Rex Features

Lessons learned on plant ops

The recent sharp downturn has led many companies to reappraise the way they operate and maintain their facilities, a recent ICIS/Lloyd's Register survey reveals

THE ICIS/LLOYD'S REGISTER SURVEY

THE SURVEY, sent out in December 2010, attracted almost 800 replies, with those taking part evenly spread geographically – 28% in Europe, 24% in North America and 23% in Asia, with the balance in the Middle East (9%) and Latin America (7%).

In terms of industry sector, 31% were in specialty chemicals, 30% in polymers and 26% in petrochemicals, with a further 31% spread across agrochemicals/fine chemicals and pharmaceuticals. Various company sizes were well represented, with 46% of respondents working for companies turning over less than $500m, and 17% working for major concerns with sales of more than $5bn. Most respondents were managers in operations or production departments but 16% were CEO level and 12% board level. ■

JOHN BAKER LONDON

The slump in demand for chemicals experienced in the final months of 2008 and early 2009 was unprecedented, not only in its severity but also for the speed with which chemical producers reacted to curb production output.

It has been notable, too, for the speed of recovery, with Asian markets driving global demand and high oil prices supporting chemical sales value. By the end of 2009, many companies were more or less back on track and 2010 heralded record earnings in many sectors.

The reaction of the chemical companies to sharply reduced demand was to close or idle many production units, to reduce operating rates and/or to produce on a campaign basis.

Short working times were implemented in countries where labor agreements made this possible and, to control cash flows, companies pushed back plant maintenance and capital spending. In many instances the lessons learned in this dramatic period have stuck and companies have changed, or are in the process of reviewing, many of the ways they run and manage plants and production.

An increased use of more sophisticated maintenance schedules and scheduling systems is a likely result of the accelerated learning through 2009. How far, though, have companies recovered from the downturn and what aspects of the operations are they changing?

ICIS, in association with Lloyd's Register, recently polled *ICIS Chemical Business* readers to establish the situation in the industry at the start of 2011. Nearly 800 readers (see panel for breakdown) filled in a detailed questionnaire, designed to assess the stage of recovery and the priorities for companies going forward in the area of plant operation and maintenance.

RESPONSES TO THE DOWNTURN

The top-line findings are revealing. More than 40% of respondents reported their companies cut production levels by at least 10% in 2009, while 28% saw production fall by more than 16%. This proportion rose to more than 40% for companies in the US, which evidently felt themselves hardest hit.

However, and somewhat surprisingly given the decreases indicted by production data for the period, 29% of overall respondents said they had seen no impact on production in 2009. This figure was closer to 15% in hard-hit Europe and North America but the Middle East and Asian producers evidently fared much better as demand in Asia held up.

In responding to the downturn, more than half of companies chose mainly to run plants at reduced operating rates but a full quarter elected to run plants fully, but only when product was needed. This "digital" on-off running is, perhaps, a significant new learning

from the downturn, brought about by the severity of the demand slump. Some 12% of respondents admitted closing plants permanently to balance supply and demand.

When it comes to plant maintenance, the slowdown prompted a mixed reaction. Some companies (18%) brought forward scheduled maintenance to take advantage of plant idling, while some delayed maintenance to conserve cash flow (12%). However, the majority of companies (39%) reacted on a case-by-case basis with a mix of these tactics.

Good news revealed in the survey is that the majority of companies (51%) have already seen volumes recover to pre-recession levels and a further 29% expect to reach this point this year or next. However, there are evidently still areas of significant problems as 18% of respondents could not see recovery taking place until 2013 or beyond.

"The speed of the recovery in demand in some sectors caught producers on the hop – helping to push up prices"

The speed of the recovery in demand in some sectors caught producers on the hop – helping to push up prices as supply reacted slowly to increased demand.

Some 35% of companies in the ICIS/LR survey reported they had issues in this respect, either experiencing technical difficulties restarting plants (13%) or finding it took them longer to restart than they would have liked (22%), given the demand in the marketplace.

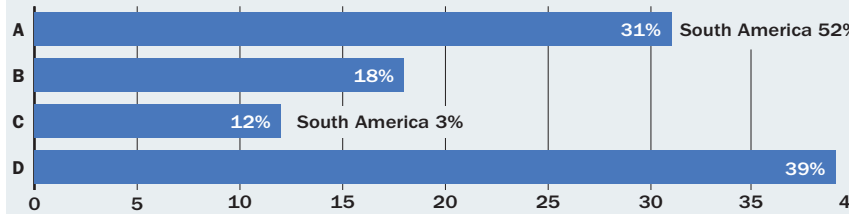
Through 2009 and 2010, European and North American producers have seen volumes supported significantly in some product areas by exports to Asia, China especially, where GDP growth has hardly been impacted.

Two-thirds of respondents agree producers in these developed regions are destined to see lower operating rates in the future and will have to find ways to make a margin at lower capacity utilization. More than 80% also agreed that in future, producers in Europe and North America would have to learn to run their assets in more flexible ways than before and adopt the role of swing producer in global markets.

This is reflected immediately in the fact more than half of those answering the survey said they would be making permanent changes to the way their company approached plant inspection and maintenance. This figure rose to 76% of Middle East-based companies, presumably because these large petrochemical plants did not have so much pressure on them before the slump due to their advantaged feedstock economics.

ADJUSTMENT OF MAINTENANCE SCHEDULES

Which of the following best describes how your organization adjusted its plant maintenance schedules to reflect the production situation during 2009?

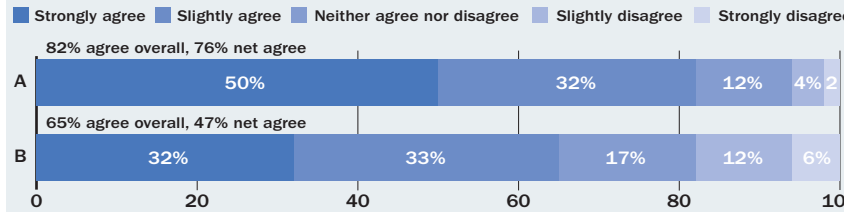


A No schedule alteration B Yes – by bringing forward scheduled maintenance on idled plants C Yes – by delaying maintenance to conserve cash outflow D Yes – by using a mixture on a case-by-case basis

SOURCE: ICIS

AGREEMENT WITH STATEMENT ON ASSET FLEXIBILITY AND OPERATING RATES

How strongly do you agree or disagree with the following statements?



A Producers in Europe and North America will have to learn to run their assets in a more flexible manner than before, adopting the role of swing producer in global markets

B Producers in Europe and North America are destined to see lower operating rates going forward than they have seen in the past and will have to find ways to make a margin even at these lower capacity utilisation rates

SOURCE: ICIS

EXPECTED CHANGES TO PLANT INSPECTION AND MAINTENANCE AS A RESULT OF THE DOWNTURN

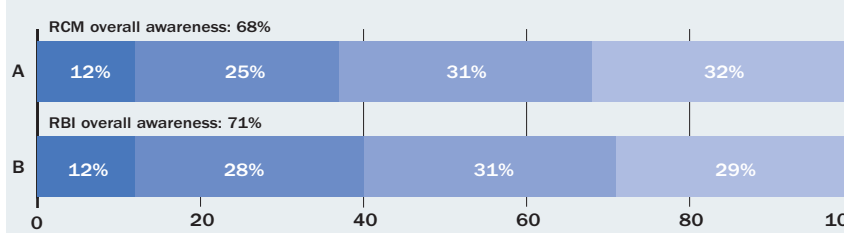
Which of the following changes your organization will make?

A We will review and implement a new strategy on asset maintenance B Decisions on asset inspection and maintenance will be raised to a higher level of management control C We will implement or increase use of reliability-centered maintenance D We will implement or increase use of a risk-based inspection approach E We will increase the level of spend on asset maintenance F We will decrease the level of spend on asset maintenance

SOURCE: ICIS

AWARENESS OF RBI AND RCM

How aware are you of risk-base inspection (RBI) and reliability-centerd maintenance (RCM)?



A RCM B RBI

SOURCE: ICIS

SPOTLIGHT ON ASSET MANAGEMENT

The questionnaire asked some probing questions on issues of maintenance practice and the impact of the downturn. Nearly half of those making permanent changes in maintenance practices said they would be reviewing and implementing a new strategy on asset maintenance. Close to a third of them said they would be raising decision-making on asset inspection and maintenance to a higher management level.

Many respondents also revealed they would take a closer look at using, or increasing the use of, reliability-centered maintenance (RCM) and a risk-based inspection (RBI) approach. However, the survey showed a significant proportion of companies feel they do not have the necessary skills and expertise in-house to devise and implement these more sophisticated inspection and maintenance programs.

Outsourcing then becomes an issue. This is relatively little used at present – only 37% of respondents admitted to using third-party contractors to manage maintenance.

This falls to 25% in North America but there seems little move at the moment to bring in the required expertise.

Only 18% of respondents said they would increase the use of third-party specialists and an almost equal percentage said they would look to bring maintenance operations in-house, with this percentage reaching 29% in Asia.

The balance of companies – a significant two-thirds – indicated they would continue with their current level of outsourcing in this area.

In terms of awareness and use of RCM and RBI approaches to maintenance, awareness is reasonably high – about 70% – but implementation is much lower in the chemical sector.

Nearly two-thirds of companies are not using RCM and 59% are not using RBI. Of the companies using these techniques, the majority are using in-house expertise but a significant proportion are employing third parties to help them, especially for RBI.

Ironically, given that companies are looking to reduce costs even further as a result of the sharp downturn, more than half of respondents agreed with the statement that RBI and RCN would directly contribute to reducing maintenance expenditures.

Thus, it appears producers have some way to go in this respect. The good news, however, is that savings are there for the taking in many companies. ■

For more information on the survey and what LLoyd's Register offers in the process industries, go to **www.lr.org/icis**

MAINTENANCE **WIJNAND MOONEN** LLOYD'S REGISTER DOWNSTREAM MARKET SECTOR LEADER

TURNING ASSET MANAGEMENT INTO A STRATEGIC CAPABILITY

If the research carried out by ICIS and Lloyd's Register shows us anything, it is that most of us expect the chemical sector to remain in turmoil for at least the first half of this decade. Many analyses I have seen point out that, on a global scale, there will be continuing overcapacity for most basic and intermediate chemicals until at least 2015. And it is only because we have hardly any sight of new greenfield and expansion projects beyond that year that demand seems to exceed production capacity after 2015.

We are dealing with an imbalance between supply and demand, not only over time but also geographically, between different regions in the world. Most of the capacity being built is in the Middle East and Asia. As this comes on stream between now and 2015, there will be significant pressure to keep new plants running at full load.

On the one hand, there is the need to recover the huge investments in these complexes but, on the other hand, there is the opportunity to create significant cost advantages from their scale, modern technology and direct access to cheap feedstocks (Middle East) or growing consumer markets (Asia).

In this setting, what role can the older, "smaller" plants spread around the world play? From the ICIS/Lloyd's Register survey, it seems more than 80% of respondents agree these plants will increasingly need to take up the role of "swing producers," quickly ramping up production to take advantage of periods of high demand but also able to survive when running at (very) low utilization rates during times of falling demand.

Moonen – winners and losers

Additionally, there will be an advantage for those operators that have the ability quickly to change the (mix of) products they supply, to maximize on shifting demand. Similarly, the ability to take advantage when cheaper feedstock – most likely of varying composition and quality – becomes available on the market, can provide significant opportunities to increase margins.

It is becoming increasingly clear the future winners will be those that combine a high level of flexibility with high efficiency.

Operating a plant in such a flexible way will put much more strain on all the equipment and, if proper measures are not taken, operators might find levels of integrity, reliability and maintenance cost deteriorate significantly. Therefore the management of the production assets and their associated risks has become a key to success. The outcomes of the ICIS/Lloyd's Register survey show more than half of the respondents support this notion.

It is here where the importance of risk-based approaches, notably RBI (risk-based inspections) and RCM (reliability-centered maintenance) come into play. The traditional ways in which "fixed" inspection and maintenance intervals are determined – and often mandated by regulators – rely on past experience and knowledge of degradation mechanisms, combined with a high degree of conservatism, in a stable environment.

Clearly, this does not meet the combined need for flexibility and efficiency. However, even when risk-based approaches are being applied, in most cases this is done as a one-off exercise, based on the degradation known to occur under stable process conditions for a constant combination of material (from which the equipment is made) and medium. If the feedstock quality as well as process conditions vary a lot – the latter may be the result of, for example, start-stop type operations – we cannot rely on these traditional approaches to properly assess risk. Risk might be underestimated, causing reduced integrity and reliability levels, or equally it might be overestimated and therefore unnecessarily increase the effort and money that is spent on maintenance and inspections.

What is needed are risk-based methodologies capable of continuously reassessing the risk levels and readjusting the maintenance and inspection intervals, by directly taking in the key process data and processing this on an almost real-time basis.

The challenge is in who will be ahead in adapting to this and turning the management of their production assets into a strategic capability. ■