



PROTECTIVE COATINGS

**in the Oil & Gas,
Power Generation and
Infrastructure Industries**

Based on a web survey among key
decision makers from all over the world.

HEMPEL



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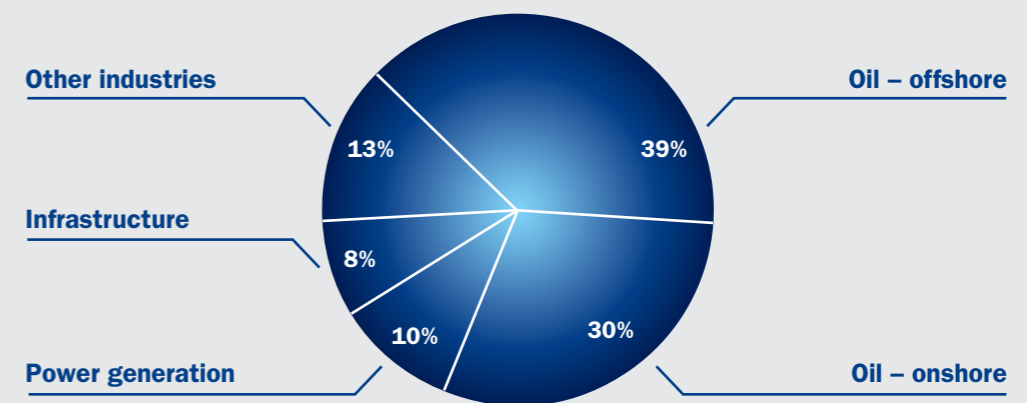


Summary

Protective coatings play a key role when it comes to corrosion protection. Their ability to protect effectively against corrosion over a number of years depends on a long line of technical parameters including fundamental corrosion protection through galvanic, barrier or inhibition effects, as well as good adhesion properties, mechanical strength and resistance against cracking.

In June and July 2014 Hempel conducted a web survey among key decision makers from all over the world. The survey was sent to a total of 200 respondents from the oil & gas industry, power generation and infrastructure industries. The purpose of the survey was to hear expert opinions on a wide selection of factors affecting the performance of anti-corrosion coatings.

Figure 1: The majority of respondents are in the oil industry



Method

Sixteen multiple-choice questions gave respondents the opportunity to rate questions on a scale of one to ten. For the purpose of the report, this scale was reduced to five degrees of importance, satisfaction and frequency, depending on the content of the question. All results are shown as a percentage of respondents per rating in the report.

In addition to multiple-choice questions, respondents were given the opportunity to comment on each question and to contribute with general comments at the end of the questionnaire.

The intention of this report is to reveal tendencies as a basis for discussion and dialogue.

Questions

The questions ranged from application environments and methods of application through factors influencing specification and purchasing criteria, economics and functionality, to choice of supplier and technical criteria. The results showed a marked need for new thinking:

Performance

Core anti-corrosion performance is key. However, the survey also indicates that other aspects of protection are important such as temperature and chemical resistance, damage resistant topcoats, abrasion and erosion resistance, and passive fire protection. On top of that long service life is important.

Now is the time for manufacturers to bring new technology to market that can fulfil all the expectations of their customers while preserving and enhancing the level of support and advice.

Productivity

Higher productivity is an important concern. The survey indicates that technical innovation is in demand in terms of easier application, shorter application time, higher surface tolerance of coatings, reduced number of coats as well as faster curing and drying.

Ongoing support

The good supplier is a trusted advisor who should provide technical advice and guidance before, during and after application. The market is looking for knowledge sharing and needs reliable data and documentation from manufacturers.

Innovation

The frequency of technical issues such as low corrosion resistance, slow drying and mechanical weaknesses experienced by a third of the respondents means that there is still plenty of room for improvement. 85% of respondents believe that it is critical, very important or important for suppliers to bring innovation to market.

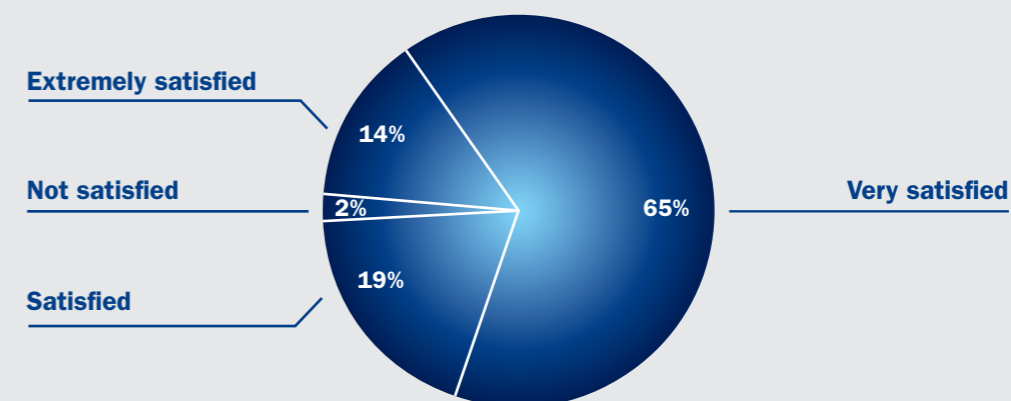
General high level of satisfaction with anti-corrosion coatings

The overall impression of satisfaction with anti-corrosion coatings is that most respondents are generally satisfied with the options they have.

The chart shows an extremely satisfied marginal of 14% and a majority that is either very satisfied or satisfied (84%). Together, these account for 98% of respondents.

Despite an apparent high level of satisfaction, however, the results of the survey point to a number of issues experienced by a significant number of respondents that fell short of their expectations. The following sections show a clear need for the anti-corrosion coatings industry to challenge conventional thinking in order to satisfy the expectations of customers in the oil, power generation and infrastructure industries.

Figure 2: Overall satisfaction with anti-corrosion coatings

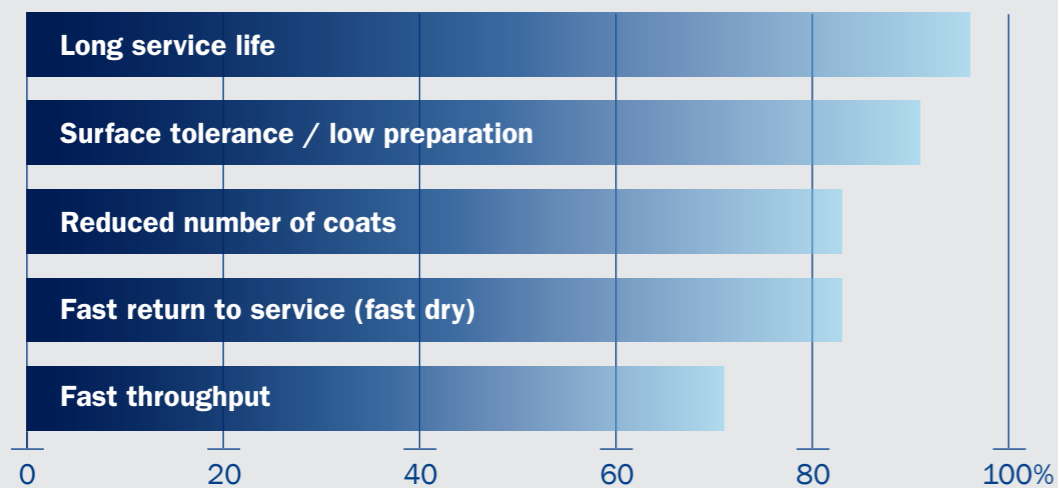


Performance is key

Low maintenance requirement and minimal repairs mean lower lifetime cost for an asset owner. The choice of corrosion control system is a critical factor when it comes to maintenance and repairs, and a long service life. 96% of respondents see a long service life as critical, very important or important.

Repair work made necessary because of under-performance of the coating system can be a very costly affair. Premature maintenance needs are experienced very often, fairly often or often by 45% of the respondents. 21% of respondents consider premature maintenance needs to be an important innovation goal.

Figure 3: Importance of economic factors when choosing an anti-corrosion coating



Performance in terms of a long service life and a minimum of premature maintenance needs is top priority. At the same time, the importance of other factors that enable higher application productivity is also rated highly.

Corrosion control is critical

Almost all respondents (98%) see corrosion control as a critical, very important or important purchasing criterion.

86% of those rating corrosion control as important also consider certified anti-corrosion performance to be a critical, very important or important coating choice parameter.

Performance is not up to scratch

Corrosion control is not the only thing that rates high among respondents. Temperature resistance was rated as critical, very important or important by 87% while 85% rated chemical resistance and robust topcoats the same.

However, as many as one third of those who found both corrosion control and certified anti-corrosion performance critical, very important or important experience low corrosion resistance very often, fairly often or often. This finding, together with the fact that only 14% of respondents are extremely satisfied with current anti-corrosion solutions, indicates a need for innovation within the area, despite general satisfaction with corrosion control.

Figure 4: Importance of technical criteria when choosing an anti-corrosion coating



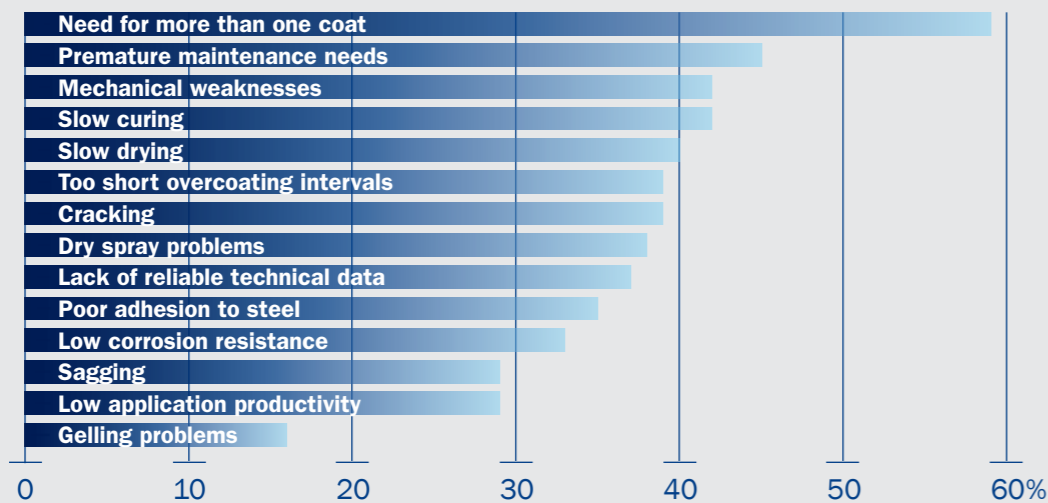
Despite the strong rankings of the above performance criteria, a significant number of respondents experience lower than expected performance for a variety of reasons.

A majority of 59% of respondents often experience the need for more than one topcoat. 45% are often faced by the need for premature maintenance, while 42% experience mechanical weakness and 39% cracking.

It would appear that a high number of respondents are experiencing multiple technical performance issues leading to premature maintenance needs.

Two technical application issues that often affect productivity are slow curing (42%) and slow drying (40%).

Figure 5: Frequency of technical issues with anti-corrosion coatings



There is a need for new technology that can reduce corrosion and the underlying causes such as poor anti-corrosive protection, mechanical weaknesses and cracking, low chemical and temperature resistance, and poor adhesion to steel.

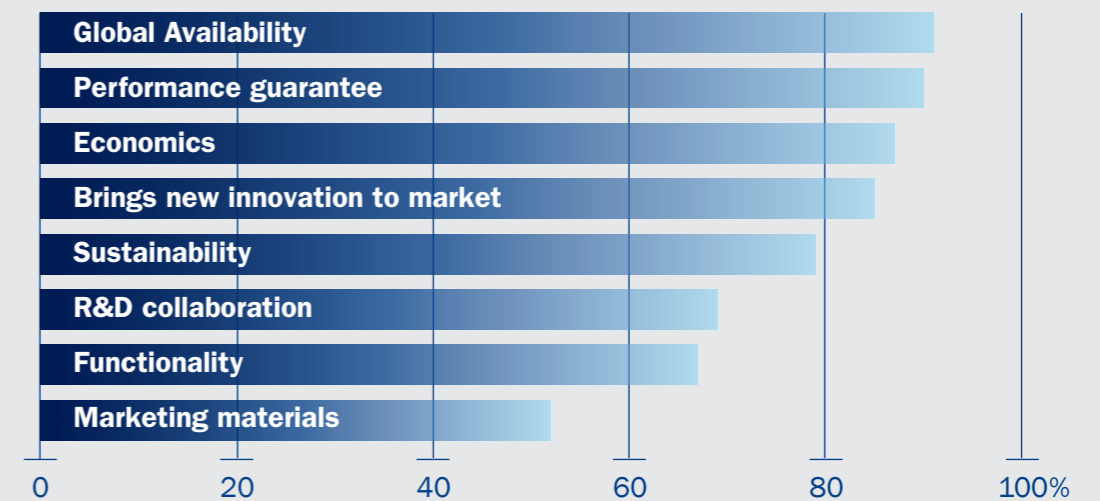
Supplier performance

Technical factors are not the only criteria that matter to the respondents of the survey. Different criteria for the choice of supplier also play a significant role.

Economics plays a major role in the choice of supplier for 87%. 85% look for a supplier who brings innovation to the market, and 79% seek sustainability. R&D collaboration with the supplier motivates 69% while the functionality of the coatings is important for 67%.

Global availability is a significant factor affecting the decision to buy from a given supplier for 91% of respondents. A performance guarantee is also an important criterion for the same number of respondents.

Figure 6: Important criteria when choosing an anti-corrosion coating supplier

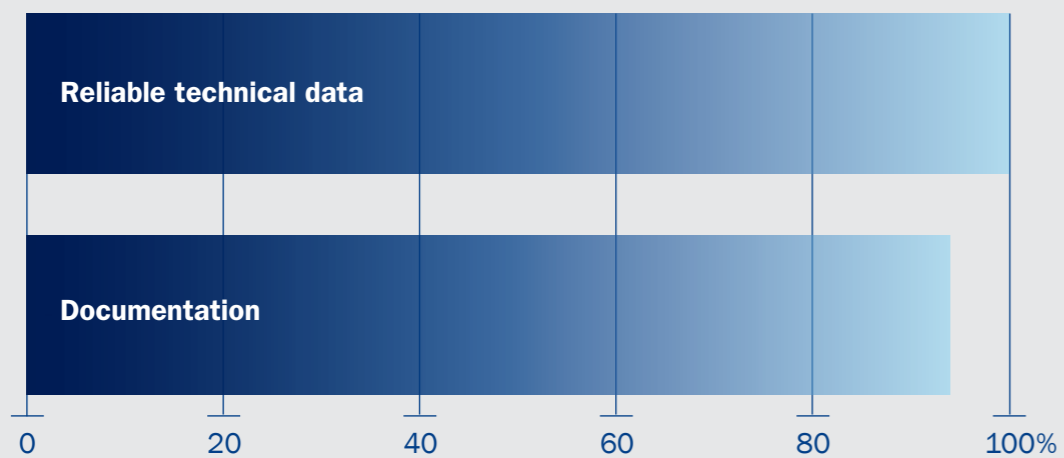


Technical data and documentation

All respondents rate reliable technical data as critical, very important or important.

Documentation is considered important by 94% of respondents.

Figure 7: Importance of technical data when choosing an anti-corrosion coating supplier

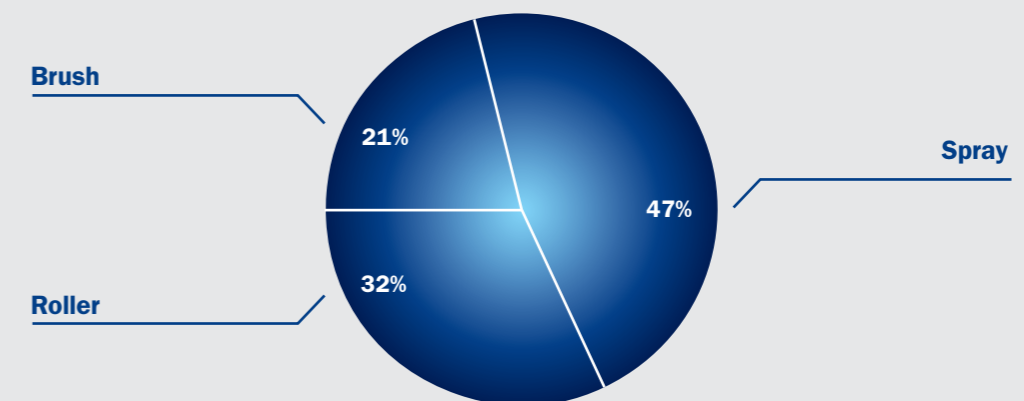


Productivity expectations demand technical innovation

As indicated earlier, surface tolerance, reduced number of coats and fast return to service rank high and indicate a wish for coatings that demand less of the application process. These application-related criteria rank as high as or almost as high as corrosion control and suggest that a combination of less demanding application along with high performance is key.

Application methods are fairly evenly distributed across arctic, temperate and tropical application environments. There is a general preference for spraying (47%) ahead of roller (32%) and brush (21%).

Figure 8: Usual method of application of anti-corrosion coatings



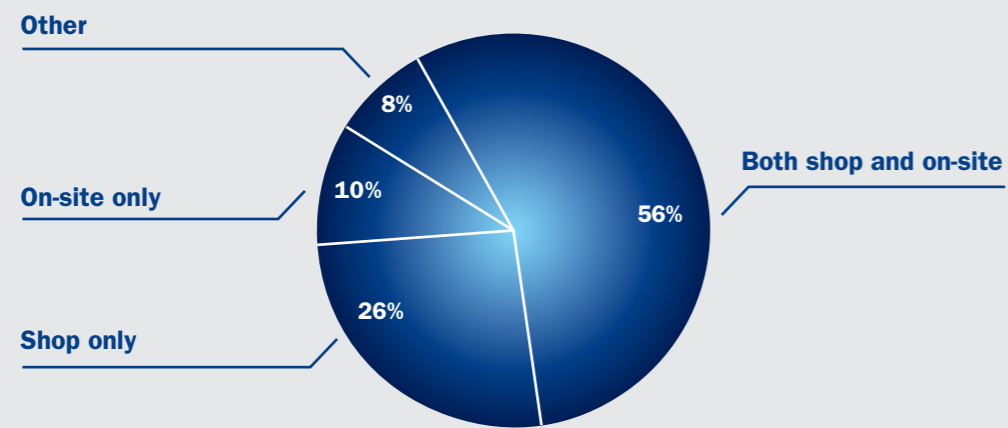
There is a marked preference for application in-shop rather than on-site. The vast majority, however, apply coatings in both types of location.

Ease of application is rated as critical, very important or important by 98% of respondents, indicating its importance in all application environments and locations. 29%, however, often experience low application productivity.

Application productivity is affected by factors such as the need for more than one coat, slow drying, slow curing, cracking and dry spray problems.

91% consider surface tolerance to be critical, very important or important; while 83% rate reduced number of coats and fast return to service the same. Fast throughput is rated as critical, very important or important by only 71%, however.

Figure 9: Primary application sites



Surface preparation

91% point to time savings offered by coatings with high surface tolerance, i.e. requiring only low surface preparation.

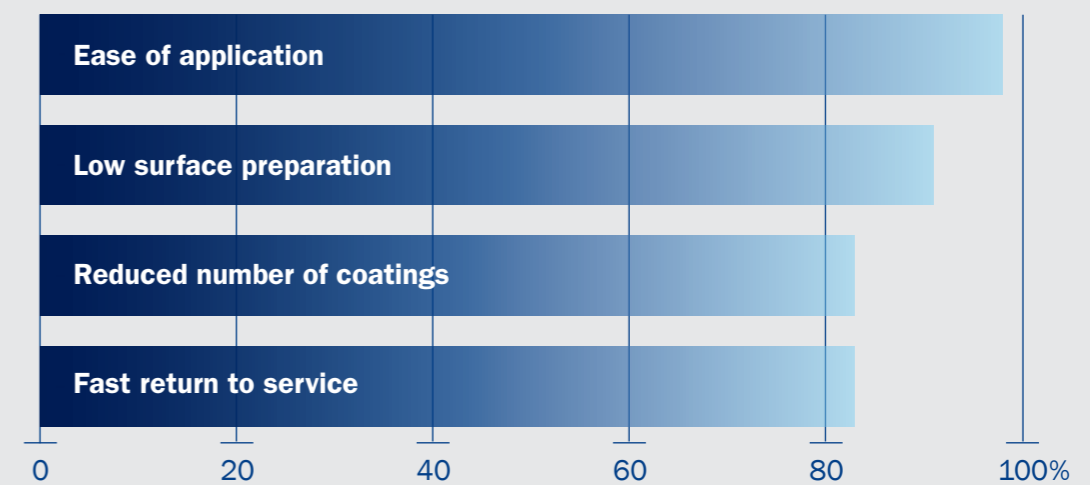
Fewer coats

Coating application also takes time. The fewer coats needed the better in terms of time.

A reduced number of coatings is rated as critical, very important or important economic parameter by 83% of the respondents.

44% of the respondents report that the need for more than one coating occurs often or fairly often. 15% experience it very often.

Figure 10: Important factors when choosing an anti-corrosion coating



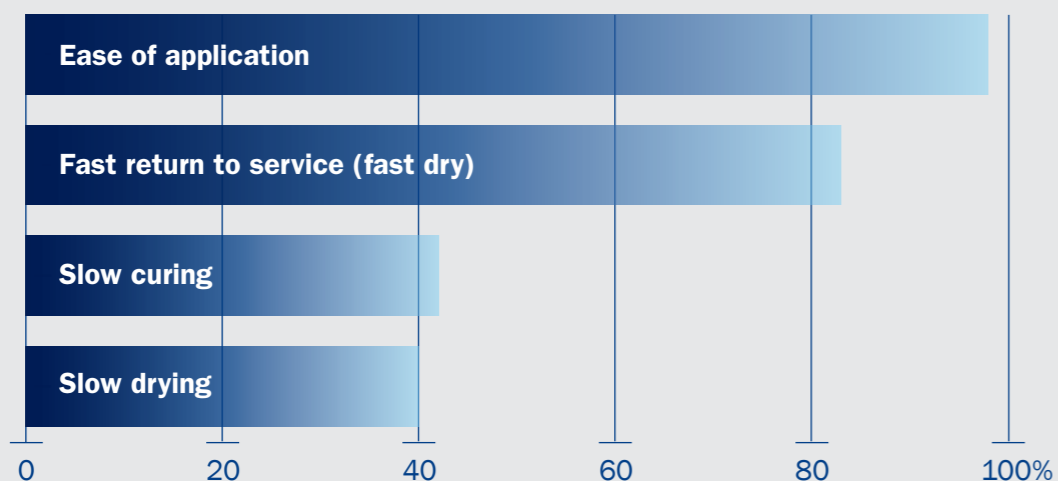
Longer drying time

Longer drying time affects productivity in terms of fast return to service, which is rated as critical, very important or important by 83% of respondents. Nevertheless, 42% experience slow curing very often, fairly often or often, while 40% give the same rating to slow drying.

Ease of application

These technical parameters combined with the actual application process all contribute to ease of application, which is rated as critical, very important or important as a coating choice parameter by 98% of respondents.

Figure 11: Frequency of technical issues affecting productivity



There is a general need for coatings that require shorter application time and that are capable of ensuring a long service life without premature maintenance or additional coats.

A trusted advisor is a key asset

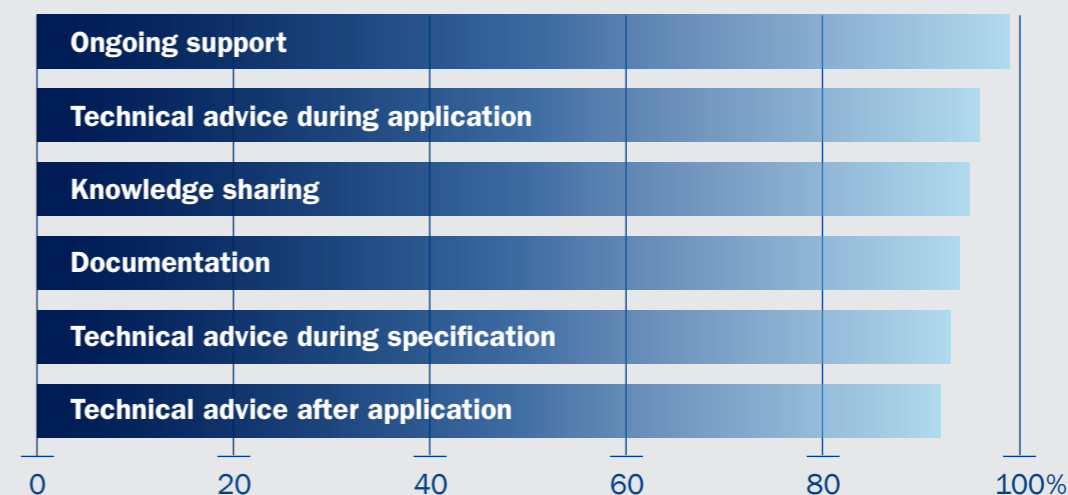
There is a marked reliance on the part of the respondents for advice and support followed by technical data.

All respondents consider the reliability of data provided by manufacturers as critical, very important or important. 99% of respondents rate ongoing support from the coating supplier the same.

More than 90% state that their choice of coating supplier depends on the supplier's ability to provide technical support throughout the specification and application processes.

Knowledge sharing is high on the list, indicating a wish for a two-way exchange on an ongoing basis and not just when choosing and applying a coating.

Figure 12: Important support factors when choosing an anti-corrosion coating supplier



Ongoing support and technical advice together with knowledge sharing from the coating manufacturer are essential factors in realising the performance standards expected by the asset owner.

The need for innovation

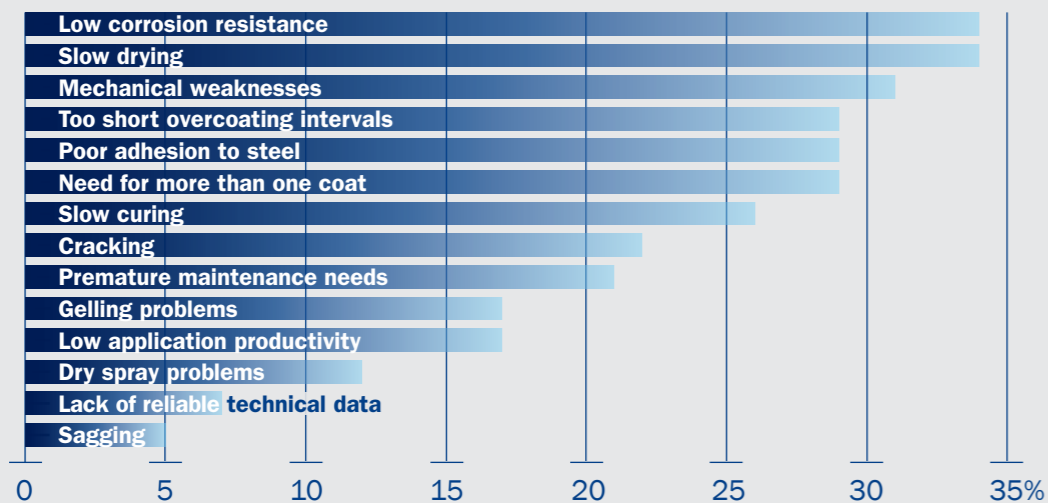
85% agree that innovation in general terms is desirable, despite the findings of general satisfaction at the beginning of this report.

When it comes to the most urgent areas of innovation, there is a wide field of interest spanning from factors such as low corrosion resistance and slow drying to gelling problems.

34% of respondents rate low corrosion resistance and slow drying as the most urgent areas for technical innovation.

Next on the list are mechanical weaknesses, too short overcoating intervals, poor adhesion to steel and the need for more than one coat.

Figure 13: Frequency of technical issues with anti-corrosion coatings



There is a profound demand for a new look at anti-corrosion technology, one that takes a holistic view across all application methods, locations and environments, and that addresses all of the important technical factors involved.





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