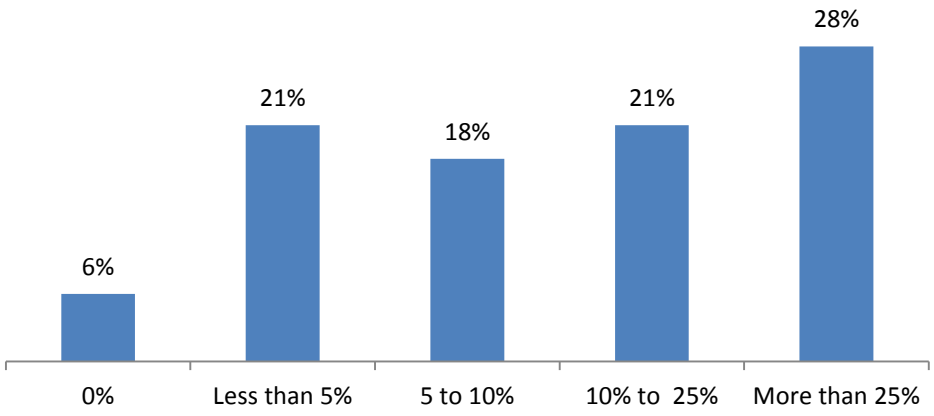
Subcontracting

Outsourcing is significantly more common than in previous years, with 28% of respondents subcontacting more than 25% of their maintenance.

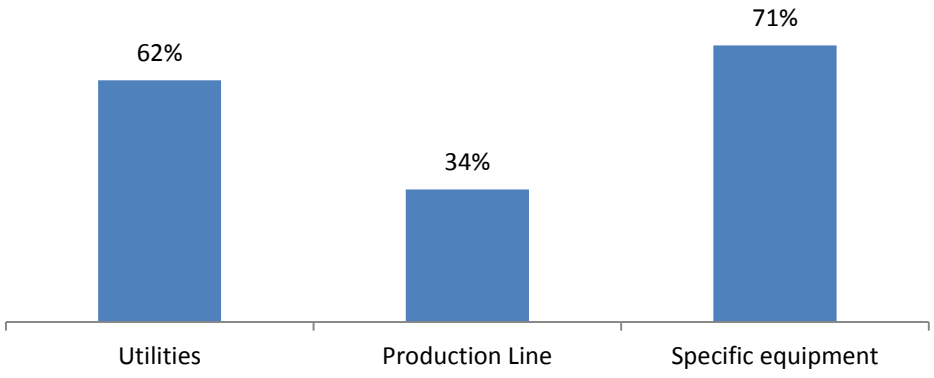
Subcontracting concerns specific equipment (71%), utilities (62%) and is much less common for core production lines (34%).

Chinese companies indicate they outsource on average 7% more than their multinational counterparts which is partly explained by outsourcing to related companies (specialized companies within the same group).

What is the percentage of subcontracted actions in your overall maintenance?



What type of maintenance do you subcontract?



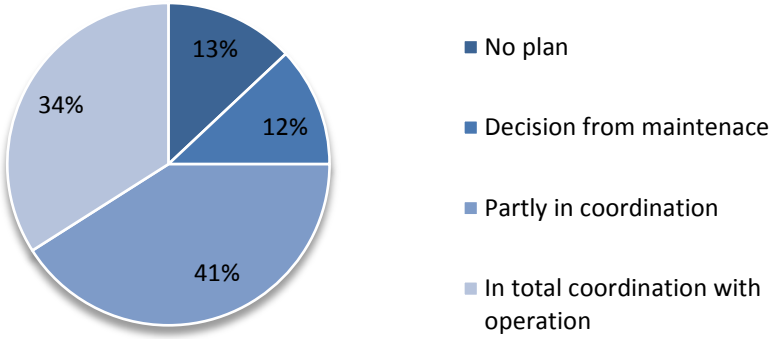
Chapter

6

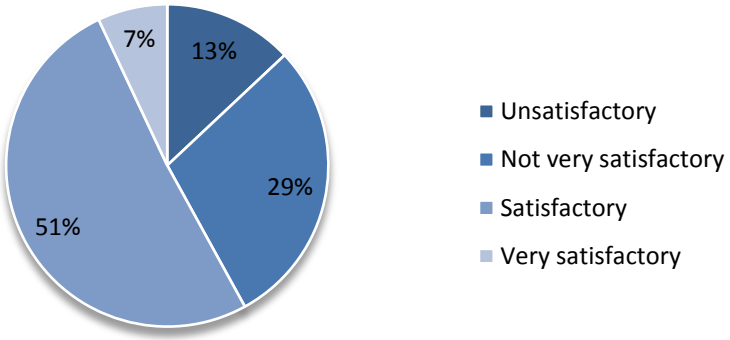
Relation between maintenance and production departments

While 75% of respondents coordinate preventive maintenance stops with production, 42% declare that the production department is not very satisfied with the result. We note that it is of course not uncommon anywhere in the world that production does not understand the need to stop for planned maintenance.

How do you plan operation/production stops for preventive maintenance?



What's the operation department's assessment for stoppages due to preventive maintenance?



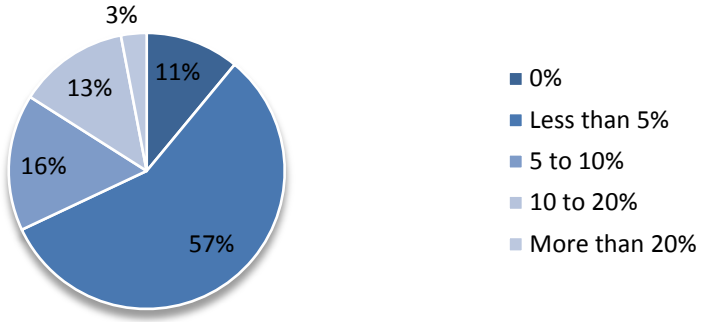
Chapter

7

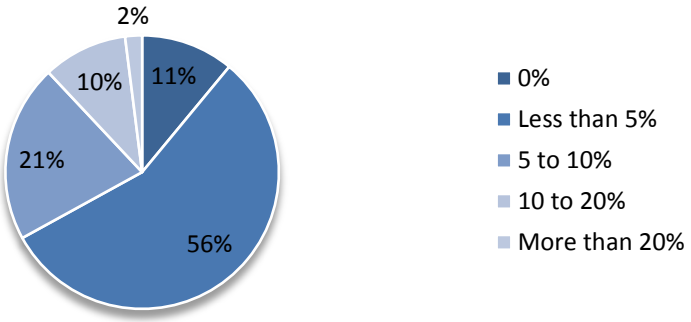
Equipment maintained, business impact and improvement potential

This section explores various indicators of the impact of breakdowns on the business, as well as the improvement potential.

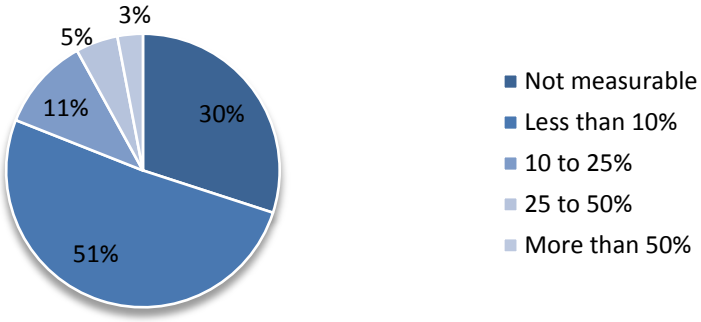
What percentage of your equipment is in a poor condition that could lead to disruptions?



What percentage of failures results in operation losses?

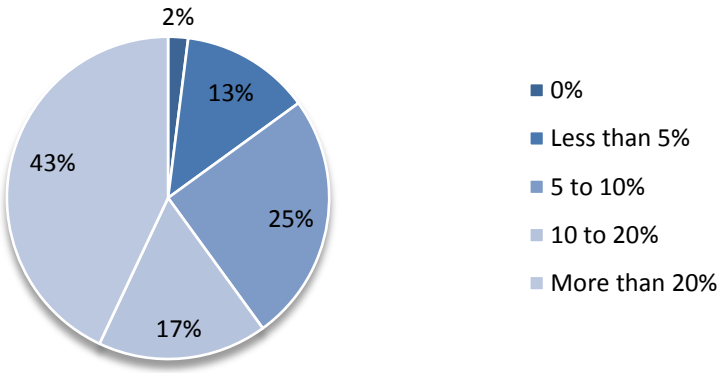


What's the percentage of operation/production losses due to breakdowns?

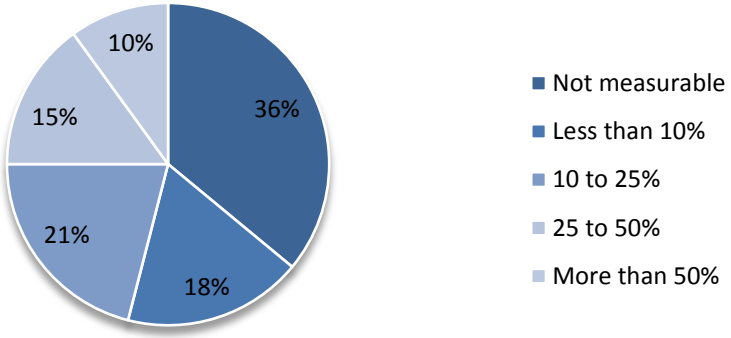


32% of the respondents have more than 5% of the equipment in poor condition that could result in disruptions, which is considered a very significant risk. 33% have more than 5% of failures resulting in operation losses, again showing a significant business impact of maintenance. 19% of respondents have more than 10% of the losses due to breakdown.

What percentage of breakdowns do you think could be prevented?



What productivity gain could you achieve by implementing a preventive maintenance program?



For close to 43% of respondents, 20% or more of failures could be prevented, showing the potential of improvement thanks to PM. 46% think large (over 10%) productivity gains could be achieved by implementing a preventive maintenance program.

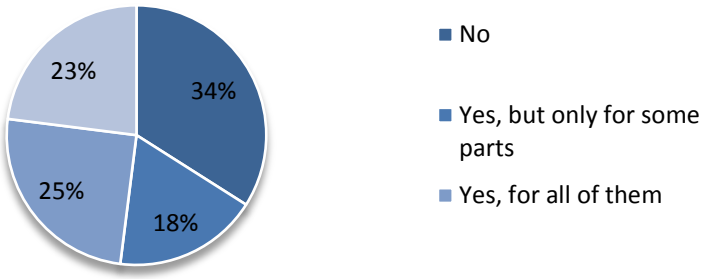
Chapter

8

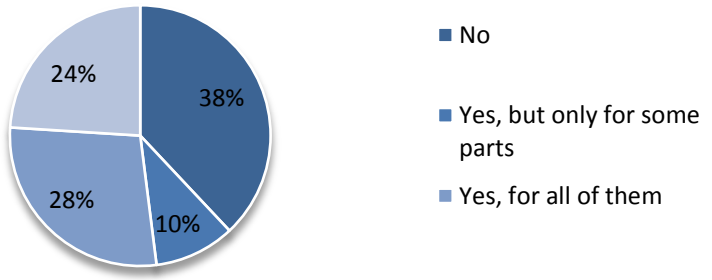
Spare parts

34% of respondents do not know the turnover rate of their parts and another 18% only know it for some parts i.e. 52% of surveyed companies do not know the turnover rate of even the most important spares. 38% of respondents have never optimized their spare parts stock and another 10% have only done it partially (not for the most important parts).

Do you know the turnover rate of your spare parts stock?



Have you already performed an optimization of your spare parts stock?

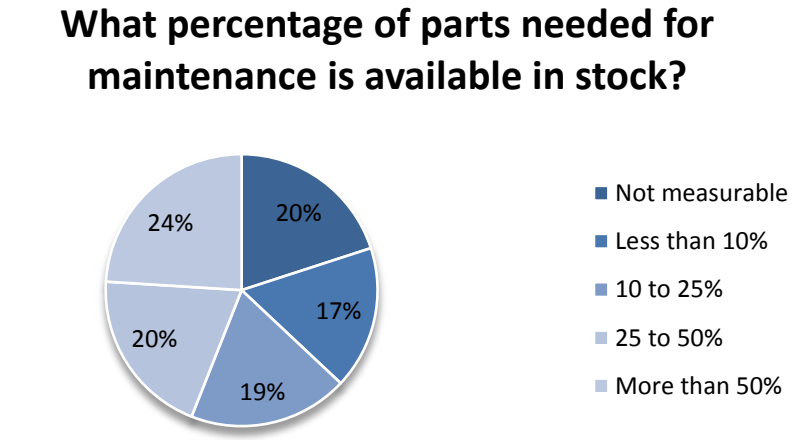


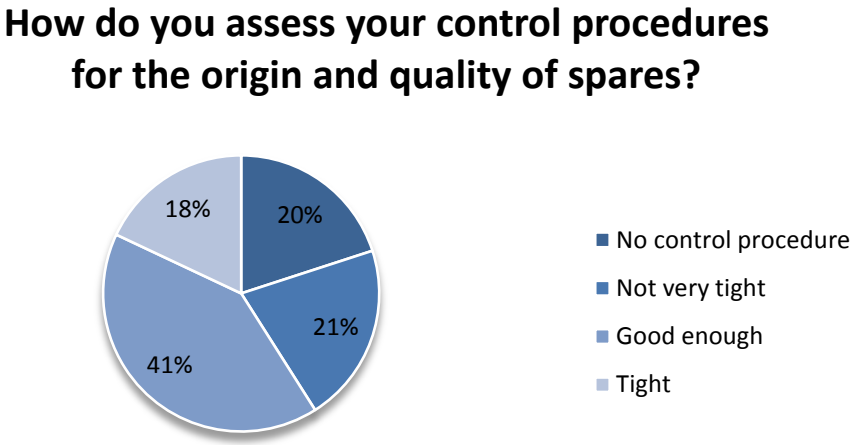
This admission is to put in perspective with the fact that most companies surveyed have already implemented an ERP system, of which stock management is a key functionality. In another section of this report, we see that 53% of respondents report using a system (ERP, CMMS or others) to manage maintenance.

Experience shows that most ERP systems are not used to manage spare parts; instead they focus on raw materials and products. Most audits conducted show wide discrepancies between stock data in the ERP or CMMS and the reality, a major pain for both financial and technical departments.

Answers to the two other spare-parts questions illustrate the pains: 20% of respondents do not know what percentage of parts needed for maintenance is available in stock. 41% have no or weak control procedures for the origin or

quality of spares. This lack of control may results in numerous operational problems.





Control of spare parts, their cost and purchasing, is often listed as the top concern when it comes to maintenance. As a consequence, companies focus on implementing a stock management system, on interfacing CMMS and ERP systems, on tightening control procedures at financial, purchasing and stock departments, which often brings more administrative workload for little practical results. Such initiatives often meet resistance in the organization. Our recommendation to improve the control of spares and related cost may be counterintuitive: start with building up an accurate asset database, with related parts (which parts belongs to which machine, the specifications of that part and who can supply it), then focus on reporting events (failures, preventive maintenance work) and part consumption (what part was used for each event). The resulting historical database will allow analysis, prioritizing parts and actions (focus on what has most operational impact) and help clean up the stock database, which will form a strong basis for improvement, after which costs can easily be controlled based on useful and accurate data.

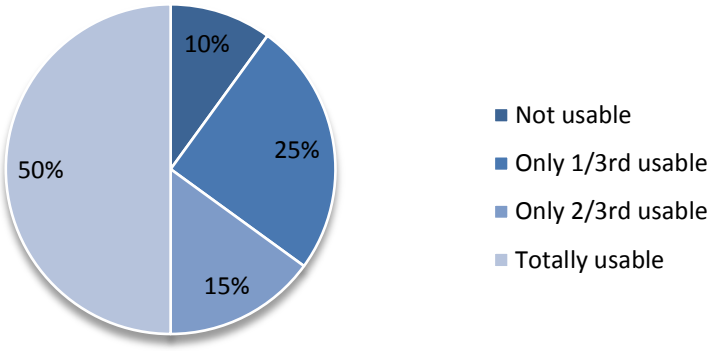
Chapter

9

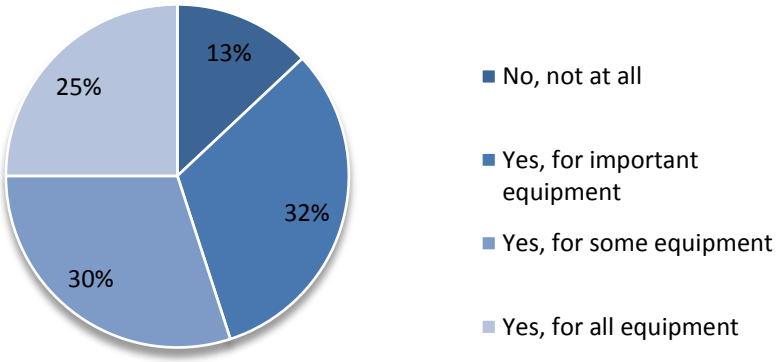
Decision support

The ability to analyze historical records is critical for managing maintenance. Over 50% of companies surveyed have all their maintenance records, while another 40% having at least partial records (we consider these numbers to be very high compared to our experience). The following charts show how companies use those records:

Are your maintenance history records usable?

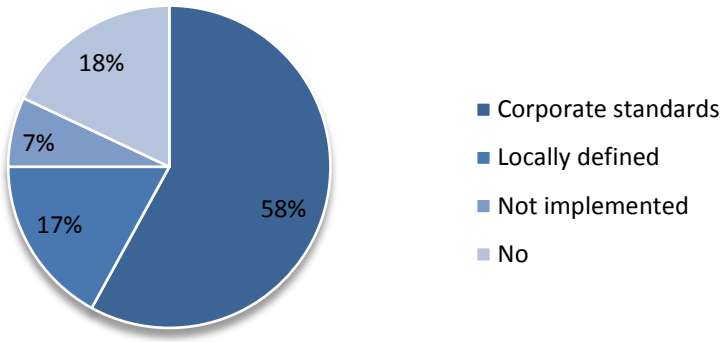


Do you know the failure rate of your equipment?



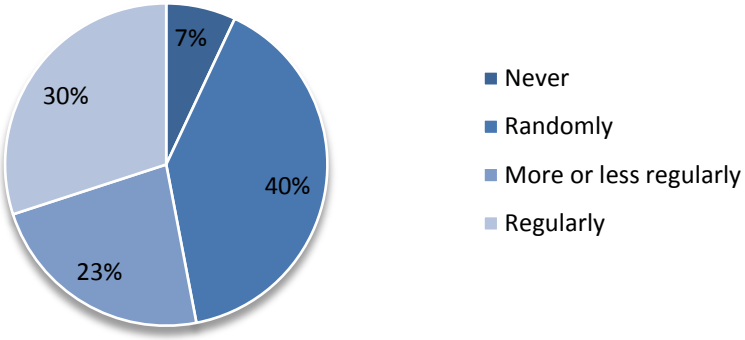
Almost half of the respondents do not know the failure rate of important equipment. Only 1/4th of companies know the failure rate for all their equipment, which would be needed for systematic analysis and improvement. However 32% know it for all important equipment, which is encouraging. Detailed audits show that even for companies that have implemented advanced EAM/CMMS, less than 12% of failures reported in the system contain useful fault-related information to help analyze history i.e. records may exist but are not structured in a usable manner.

Performance indicators for maintenance



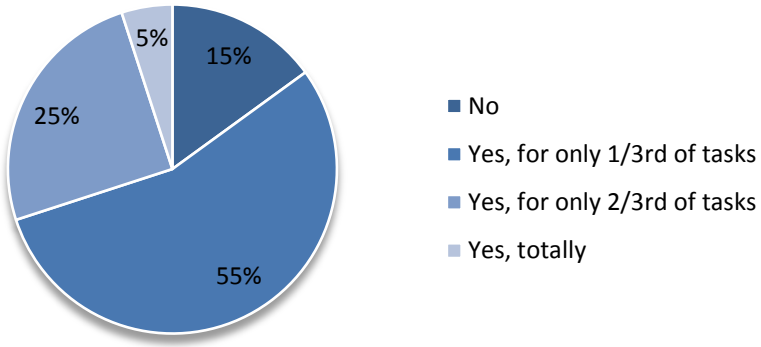
Performance indicators, either from corporate or locally defined, exist in 75% of companies.

Do you hold regular maintenance improvement meetings?



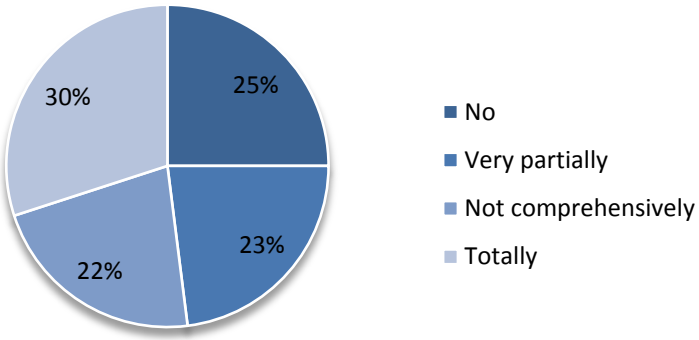
Only 30% of respondents however have regular meetings to review the reports, leaving doubts as to their actual utilization or accuracy.

Are you able to adjust maintenance tasks and frequencies over time?



Companies seldom adjust their maintenance plans and only 25% of so are able to compare different maintenance plans.

Are you able to compare the cost of various maintenance decisions?



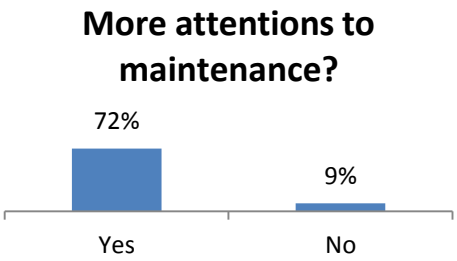
Chapter

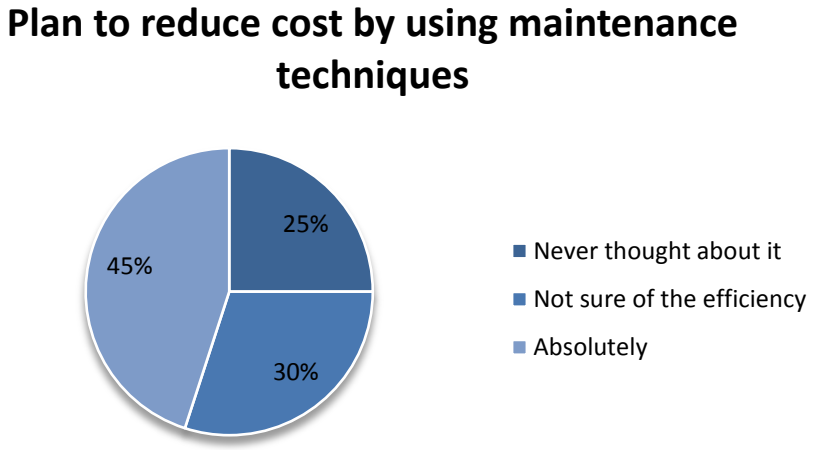
10

Maintenance improvement

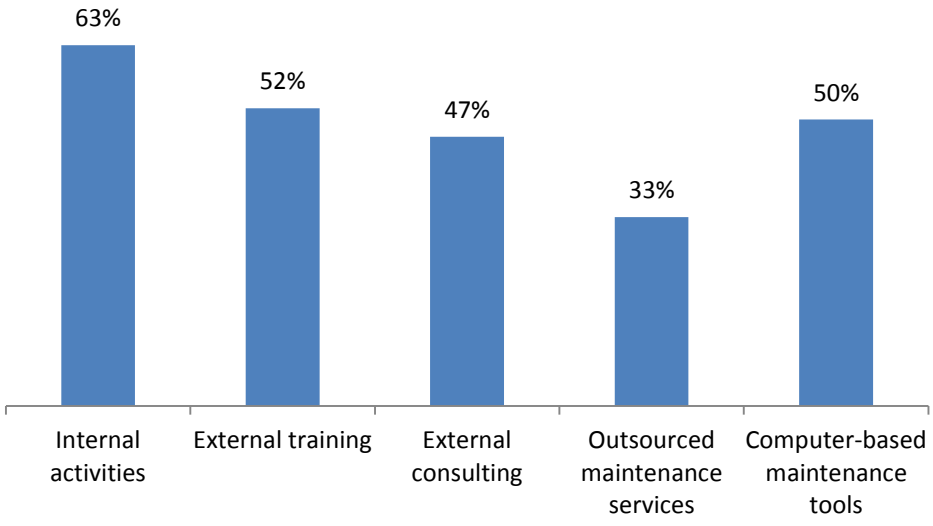
This section shows how respondents plan to improve maintenance.

First of all, 72% declare wanting to pay more attention to maintenance in the coming year. 45% of respondents plan to reduce cost though maintenance techniques, while another 30% is not sure about the efficiency of such an approach.



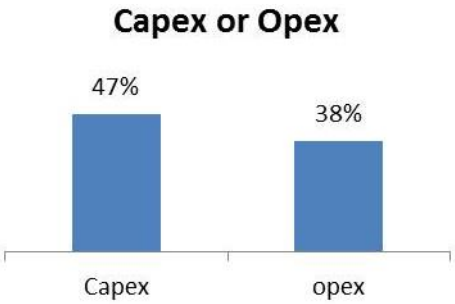


Companies listed various methods to improve maintenance:



Internal activities rank very high (63%) and are obviously necessary to support any external method. External methods include training for 52% of respondents, computerized tools for 50%, consulting for 47%, outsourced maintenance for 33%. These figures are all remarkable higher (10 percentage points on average) than in previous years.

47% of companies would privilege an investment (Capex) project to improve maintenance, 38% would prefer to use operational expenditures (Opex). This mostly reflect different companies strategies and internal approval processes.



Note on influence of company size, nationality and evolution over the years

Unless otherwise stated in this report, company size and nationality of origin (Chinese or multinational) do not have a significant impact on the results. Similarly, significant evolutions from previous years survey are listed in relevant sections of the report.

About Siveco China

Siveco is the largest maintenance consultancy in China. Based on a long experience of "maintenance with Chinese characteristics", Siveco has developed a unique approach to address the needs of plants, facilities and infrastructures owners in China through the utilization of technological tools.

MAINTENANCE | FACILITY MANAGEMENT | RISK PREVENTION

· Assessment (facilities and organization)
· Maintenance engineering
· Improvement projects
· CMMS (Computerized Maintenance Management Systems)
· Cloud computing (bluebee® cloud) and mobile solutions (bluebee®)

Siveco has more than 700 customer sites in China, including ABB, Alstom, Arkema, Brose, Carrefour China, Changcheng Property Group, CNEEC, Fushun Mining Group, Shanghai World Expo 2010 pavilions, GDF Suez, Greenland Holdings, IKEA, International Paper, Nokia, Saint-Gobain, Sichuan Lutianhua, Sogefi, ZF, etc.

Siveco China is headquartered in Shanghai, where it also operates a R&D center, and has a branch office in Chengdu. The company is a subsidiary of Siveco Group, Europe's largest CMMS supplier with over 82,000 users worldwide.

Siveco China publishes the monthly "Maintenance in China" newsletter, available online at:
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