

The next generation moisture cure polyurethanes

Two years ago, I wrote in this magazine about one of the few true innovations in the coatings industry during the last decades. Steelpaint, a German coatings manufacturer specialising in moisture cure polyurethanes, managed to reinvent MCPU technology and extend its life for the next decades to come, explains *Perry Poppelaars, director of Recoat UK Ltd, distributor for Steelpaint in the United Kingdom.*

Moisture cure polyurethanes (MCPUs) are single-pack coatings which utilise ambient moisture as a catalyst to initiate the curing process. The advantages of the technology are well known. MCPU coatings provide longer corrosion protection at a lower film thickness, cure down to -5°C without additives, can be applied at RH up to 98%, are flexible, resisting hair cracks and are surface tolerant etc.

Like all polyurethane coatings, MCPUs contain isocyanates for the curing process.

Isocyanates and other raw materials, such as Bisphenol and Epichlorohydrin used in most epoxy coatings, have been under scrutiny by the health and safety authorities for some time. It seems likely that these raw materials will be phased out one day.

By introducing Stelcaterc, Steelpaint is far ahead of the game. The major step forward compared to traditional moisture cure technology is that Stelcaterc does not contain any isocyanates and VOC levels are very low.

The above-mentioned advantages of traditional MCPU technology are all still valid for Stelcaterc. As an extra bonus drying times are extremely short – even when conditions are unfavourable. If required the individual coats can be spray applied wet-on-wet 15 minutes after each other. This means that the full three-coat system can be applied within one hour and is dry hard in 130 minutes at 10°C. For roller/brush applications the minimum recoat intervals are 40 minutes.

Demonstration

Not long after launching the new product line, a demonstration was given to a delegation from the UK Environment Agency. The purpose of the demonstration was not just to show the impressive drying characteristics of the Stelcaterc system, but to present an innovative, time-saving, cost-effective, environment-friendly procedure to perform a full coating refurbishment on existing steel structures.

During the demonstration, the existing coating system, a standard offshore epoxy system, was fully removed by RPR Heat Induction, then the substrate was prepared to St3 standard. The Stelcaterc coating system was applied by brush/roller, and was dry and hard before the end of the demonstration. The whole operation from start to finish took less than six hours.

RPR Heat Induction is rust and paint removal by heat induction. Heat induction is the process of heating an electrically conducting object (usually metal) by electromagnetic induction, generated by eddy currents. When heat is generated in the substrate the bonding between the steel and the coating is broken. The coating is then removed in sheets by scraping, without disintegrating and is completely free from contaminating agents, i.e. blast media. This makes disposal and recycling of waste easier and cheaper. Even inside pittings and cracks in the substrate the coating disbonds. There is no noise, which makes it an ideal method around



Final coat
of Stelpant-PU
Combination 500
Black on lock gate

→ Final result of surface preparation



residential areas, and the only chemical waste is sheets of paint instead of tons of grit. As a result, scaffolding can be built lighter because it doesn't have to hold tons of spent grit.

Real projects

Based on the outcome of the demonstration, it was decided to test the full procedure on some actual projects. We were assigned a series of four Environment Agency river locks to allow evaluation of all the pros and cons of the procedure and set them off against the traditional way of doing these projects. The lock refurbishment projects can only be

executed off season, in the autumn/winter when there is much less boat traffic. Third-party inspection was implemented, and all participating parties worked to monitor and measure the effect of the process on the programme, such as quality, cost and most importantly risk.

We are two years on and finalising the 14th lock refurbishment – we never stopped. The following is a case study of the Irthingborough Lock, the first lock in this running project. Based on the results monitored during this pilot project, the same procedure was followed on subsequent locks.



→ Mechanical cleaning to St3 standard

Case study:

Project	Irthlingborough Lock on the river Nene, in Northamptonshire, England;
Owner	UK Environment Agency
Main contractor	JN Bentley and Jackson
Paint contractor	Specialist Painting Group
Paint supplier	Steelpaint/Distributed by Recoat UK
Independent inspection	Paint Inspection Limited
Executed	February to March 2019, duration three weeks
Contract value	£ 40,000.
Coating system	<p>Structural framework (C5-M environment) Stelcaterc-L-PR primer at 100 microns Stelcaterc-L-NT intermediate at 80 microns Stelcaterc-L-TC topcoat at 80 microns</p> <p>Guillotine gate (C5-M environment submerged) Stelpant-PU Zinc primer at 100 microns Stelpant-PU Zinc primer at 100 microns Stelpant-PU Combination 500 intermediate at 100 microns Stelpant-PU Combination 500 intermediate at 100 microns</p>
Surface preparation	High pressure fresh water washing RPR Heat Induction Mechanical cleaning to St3 standard
Life expectancy	15 years to first major maintenance. Due to the reduced surface preparation standard, an extra coat of Stelpant-PU Zinc was specified for the guillotine gate because it is submerged on a regular basis.
Application	Brush and roller
Challenges	The EA traditionally utilised abrasive blast cleaning when refurbishing its large portfolio of steel structures. The risks associated with this process of coating removal and surface preparation include contamination of the land or watercourse, creation of large amounts of hazardous waste, exposure of operatives to hazardous substances (particularly lead), reduced annual output costs and standing time costs due to plant rental in times of inclement weather.
Solution	Specialist Painting Group introduced the EA to the use of RPR Heat Induction as a means of safely removing the existing coating system prior to mechanical preparation, coupled with the application of the Steelpaint moisture coating system.
Key benefits	40% reduction in project costs 99% reduction in hazardous waste 50% reduction in project duration Increased number of refurbishments annually

➔ Clockwise from top left: Irthlingborough Lock encapsulated; Final coat of Stelcatec-L-TC Holly Green on the framework structure; The Irthlingborough Lock before treatment; Final coat of Stelpant-PU Combination 500 Black on lock gate



Conclusion

The combination of using RPR Heat Induction and MCPU technology results in significant savings in project costs, hazardous waste removal and project duration. This has freed up budget and time to allow for more projects per season.

Imagine what difference this would make on e.g. bridge projects. Scaffolding could be built much lighter because it does not have to hold tons of grit, risk of contamination of the environment is immensely reduced and road closure is shortened by 50%. There is also no conditioning required and downtime due to weather conditions is reduced by 90%.

This project has proved that the procedure truly works in practice, which makes it a viable solution to many infrastructure refurbishment projects. ■

