The Ultimate Plate

We've seen processless plates, and plates with low chemistry requirements, but what about a CtP plate with no coating or chemistry whatsoever?

Computer to plate production has improved printing's carbon footprint no end because it does away with film and the associated chemistry. But the recently announced Miracle technology, developed in the UK by JPI, does away with coatings and processing entirely. JPI has patented a method of switching uncoated, grained and anodised aluminium from hydrophilic to hydrophobic states, so they don't need any coatings at all.

In order to turn grained and anodised aluminium into a printing forme JPI uses ultra fast femtosecond lasers. The laser pulse, which is carefully controlled to avoid over or underexposure, modifies an aluminium oxide surface to create a highly hydrophilic imaged layer. This is visible as a darker area under normal viewing conditions. The environmental impact of this technology goes far beyond the pressroom because conventional plate manufacture and the associated carbon cost could become obsolete.

Does it Work?

The femtosecond lasers typically operate with a frequency of 1kHz+, to change the plate surface. They pulse at rates of up to a millionth of a nanosecond to temporarily make the aluminium surface hydrophilic. Unless the surface is gummed, it will revert to a hydrophobic state after a few days exposure to the atmosphere. The Miracle technology can image a 30µ spot size with an energy density of around 225 mJ/cm^2. In comparison, Kodak's Thermal Direct images a 25µ spot with 325 mJ/cm^2 and Agfa Azura a 21µ spot with 300mJ/cm2. Miracle creates a temporary hydrophilic state that gradually returns to normal after 12 hours and the technology can be fine-tuned to meet different specifications.

The Miracle developers are a formidable team: Dr Rod Potts, former R&D plates director at DuPont & Agfa, Dr Peter Bennett, former R&D plates director at Kodak and John Adamson, plate manufacturing manager at DuPont and Agfa, so there is good reason to believe that Miracle will work. According to the developers, the surface has no special press, ink or paper requirements and is good for several thousand copies. Although the maximum run length has not yet been determined, JPI hopes to establish this by the end of the year.

After use the plate is cleaned with a standard plate cleaner and reverts to its normal hydrophobic state. It can either be left for a couple of days to revert under normal atmospheric conditions or be moderately heated for a few minutes in an oven. It can be reused up to four times.

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This technology could eliminate all chemistry and plate processing costs, as well dramatically reducing the carbon footprint of print. It does away with all chemicals relating to plate coating and manufacture, their processing in the print factory and because the plates can be reused up to four times, there is less transport and packaging required because plates are not as susceptible to scuff or physical marking during transport as are normally coated plates.

On behalf of Verdigris, we asked Rod Potts if he and his colleagues are aware of any similar technology to Miracle under development?

RP: No we are not. The new field of ultra fast lasers is still being explored, and to the best of our knowledge the miracle-plate technology is totally novel. That is one of the qualifications required to facilitate the grant of the worldwide patents that we have filed. Having said that, many of the major industry suppliers have been in touch with us since we filed the patent applications and began speaking publically about this technology. People are keen to know as much as they can about this.

Verdigris: So how will Miracle work as a product?

RP: The technology will be applicable to printing plates or alternatively, for example, it could be applied to printing press cylinders or printing press cylinder 'sleeves'. To date

the technology has been tested at a commercial offset printer through its utility as a printing plate. Further testing is planned with a top UK printing college. This is very much a technology which is being described and not a commercial product.

Verdigris: What interest have you had from the top three plate developers?

RP: To date, we have had interest expressed from two top plate developers. Preliminary interest has been associated with the technology (modus operandi and capability) itself and also with the Intellectual Property associated with the Miracle plate.

Dr Rod Potts, former R&D plates director at DuPont & Agfa, and one of the founders of JPI.

Verdigris: How will this technology be developed?

RP: Much depends on the support we can get. Work has so far been done with grants from the UK government and work with leading universities. Since we went public we have had several expressions of interest from large suppliers, and have been pleasantly surprised by the genuine interest and goodwill from some big names in the industry. JPI is a very small team and the potential for the Miracle plate technology is bigger than we are. Realistically we will be looking to find a way to bring heavyweight R&D muscle to this from the outside.

One obvious challenge would be to find a way to build a platesetter equipped with an ultrafast laser which would allow us to embark on more comprehensive and professional press testing. We have agreed to use one of the UK's leading print colleges to give us a completely impartial assessment of the press behaviour. We don't know if this is over ambitious, but our next major goal would probably be the building of a platesetter.

All this takes time and money, and of course we don't have a fraction of the resources of some of the people that have offered their help. We are taking all the offers extremely seriously and want a partner that shares the environmental vision, rather than a partner that would want to 'buy-to-kill' the technology because it upsets their 5-year plan.

Verdigris: Which sectors of the printing sector are most likely to embrace this technology?

RP: We see two or three main applications but it is perhaps too early to say how it will all pan out. One obvious application is to use the cost benefits of blank, uncoated litho plates for CTP. Blank plates can cost as low as €3/m2, contrast that with some of the high-end thermal plates that sell for €9-10/m2. Even if the plates are imaged once and thrown away, the savings are significant both economically and environmentally as there are no coating chemicals, coating solvents, development chemicals or processors. Also, there is less energy in transport, manufacture and so on. There is an instant, massive, reduction in plate costs both to the manufacturer and user.

Miracle technology allows a plate image to be 'erased' simply by heating the plate. If the practical challenges could be addressed, such as how do you image a plate that is already punched and bent, then the plate could be used for several print jobs. In the lab we have re-imaged and re-printed the same piece of blank aluminium four times. More could be possible - work continues on that.

Or we could implement it as an image-able 'cylinder' technology. Imagine a press without plates. The printing would be done from a printing cylinder or sleeve that could be imaged with an ultrafast laser either on-press or in a separate platesetter. The job would be printed, the cylinder cleaned of ink, and the image 'erased' by heating the cylinder. The cylinder would then be ready to be imaged with the next job. When the graining/anodising begins to wear on the

cylinder, after perhaps two or three million impressions, it could be re-grained/re-anodised in the normal way.

This might mean specially developed Miracle-enabled presses, but the benefit to the printer would be a printing press that no longer needed tens of thousands of square metres of expensive plates every year. Plus, again, you have the massively reduced environmental footprint that comes from a plate-less press. On top of that you have the benefits of eliminating plate coatings - these use massive amounts of chemicals, solvents and energy.

Verdigris: How does Miracle imaging affect the recyclability of plates? Can printers expect to get a better price for them?

RP: Miracle-plate is simply grained and anodised aluminium, the industry has used this for decades, and all that has changed has been the coatings placed on the aluminium. With miracle-plate technology the secret is the novel laser imaging that switches the ink-receptivity of the aluminium itself. No coating is needed and the plates are already effectively freely available as the low cost 'blanks' that people have been using for years. Recyclability should not be affected in anyway; price will be as existing standard plate products.

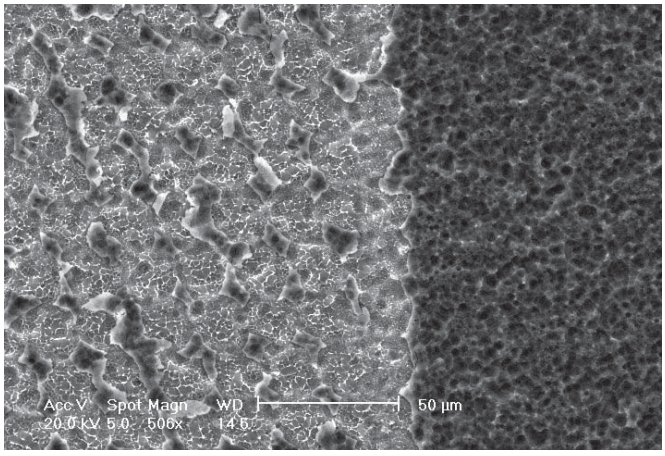
Verdigris: How do you expect the market to change because of this technology?

RP: We believe that the Miracle plate technology is a breakthrough technology and that it has the potential to change the market dynamics. The entire project has been driven by the prospect of establishing a technology that has a reduced environmental impact. It is envisaged that the technology can provide a coating-free plate, with no organic coatings, no coating solvents and with fewer packaging and transport constraints.

The plate will be processless and the technology has the potential to provide a re-writeable surface which could in turn, provide a plate which could be reused several times. The potential to reuse the aluminium plate is clearly exciting and would have a significant impact on litho aluminium usage, meaning less aluminium smelting and less associated greenhouse gas emissions. Many of the environmental advantages of the Miracle plate would apply equally to other media such as re-writeable press cylinders or press cylinder sleeves.

Verdigris: What do you believe is the biggest attraction for printers?

RP: Currently it is envisaged that the biggest attraction of the technology to printers would be its reduced environmental impact but the potential reuse or re-writeability also means potentially improved efficiencies and reduced cost.



The lighter area on the left of the uncoated litho aluminium has been imaged by the femtosecond laser and the surface has changed from hydrophobic (ink receptive) to hydrophilic (water receptive). This change in state is at the cornerstone of JPI miracle technology.

Verdigris: How long before it could reach the market?

RP: JPI intends to bring its unique technology to commercialisation before 2012 and are considering any offers that will add value to the Miracle plate technology, or accelerate its introduction. Specifically JPI is looking for potential partners that share the vision of making a significant environmental contribution to the printing industry. We are hopeful that both a demonstration and sample prints will be available at IPEX.

Verdigris: Much debate has raged over the offset to digital transformation. To what extent does Miracle influence it, either to slow it down or increase it in different sectors?

RP: Good question! The downside of inkjet, for example, is the costs of the ink, plus the relative slowness compared to offset, and perhaps quality limitations. Imagine the quality, speed

and affordability of offset printing without the cost of the plates. The concept of a re-usable printing 'sleeve/cylinder' has many attractions. You could say that Miracle plate technology throws a spanner into the digital transformation.

Verdigris: Any other comments on the future direction of the printing industry?

RP: The current recession has caused many suppliers and printers to look at their business models going forward. As a company, JPI was formed with the intention of reducing the environmental footprint of our industry. If we can also reduce the financial costs we feel that we would have made a significant contribution to it. But these are all in the future. For now we at JPI feel that we have a breakthrough technology that requires significant effort before we can start to make claims about product potential. We will be taking it one step at a time...and keeping our feet on the floor.

In conclusion, the Miracle plate could be the greatest innovation seen in the plate business since thermal imaging first came on the scene. It has many attractions including consumables cost reductions, workflow efficiencies, flexibility of supply and of course the environmental friendliness of a plate that involves no chemicals to manufacture or use.

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