

WHO PAYS WHEN THE PAINT FAILS

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Premature coating failures are usually quite expensive and the cost of rectifying them is often more than the original application cost.

Past experience indicates that in most cases it is the facility owner who ends up carrying the bulk of the cost of the failure. To a lesser extent the coating applicator bears either a proportion of the direct cost or a cost in terms of loss of reputation. These are the hard facts of the matter but they often belie the true story behind the failure.

They certainly don't reflect the proportion of blame attributed to a failure.

It's unfortunate that the owner is usually the most disadvantaged because often he is the person least equipped to assess the characteristics of the coating itself and its suitability for his project or the technicalities of application. The owner usually relies on expert advice from the paint supplier, the applicator or in some cases an expert consultant.

When consultants are called in to look at a coating failure the key question in the client's mind is not so much what went wrong or why; but who will pay to fix it.

The coating failure investigator must be aware of the personal self-interest reactions of all parties that can, and often, colour the information supplied to him, particularly in the initial stages.

The owner is nervous because he will realise from previous experience that he is probably going to be out of pocket.

The engineer is usually defensive, fearing he may have made an error in judgment in selecting the applicator or the coating system.

The applicator is worried because very often the onus of blame falls on him and whilst rectification costs may be a small percentage of the owner's total turnover, they often represent a major impost on the business of the applicator.

The paint company representative tends to be aggressive because he may feel that there could be career implications.

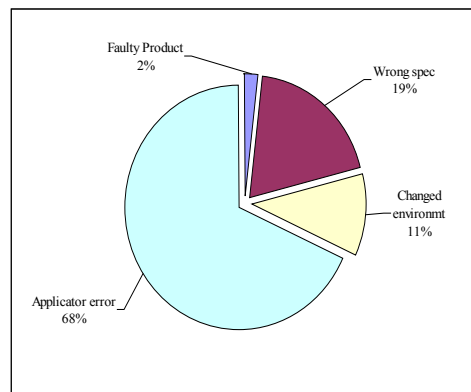
The paint company manager similarly feels apprehensive because any prospective claim for faulty product or specification can have ramifications for other failures. For example, it is not uncommon to see substitution of a specific product with another one that may have not been quite up to the task, or there may be ramifications for him on lack of supervision and control of actions of his representative contributing to the failure.

So when facing a protective coating failure investigation the attitudes and fears of all parties concerned must be considered in terms of individuals' reactions to objectively examining the problem.

The failure analysis meetings between all concerned parties often end up in a three ring contest where each participant points the finger at the others, saying it's his fault, not mine.

My company has been involved in providing expert and independent consultancy in protective coatings since 1981. During that time we have undertaken numerous coating failure investigations. In 1993 I presented a paper at an ACA conference in which I analysed over 120 failure investigations.(1) The results were tabulated by (a) reasons for failure, (b) type of product that failed, and (c) the size of the project/failure. The paper concluded that there are four basic reasons why a coating system will fail.

The first reason is faulty paint, the second is incorrect specification –in other words the wrong product was specified for the job. The third is that the environment has changed since the original coating specification was devised. The fourth is application error. These figures broke down to roughly:



2%	Faulty paint
19%	Incorrect specification
11%	Environment change from original design criteria
68%	Application error

Historically, the largest reason for failure has been attributed to application error and the reasons for this are many and varied. Often it is inadequate training of the applicator. Sometimes just plain cutting corners by the applicator. The pie chart shows a break up percentage of the reasons with figures taken from our records over the last 15 years or so.

It is fair to say that until the early 1990s this type of break up of reasons for failures was accepted as an industry standard. However, since the early 1990s we have had the implementation of quality assurance and quality control systems, namely ISO 9000 series and later the PCCP certification program. These quality standards have improved the record keeping of applicators and coating application to the point where those of us involved in coating failures are beginning to question whether in fact the old percentages are in fact correct.

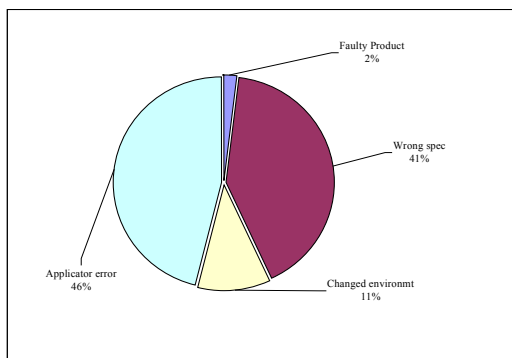
We have seen a significant number of coating failures recently which, prior to Quality Assurance programs, would have been blamed on poor application. These recent failures all had the application procedures well documented. Good records had been kept, application has been inspected and checked and work procedures scrutinised both during and after the event. The retained samples of liquid paint were all within specification and other uses of the paint system in similar environments are working well. Yet paint failures have still occurred.

It is possible that the root cause may be incorrect or inadequate instructions from the paint supplier to the applicator as to how to apply the product, or that the paint manufacturer’s quality control and manufacturing specifications are either too broad or not stringent enough.

A reasonable criticism can be leveled at the paint suppliers. They usually have enthusiastic representatives who will sell a facility owner on a particular paint system, illustrating the point with examples of where it has worked, photographs of what it should look like and glossy brochures implying that “your facility can look like this if you use our product”. These sales techniques are very well founded and certainly there are many proven case histories. I am not remotely suggesting that in these instances the paint company representatives are misrepresenting facts, but what they do is give the owner the impression that this is what the project will look like after completion. The owner in all good faith accepts the expert opinion of the coating supplier who will often recommend a contractor. The contractor then proceeds to do the job and apply the coating.

Now when something goes wrong and the coating fails, the paint supplier will inevitably say “It’s not our fault, we supplied the product in good faith. We have retained lab batch samples that work well. We’ve sold many thousands of litres of this product and never had a complaint. It’s not our fault it wasn’t put on right”.

I suggest that the coating failure breakdown is somewhat closer to the following:



- 2% Faulty paint
- 41% Incorrect specification
- 11% Environment change from original design criteria
- 46% Application error

For example we have seen a large number of coating failures where catalysed acrylic has been applied over epoxy mastic or over a MIO Epoxy. Whilst there are many examples of this system working extremely well, every so often it presents a failure mode where in the acrylic fails to bond to the epoxy. Discounting the obvious problems of under film thickness of the acrylic and missing overcoat window of the epoxy (both of which will present the same failure mode) the problem is unresolved even when QA and QC confirm that the application conforms to the manufacturer's instructions. Our investigation on the issue indicates that often the manufacturer's instructions are inadequate and that a probable causal factor is that of the formation of amine carbonates during certain cure factors of the underlying epoxy in specific environmental conditions. That issue is the subject of a further technical paper.(2)

In any discussion on "who pays when the paint fails" we must include the issues of warranties/guarantees (sometimes incorrectly referred to as partnering agreements) which have seen current vogue in the protective coating industry.

There are a number of guarantees offered by paint companies regarding performance of their coating systems. It behoves the facility owner to check carefully the wording of guarantees offered. Frequently amongst the legal mumbo-jumbo the warranty offers to guarantee the performance of the paint, but not the application. The applicator's warranty under common law is limited to one or two years. Many failures will show up within the first year but it is not uncommon for failure to occur later than this, sometimes up to six years after initial application.

At the risk of having brickbats hurled at me by various paint companies, I can state quite categorically that over 30 years in the business, I have rarely paint companies' warranties upheld in the spirit in which the owner believed they were written. I have, however, frequently reliable applicators return to rectify failures well after their legal liability has expired.

So, given the above, how do the facility owner, the applicator and the paint supplier protect themselves against coating failures?

1. Extreme care should be exercised in preparing the coating specification and scope of works. The specification must clearly detail what is expected from the applicator and the performance expected from the recommended protective coats.

In any failure investigation, the first question to be asked is "exactly what was the paint supplier and the applicator asked to do?"

2. Care must be taken in selecting the correct coating specification, one that is suitable to the site environment and to the application environment, ie some coatings perform very well when applied under ideal laboratory conditions but site conditions may preclude correct application.
3. History check. Check the history of similar coating applications in similar environments.

There is nothing more valuable than historical experience and in the light of that statement I would caution facility owners to be conservative in their specifications. Use products, systems and applicators whose work and worth is proven.

4. The applicator must be meticulous in his site notes and quality assurance documentation. Recording of application dates, batch numbers, equipment type used, weather conditions, all must be meticulous.

Recently due to a protective coating failure a very substantial set of application QA documents were the subject of scrutiny. They were inaccurate as to weather conditions of the day and recorded some paint batch numbers that did not exist. Apparently they were filled in well after the event.

QA documentation and site documentation is never really needed until something goes wrong; then it's examined with attention to every detail.

5. Third party inspection at all stages during the coating application is essential and that scrutiny should be thoroughly documented and recorded.

The inspectors must be trained and familiar with paint inspection. The ACA conducts an excellent certificated inspectors' course. This should be a minimum requirement together with a number of years of practical field experience.

6. Prior to the first 12 months or the end of the applicator warranty period, a thorough inspection should be made of the protective coatings to ensure they are performing to specification.

Finally, who pays? Let's hope the coating system doesn't fail but, if it does, unless all the above checks and controls are in place the owner will inevitably pay at least twice over for the job to be done and the contractor pay either financially or in loss of his reputation.

- (1) Mark Weston, paper "The Practical Implementation of Quality Assurance and Quality Control Standards for Coating Application", ACA Corrosion Prevention Conference 1993, Newcastle, NSW
- (2) Jennifer Tan, Engineering final year project, "Failure analysis of the conditions prevailing in the adhesion of acrylic paint to epoxy mastics", unpublished, 1998