

Official Journal of the South African Metal Finishing Association

S. A. Metal Finisher

Issue

25

June 2016

**Smartphones
supporting
sustainable
lifestyles**

Pg 41

**Artificially
Intelligent
Teaching
Assistants**

Pg 50



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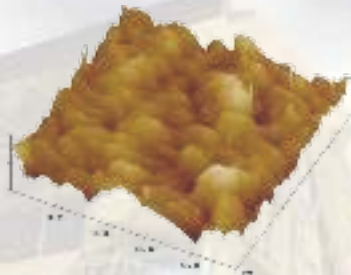
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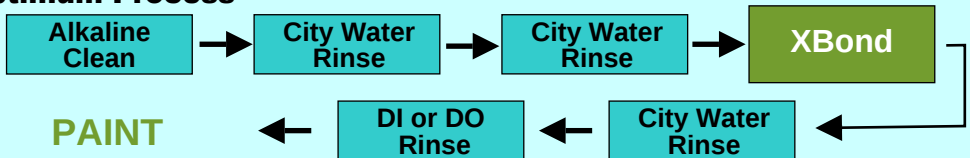
PRODUCT FEATURES

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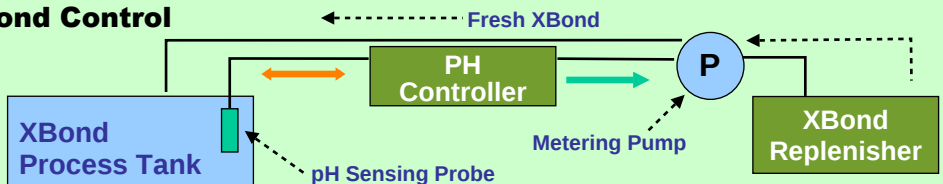


**Atomic Force Microscopy
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From the Editor

Tony van der Spuy

Welcome to Issue 25 of S A Metal Finisher, another milestone in the journey of our national association. It remains my privilege to be entrusted with compiling this industry journal. I know that our readers have come to expect a high standard, and it is my challenge to continue to meet or exceed expectations.



When one reaches any waypost it usually gives cause to reflect on the road one has travelled, and to make comparisons with then and now. Over the thirteen years since our first issue so much has changed in the world around us. Today, no one is surprised by leaps in technology. We have come to expect that anything can be achieved, and these technical innovations are being incorporated into every facet of our lives. The Internet of Things is the new buzz.

Yes, we did have desktop computers in 2003 when the first issue of S A Metal Finisher was produced. Windows XP was the operating system of the day. What we did not have was the fantastic smartphones and tablets that everyone takes for granted now, and which are fast replacing the humble PC in many applications.

Apple and Android Smartphones hit the streets in 2007 2008 respectively. They heralded the beginning of a profound change in the way we use technology. In the beginning they were for cutting edge people. Today everyone from young school children to grandmothers rely on these devices for the host of services they offer.

In 2003 we carried map books. Now your smartphone even speaks to you, providing turn by turn travel directions. How clever is that! And you can speak to it!

In this issue we learn about smartphones helping to slow down climate change, and how Artificial Intelligence can replace Teaching Assistants in online classes.

Will AI robots take over in the metal finishing industry in the foreseeable future? What sounded far fetched not so long ago, now sounds very plausible. So, hold tight for a very exciting ride into the future!

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The background of the entire page is a dark, out-of-focus photograph of various pieces of laboratory glassware, including test tubes, beakers, and a funnel, some containing liquids. The lighting is dramatic, highlighting the glass textures and liquid levels.

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**NEWS
ROUNDUP***Report by Tony van der Spuy*

A concise overview of all activities within SAMFA in the period that elapsed since the previous edition was circulated. If you aren't sure what the association busies itself doing, this is where you find the quick update.

The best news is that you are busy looking at Issue 25 of S A Metal Finisher. Along with our training courses in the metal finishing industry this has been one of the lasting outcomes of the DANIDA funded foreign assistance programmes in the metal finishing industry which ended in March 2005. I am sure that the Danish Embassy will be proud to know that their efforts continue to bear fruit.

The idea of having a national industry journal germinated in 2003, well before the amalgamation of the regional metal finishing associations that make up today's SAMFA. At that stage the regional associations were producing basic "home-made" newsletters, but those tasked to do the job found it heavy going.

Our first national issue was distributed during October 2003. It comprised 32 pages, and there were no adverts. By the time we got to the third issue, it was realised that like everything that DANIDA had been funding, this newsletter would have to pay for itself if it was to continue.

In truth, the amalgamated metal finishing association was going to have to be very resourceful to continue to operate as a national body, and to be able to provide all the services that would be expected of such an organisation.

The third edition, released in August 2004 was the first to invite adverts from industry suppliers. It is very pleasing to be able to place on record that one of those companies, as well as the successor to another, has adverts in this 25th edition. They are: Metalquip and Krome Metal Chemicals.

Since then the magazine has gone from strength to strength. S A Metal finisher was devised as

**One of those
companies and
the successor to
another has
adverts in this 25th
edition**

the mouthpiece of SAMFA. The brief was to keep members updated in regard to all the association's activities, and to attract new members from the industry.

However our journal really took on a life of its own, and over the years has developed into a Buyer's Guide for the Industry.

So many people have commented that they always keep copies of *S A Metal Finisher* close at hand because there are products or services advertised that gained their attention, and to which they refer when a related requirement crops up. It's a bit like a business card file.

YEAR END MEETINGS 2015

Our year end meetings were held on November 12 in the Cape, November 19 in Gauteng and on December 3 in KZN, respectively.

At these events we were fortunate to be able to seize on a very topical subject, 3D printers, for the focus of these meetings. This led to there being a very good turnout in all our centres.

As metal finishers, any development that involves component production must be of interest to our sector. A Google search for "electroplating on 3D printed components" turned up 138,000 results.

In Gauteng we had presentations from Cad-House and in KZN and the Cape presentations were by MakerBot, a division of Rectron.

It was fascinating to see complex items being printed while the presenters were giving their talks. Members were stunned to discover that an item like a chain could be printed, with all the individual links connected. It was one of those, 'How did they do that?' moments.

Where many people were still of the impression that 3-D printing was confined to plastics, they were amazed to learn that components can be printed in various metals, and be just as good as, or superior to, components manufactured by traditional engineering methods.

**It was fascinating
to see complex
items being
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presenter was
talking**

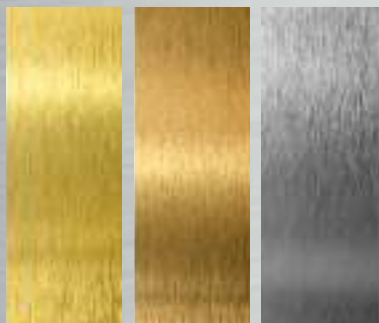


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The 3-D printing presentation is going to be a hard act to follow. Finding something as interesting as that for our future meetings will certainly be a challenge!

ANNUAL NATIONAL EXEC MEETING

The National Executive Meeting took place in Cape Town on February 20, 2016. At this forum the national chairpersons take the opportunity to consider the progress of the association over the preceding financial year and based on that performance make assumptions about what conditions the industry can anticipate for the year ahead.

As the industry is generally in a rather fragile mood, it was decided to adopt a very conservative outlook, and to make plans based totally on industry demand. This would be gauged as we progressed through the year.

Once again the idea of a metal finishing expo was discussed, and considering feedback from the regions, it was decided to hold off on such plans until positivity returned to the sector.

SAMFA finances were examined and the association was found to be on a solid footing as it has been since its inception. Funds continue to be managed conservatively.

**the association
was found to be
on a solid footing
as it has been
since its
inception.**

The association has built up a long enough history that can be used as a referral. This enables mostly good decisions to be taken, as repeating past experiments that delivered less than stellar results is avoided.

ANNUAL GENERAL MEETINGS - 2016

Once again, it's nearly time for our regional Annual General Meetings. Dates in the regions have been set as follows:

KZN Region - Tuesday, June 14

Cape Region - Wednesday, June 22

Gauteng Region - Wednesday, July 6



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TRAINING COURSES PLANNED 2016

Training programmes kicked off this year during May, when our standard five day electroplating course commenced on May 18 in KZN. Now this course has been planned to commence in Gauteng during July. The initial enrollment level has ensured that this programme is viable and will definitely go ahead.

The dates are as follows:

Session 1 - Thursday, July 7

Session 2 - Thursday, July 21

Session 3 - Thursday, August 4

Session 4 - Thursday, August 18

Session 5 - Thursday, September 1

Our venue, courtesy of the Astro Group, will be as usual at:

20 Ingwe Road,

Sebenza Edenvale.

There has also been interest from the Cape, and tentative dates for this course have been planned as follows:

Session 1 - Thursday, July 14

Session 2 - Thursday, July 28

Session 3 - Thursday, August 11

Session 4 - Thursday, August 25

Session 5 - Thursday, September 8

The venue will be:

Belmont Square,

Belmont Road,

Rondebosch.

**Electroplating
Training planned
for Gauteng
commencing on
July 7, 2016**

**Electroplating
Training planned
for the Cape
commencing on
July 14, 2016**



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If you are in Gauteng or the Cape, and want to have the opportunity to join the electroplating sessions, please either phone or email head office, or sign up on line on the website. All these contact details are available on the address panel beneath the index at the foot of page 3.

We will be doing surveys on demand for training in powder coating, OHS and other subjects in all our regions very soon after distribution of this issue of S A Metal Finisher. Promotional mails will be sent out wherever we have positive feedback.

We will be doing surveys on the demand for powder coating and OHS Training

ELECTROPLATING APPRENTICESHIP

This subject requires some in depth coverage. In most issues of S A Metal Finisher there has been some reference to this ongoing odyssey. Mostly we have not been able to report favourably on the speed of progress even though significant effort has been directed at this project.

In Issue 18, distributed in February 2012, we ran an article titled, "The Quality Council for Trades and Occupations" with the sub heading, "A Fresh Approach to Successful Training of Employees." Alongside the title we depicted a graphic proclaiming, "Apprenticeships are back!" We reported that:

Apprenticeships are Back!

Qualifications will now be designed by industry and for industry. Inputs are required and essential at various levels and stages: 1) Communicating skills needs; 2) Participating in curriculum development; 3) Developing external assessment specifications.

We also reported that a group of "Expert Practitioners" had been formed to give input in the structuring of this new qualification. Originally this group included Trevor Seiphemo of Cobra Watertech, Gary Joseph of Team Plating, Michelle Nelson of Metalchem and the writer. At a later stage we were joined by John Danks of SD Electroplating, Trudy Kastner of Nexor 100, and Lizette Eksteen of Platerite.

We remain indebted to all of these members for giving up their valuable time to pursue this initiative on behalf of the industry.

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By the time we published **Issue 19 in October 2012** we were able to report as follows:

Our work was completed on May 30 and presented to MERSETA, who in turn submitted the document to SAQA¹ at the end of July for registration. SAMFA also submitted a final feedback report to the National Artisan Moderation Body on August 10. At this time, we are waiting for further feedback.

In Issue 20 of June 2013 we commented

Things have taken a lot longer than everyone envisaged. At the outset, the QCTO approach was heralded as a “fast-track” process for getting useful training in this country sorted out quickly. It hasn’t quite worked out speedily. But the qualification has finally been registered, and you can read all about it on the South African Qualifications website [www.saqqa.org.za] via a link from the QCTO² logo on the right side of the page.

In Issue 21 of November 2013 our reports started to reflect some disappointment at a new turn of events:

In January 2013 the Department put out a document proposing reimbursement for travel and accommodation expenses for technical experts, forum members, working groups and the like. Payment for services would be based on the rates of an entry level deputy director. A couple of meetings later the attendees were informed that there would be no remuneration for any experts, and that the Department considered that if an industry was interested in developing apprenticeships then they should fund their own experts, and not the Department of Higher Education.

**the attendees
were informed
that there would
be no
remuneration for
any experts**

SAMFA does not have a budget to remunerate our technical experts, so this is a serious blow. We need to create a fund, or find competent representatives whose companies will sponsor their time to do the necessary work. If any of our members has any input on how we can address this situation, please contact head office as soon as possible.

¹SAQA - South African Qualifications Authority ²QCTO - Quality Council for Trades and Occupations



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Nobody from the industry responded to this plea.

And so on to Issue 22 of August 2014 where we covered the story as follows:

When the Department of Higher Education decided to walk away from a commitment to remunerate subject experts to continue this work, and SAMFA had absolutely no budget, it signalled pretty much the end of the road for our involvement. However, we never gave up hope and stayed in touch.

SAMFA should be able to afford to cover the cost of a couple more meetings with funds derived from the revised membership fee. In fact one of the motivations for implementing the increased membership fee was to be able to make a small budget available so that we can afford to have our experts attend vital meetings that affect the future of training in this country.

SAMFA should be able to cover the cost of a couple more meetings with the revised membership fee

It has been realised that a college facility that includes a state of the art mini plating plant has to be provided if the development of the electroplating trade is to proceed properly.

No FET college would be able to swing this without special funding running into millions. It is not likely that the industry itself will build this facility.

Issue 23 of February 2015 made no mention of the electroplating apprenticeship because there had been no movement at all.

Issue 24 of October 2015 took up the story again:

We reported that the National Artisan Moderation body had asked if we could indicate how many learners we believed would enrol in the new curriculum. SAMFA responded with these questions:

- *In which provinces do we have colleges to offer the theory component?*
- *How long will trainees be on the shop floor and how long in a FET college?*
- *What is the minimum duration of the apprenticeship/learnership?*



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- *What is the incentive for employers to register their trainees to do this training?*

The letter concluded : *People always want to know when, where, how much, etc., before they commit to anything. Is there anyone who has all of this info?*

We duly learned that the matter had now been referred to the relevant department in MERSETA and that we could expect a response. No response to these questions has been received so far, but new developments have eclipsed this enquiry, as reported below.

PART QUALIFICATION DEVELOPMENT

Out of the blue we received a letter from MERSETA asking for SAMFA to be represented at a meeting on February 18, 2016 styled as a workshop to Develop Part Qualifications for the Electroplater Occupational Qualification.

The accompanying literature explained a new concept of "part qualifications" and suggested that this was worth considering in relation to the electroplating qualification.

On behalf of SAMFA I requested Hazvinei Munjoma to represent SAMFA at this meeting. Hazvinei is known to many longer standing SAMFA members as the consultant who worked with the Danish Technological Institute helping to implement the DANIDA funded programmes in RSA up until when they were completed in 2005. Hazvinei is resident in Gauteng, and his qualifications make him well placed to understand the frameworks that the Department of Higher Education prescribe for the development of training programmes.

He attended that February 18 meeting and reported back that some industries had motivated to chop up their qualifications into sections allowing trainees to achieve a certificate for a specific set of skills, which formed part of the greater qualification. Such trainees would then hopefully be able to find employment harnessing the specific skills they had learned,

**Some industries
had motivated to
chop up their
qualifications into
sections**



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but would not be regarded as artisans. They could however over a period of time, perhaps years, continue to add skills until they were fully fledged artisans.

Naturally, this would have a big impact on curriculums already developed without an eye on this particular outcome, and would probably involve a considerable amount of work aligning this qualification with the relevant modules, topics, elements, etc. A Part Qualification will need to go through QCTO and SAQA again before it is accredited. **Additionally, industries that elect to go the route of part qualifications will be responsible, in terms of both financial and human resources, for their development.**

Industries that elect part qualifications will be responsible for financial and human resources

It is very conceivable that the development of part qualifications may actually suit some industries very well, but not necessarily all. Hazvinei advised that SAMFA members should review the current curriculum and give their opinions on whether they supported the concept of developing part qualifications. If so, SAMFA should inform QCTO and start working on the development of these qualifications. He observed that it would be difficult to take out some components to form the Part Qualification without making changes to the current curriculum.

QCTO called another workshop to be held on May 4 and May 5 in Gauteng, and it was expected that participating industries would then make known their intentions with regard to part qualifications. At the same time, credits would have to be re-balanced to achieve 540 in total for a full qualification. One credit is 10 notional hours. As things stood the electroplating trade had finished up at only 411 credits. The work of identifying part qualifications and re-balancing credits was ideally supposed to happen at this workshop.

In preparation for this meeting, SAMFA sent all relevant documentation to our electroplating members and conducted a poll to determine what their collective response was.

SAMFA conducts a poll to determine the collective response to part qualifications



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Overwhelmingly, it went against the idea of part qualifications, with one electroplater stating categorically, "There will be no merit in having all sorts of qualifications for individuals. A qualified Electroplater is not a labourer, he is an artisan."

Hazvinei Munjoma and the writer duly attended this workshop, and conveyed this response to Collin Naidoo of SAA Technical who was the only other individual from the electroplating industry present. SAAT have elected not to be members of SAMFA.

After discussions our small group spent the time re-balancing the credits to achieve the required 540. It was agreed that we would convey to QCTO that the electroplating industry was not opting for part qualifications, but rather wanting to finalise the requirements to be able to offer the full electroplating apprenticeship. SAMFA is currently finalising the curriculum documentation to present to QCTO for further action.

However, if there is no enthusiasm from SAMFA members for reviving the electroplating apprenticeship it will be pointless to direct more money and effort into finalising the curriculum, developing trade tests and printed training materials. We will need to acknowledge this.

It would be an embarrassing admission for an industry association to make, but we will have to do a poll to establish the collective opinion on this matter and convey our attitude to the education authorities so that there is finality one way or the other. 



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ROBOTIC SHOT PEENING SYSTEM FOR SAA TECHNICAL

Technical Advertorial from PSE Surface Treatment

At the beginning of 2016, PSE Surface treatment has supplied a **robotic shot peening system** to SAAT (South African Airways technical), the MRO (Maintenance Repair & Overhaul) division of SAA, at their facility at OR TAMBO International.

This system has been designed to shot peen landing gear, shafts, discs, blades, and other aircraft and turbine engine components. The robotic shot peening system is supplied in cooperation with Straaltechniek International, who are leaders in the design and manufacture of shot peening and high-end grit blasting systems.



ABB robot fitted with two nozzles

What is shot peening?


The shot peening process is based on the effect of inducing compressive stress in the surface of a metal part by controlled impinging with spherical particles. During the shot peening process, the resistance against fatigue will be increased and therefore also the lifetime of a part.

The advantages of the shot peening process are already known and used in the aerospace and automotive industry as it also increases the resistance against fretting, galling, cavitation erosion, stress-corrosion cracking, intergranular corrosion and hydrogen embrittlement.

This robotic shot peening installation for SAAT is a state-of-the-art machine with the ability to monitor & control all KPV's. The control system is fully automatic and closed loop, and will deliver unrivalled levels of process reliability and repeatability. It will log individual component process parameters that can be used for long-term analysis and will meet the requirements of governing bodies to SAAT e.g. CAA, FAA, EASA, AS9100 and NADCAP.

An ABB robot fitted with 2 nozzles is being used along with a specially designed and programmed computer system. Three different types of shot peening media are being used. The recovery and classification of size and shape is fully automated and the media is stored in 3 separate silos. A double chamber peening pot system makes it possible to peen continuously without losing time for refilling with new media. The flow of the shot peening media is precisely and closed-loop controlled by a Magna Valve, making sure the supply of the media is accurate and constant - crucial for the shot peen process.

The system PSE SURFACE TREATMENT commissioned at SAAT is the first robotic shot peening system supplied not only in South Africa, but uniquely for the African continent as well. New standards have been set with the delivery of this machine - an automated and precision shot peening machine to satisfy the needs of the future and a unique process within the MRO division.

With this system SAAT complies with the highest FAA requirements and is certified to carry out heavy & line maintenance on Airbus and Boeing aircraft as well as the related engines and auxiliary power units. 



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ATOTECH



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NEW TECHNOLOGIES – NEW PARTNER – NEW FUTURE

Krome Metal Chemicals chooses Atotech as new partner for South Africa

Krome Metal Chemicals (Krome), the leading South African electroplating and metal finishing supplier with 3 technical service centres and more than 40 employees countrywide, has represented Enthone for the past 5 years. In recent months, Enthone has been acquired by Platform Speciality Products Corporation and merged with Macdermid.

Ryszard Orlik (Director at Krome Metal Chemicals) says “In our more than 20 years of experience in this industry, large mergers of what were previously competitors leads to a tumultuous and volatile time for the new entity. Some of the smaller markets and more specialised companies in those industries are weighed down by all the change.”

In view of this and in the interest of the South African Metal Finishing Industry, Krome has taken the decision to bring Atotech to South Africa under a Distribution agreement and to end the partnership with the newly formed Macdermid-Enthone business.

Atotech are not new to the South African market and are regarded to be the global leaders.

in the Electroplating and Metal Finishing Industry.

Atotech at a glance:

Located: 3 Regional head offices and in 47 worldwide countries with sales offices, R&D and Tech Centres.

Revenue: US \$ 1.1 billion

Number of Employees: > 4000

Number of customers: > 8000

R&D spend: U.S 131 million with 567 people



ATOTECH

Sustainability: 39% of all R&D dedicated to cover Green technologies

Technical centres: 18 dedicated Technical Centres globally

Russell Gregory (Managing Director of Atotech UK) commented that he is looking forward to working with Krome Metal Chemicals with this new South African partnership. Having visited our facilities he is impressed with the infrastructure, capabilities, experience and the “know-how” within the team.

The Directors and staff of Krome are positive and excited about the new collaboration and have assured existing and potential customers of their continued technical support and increased range of leading technologies.

Please feel free to contact your nearest Krome Metal Chemicals office to ask any questions:

Johannesburg: 011 450 2680

Durban – 031 705 3581

Cape Town – 021 932 6457



ATOTECH



Every industrial sector needs an association looking out for its special interests. For the metal finishing industry SAMFA offers this service keeping members up to date on technology and trends, providing technical advice, dedicated training programmes and a strong communication platform. We also represent the industry in dealings with local or national government departments and more. The membership fee is currently only R 2 100 year.

If you are connected to the metal finishing industry and have not yet joined SAMFA, we encourage you to do so today.

Call us on 021 761 8537 or 082 553 2463.

Pretreatment

Advertorial from PPG Industries

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PPG is the only global coatings supplier that offers a complete, integrated line of pretreatment products such as multi-metal safe cleaners, ambient-temperature cleaners, and iron-, zinc- and thin-film pretreatments including zirconium and silane. PPG's pretreatment portfolio includes versatile products that can operate over a wide range of conditions and meet the demands of various application methods, substrate combinations and end-use markets.

PPG Featured Pretreatment Products

ZIRCOBOND® Pretreatment

While the pretreatment process cleans and provides corrosion protection to metal and other surfaces, traditional zinc-phosphates generate sludge as a natural byproduct. This sludge can contain heavy metals such as nickel, zinc and manganese that are subject to environmental regulation.

To address these issues, PPG has developed **Zircobond** pretreatment, an alternative thin-film pretreatment technology based on zirconium chemistry and a proprietary blend of patented additives. Zircobond pretreatment reduces the formation of sludge byproducts by at least 80 percent compared to zinc-phosphate-based systems.

Additionally, a **Zircobond** pretreatment process can be plugged into your existing pretreatment line easily, with little or no modifications.

Zircobond pretreatment is the preferred choice when replacing zinc-phosphate ahead of an electrocoat painting system.

X-BOND® 4000 Pretreatment


X-Bond 4000 pretreatment is an environmentally friendly technology that is effective for multi-metal applications. Formulated to provide excellent corrosion resistance for steel, galvanized steel, zinc and aluminum, **X-Bond 4000** pretreatment operates at ambient temperatures, contains no toxic metals, creates minimal sludge, and is ideal as an iron-phosphate replacement that improves mixed-metal performance and corrosion resistance without the need for an additional final sealing rinse. **X-Bond 4000** pretreatment is recommended for use under powder and liquid coating applications. The PPG technical team will assist you in determining which thin-film pretreatment is right for your finishing system.

ULTRAGUARD ZCC3 Cleaner-coater

ULTRAGUARD ZCC3 cleaner-coater is the newest development in product technology by PPG, combining the best in zirconium pretreatment formulation with the latest in low-temperature cleaning chemistry. **ULTRAGUARD ZCC3** cleaner-coater has demonstrated corrosion resistance performance that is significantly better than conventional iron-phosphate cleaner-coaters and can impart the same exceptional improvement over mixed metals. If you pretreat parts in only three or four stages and are looking to improve the corrosion resistance of your finishing system, look no further than **ULTRAGUARD ZCC3** cleaner-coater. Contact your PPG representative today to discuss which PPG products will work best in your finishing system.

CHEMFOS® 51HD Cleaner-coater

CHEMFOS 51HD chemical cleaner-coater is a heavy-duty, dual-action, iron-phosphate system that removes a wide variety of soils; then deposits a high-coating-weight, iron-phosphate on steel surfaces in a single processing step.

CHEMFOS 51HD cleaner-coater is ideal for heavily soiled parts that need to be adequately cleaned and pretreated when space and the number of stages places limitations on your finishing system. 



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BENEFITS OF PICKLING USING ACID LIFE EXTENDER

A Case Study of the Economics of the System

by Gideon Hugo of Metal Quip

INTRODUCTION

A proprietary chemical product, PRO-pHx Acid Life Extender, has been available in South Africa for the past five years. The product finds application in acid pickles used in the metal finishing industry. Processes like hot dip galvanizing, wire galvanizing, anodizing, electro-polishing and electroplating can benefit from its use.

The product is added to an acid pickle bath, preferably a newly made up one, in the ratio of 1% of the volume of the bath. (A Double Strength product is also available, with addition of 0.5%) Any further concentrated acid additions, to maintain the acid concentration, must also contain 1% Acid Life Extender of the added volume.

The Acid Life Extender converts the soluble metal in the pickle bath to insoluble metal silicates that can be filtered out. The metal concentration in the pickle stabilizes and the pickle does not have to be decanted, dumped or recycled.

FILTRATION

To filter out the solids formed by the reaction in the pickle tank an adequately sized filtration system must be added. For smaller volumes filter units with cartridges can be used, but for larger volumes an automatic backwash plc controlled filter unit is needed. Such a filter unit can have one to four filter chambers.

The backwash cycle is initiated by a pre-set pressure, or a timer (typically 1.5h). Chambers are backwashed sequentially, with the filtration being maintained in the chamber(s) not in a backwash cycle.

At the start of a backwash cycle, the inlet to the chamber is closed, and the chamber is air purged back to the pickle tank to prevent any loss of acid. Thereafter the chamber is backwashed with mains or pumped rinse water, to waste. After the backwash cycle the chamber is again air

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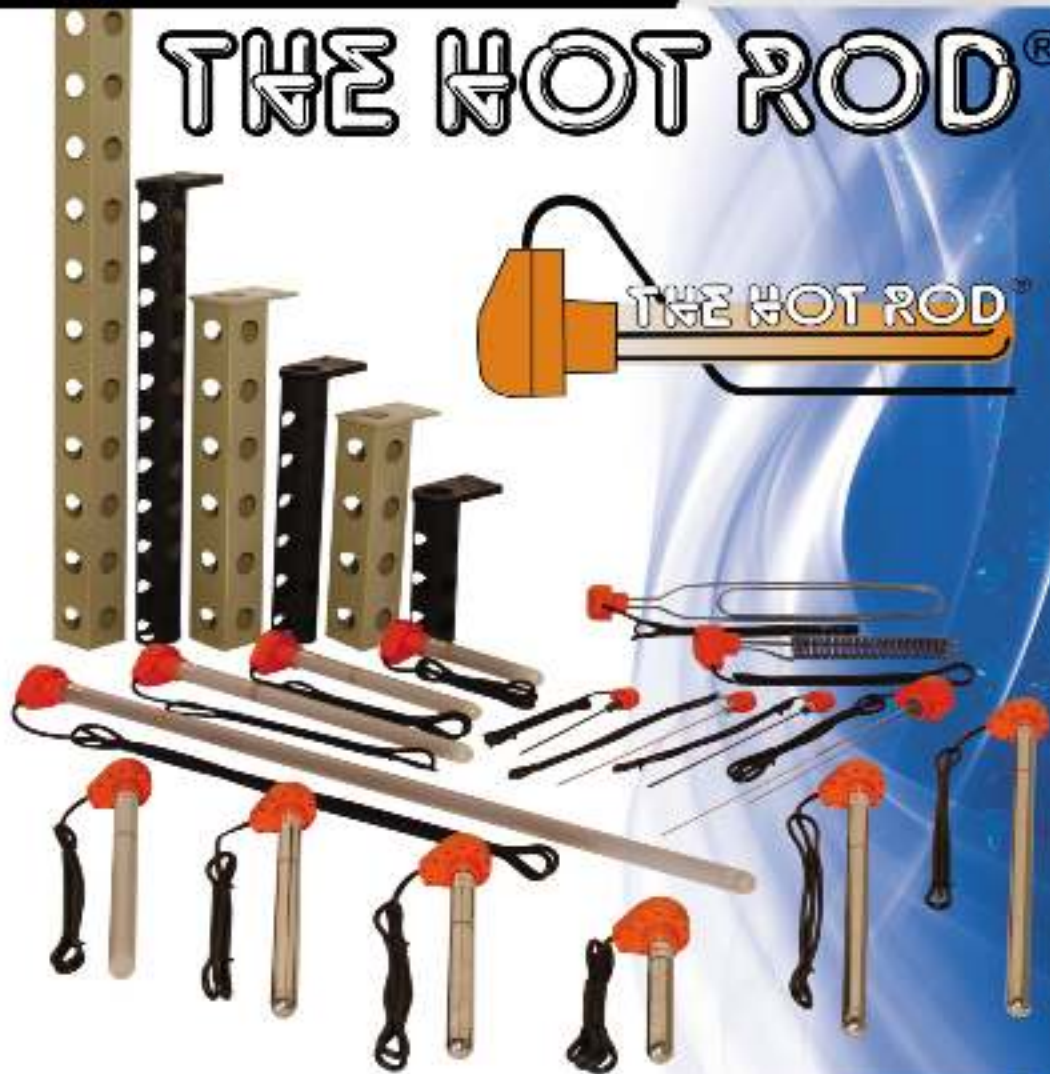
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purged, to waste, to clean out any remaining water. Thereafter the inlet valve is opened, filtration is started again, and the next chamber starts its backwash cycle. The chambers can each hold 2kg of solids.

CASE STUDY

In January 2014 a South African company with wire galvanizing lines, each producing +/- 30 000tons/year, installed an automatic backwash filter system with 2 chambers on one line and introduced the Acid Life Extender Double Strength chemistry in the associated pickle tank.

The pickling was traditionally done with 16% regenerated HCl. Concentrations normally varied from 14 to 7% with the Fe concentration typically 7%.

With the Acid Life Extender the HCl concentration was maintained at 10% by adding 30% virgin HCl treated with Acid Life Extender. The Fe concentration stabilized at 7 to 8%.

Mains water was used for the backwash. There is no drag in to the pickle tank as the wires enter dry. It is important to have more drag out than drag in to enable acid additions without having to decant.

With the acid concentration maintained at 10%, compared to the previous average higher concentration, neutralization costs of the rinse water is reduced.

Initial problems were experienced with the filtration, caused by calcium solids in the acid pickle, coming from the calcium based wire drawing soap. The filter gradually managed to clean the acid adequately to cope with the load of metal silicates and calcium solids.

Another problem was experienced with the back wash water. Initially rinse water that normally goes to the WWT plant, was pumped for back wash cycles. However, the volumes were not adequate, and mains water had to be used for back washing. This problem is addressed below. The volume of back wash water is typically 60l per chamber per back wash.

The consumptions and operating parameters were closely monitored and compared with previous results on that line and another similar line using 16% regenerated HCl and periodic decants. The quality of

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pickle and galvanizing with the converted line was no different from the past.

The acid consumption on the 16% regenerated HCl line averaged at 25kg/t. This equates to 12.5kg/t 30% HCl.

The acid consumption on the 30% HCl top up line stabilized at 5.7kg/l 30% HCl.

The cost benefits were substantial and are set out below.

In the light of the economic benefits associated with using Acid Life Extender, 30% virgin acid and filtration, management decided to convert a second line to Acid Life Extender chemistry with 30% HCl top up and filtration. That line was commissioned in April 2015 and is running successfully at the same performance levels as the first.

With two lines operating on the Acid Life Extender and filtration, a rinse water buffer sump was introduced with back wash water pumped from the buffer tank for each of the two filter units. This introduced further savings as mains water is not used.

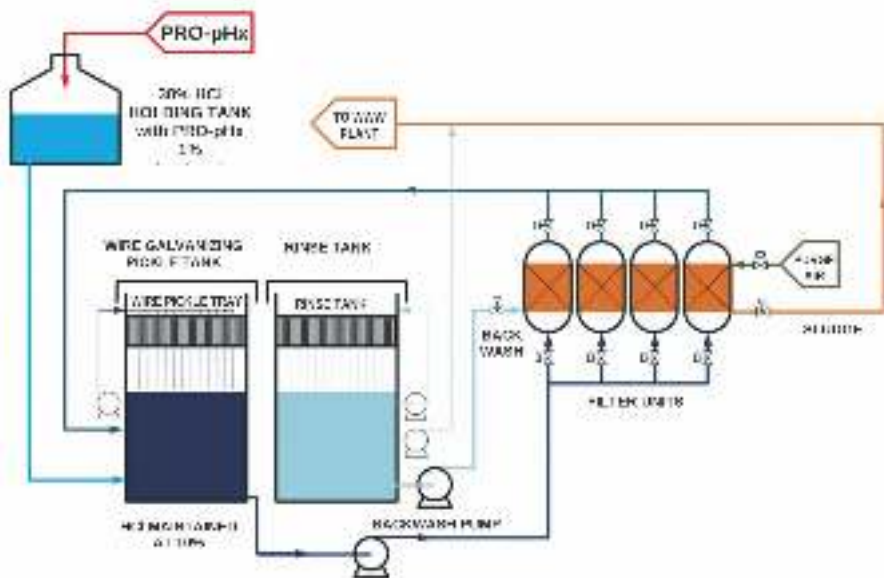
FINANCIAL BENEFITS

The figures below are based on production of 30 000 tons/year/line and typical present day unit costs.

16% HCl consumption:	25kg/t
Cost per year @R1.80/kg:	R1 350 000.00
30% HCl consumption:	5.7kg/t
Cost per year @R0.75/kg:	R128 250.00
Acid Life Extender 2X consumption:	0.0248l/t
Cost per year @R350.00/l:	R260 400.00
Electricity consumption:	222kWh/week
Cost per year @R0.70/kWh:	R7 459.20
Water consumption:	20.2kl/week
Cost per year @R17.77/kl:	R17 229.79
Total cost per year with Acid Life Extender:	R413 338.99



Typical two chamber automatic back wash filter



Typical layout of the system with filters and backwash

Cost Saving per year:	R936 661.01
Cost Saving per month:	R 78 055.08
Percentage Saving:	69%

INVESTMENT RECOVERY

The capital cost associated with the introduction of the Acid Life Extender in the acid pickle and filtration, ie:

- initial Acid Life Extender make-up
- filter and pumps
- electrical connections
- pipework, tank conversions, valves, etc

can usually be paid back in 6 to 9 months.


CONCLUSION

- Substantial cost savings can be achieved by using Acid Life Extender, 30% HCl and filtration in the acid pickle.
- Neutralization costs are reduced by continuously pickling at a lower constant concentration.
- Storage, handling and transport of waste acid is eliminated.
- Return on investment is well within acceptable financial limits.

SAMFA COMMENTS ON ACID EXTENDER TECHNOLOGY

During 2010, when the PRO-pHx product was first brought to South Africa the importer engaged with SAMFA to arrange impartial trials with selected industry participants. Using DANIDA funding, SAMFA provided soft loans to three electroplating companies to encourage them to purchase a suitable filter pump which is an absolute requirement for the system to work.

In the November 2010 issue of S A Metal Finisher one of the participants, John Danks, wrote a review endorsing the product provided that the system was properly managed and maintained.

His concluding remarks were: "This is a good idea, providing you have the capital to outlay and some modicum of control over your plant." 

Smartphones supporting sustainable lifestyles as mobile makes its mark on climate change



Smartphones are playing a key role in addressing the challenge of climate change, according to GeSI Mobile Carbon Impact, a new report released today by the Global e-Sustainability Initiative (GeSI), authored by the Carbon Trust.

- ❖ 84% of smartphone users, that also drive a car, use SatNav apps to plan routes and avoid traffic
- ❖ 68% would use a smartphone to control heating or cooling at home
- ❖ Half would replace payment using debit, credit card or cash with smartphone
- ❖ 40% would consider using a self-driving car in future

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The Carbon Trust assessed of a number of carbon saving mechanisms across ten categories. This involved examining a variety of uses of mobile communications technology, from the use of smartphones to machine-to-machine (M2M) connections.

An international study of 4,000 smartphone users across the USA, UK, Spain, South Korea and Mexico was also conducted for the report and found that many people are already using their smartphone in a way that helps cut their personal carbon emissions. Overall, respondents expressed high levels of willingness to adopt new behaviours that could result in even more substantial future reductions.

The research revealed some of the most common uses of mobile which are currently contributing to the overall carbon abatement impact. 84 percent of smartphone users, who also drive a car, use SatNav apps to plan travel routes more efficiently or avoid traffic. 80 percent of respondents use mobile to work or study from home, avoiding the need to travel. Nearly half (49%) of those surveyed stated that they purchase digital instead of physical products, such as newspapers, music and books.

Eighty four percent of smartphone users, who also drive a car, use SatNav apps

Eighty percent of respondents use mobile to work or study from home

Forty nine percent of those surveyed stated that they purchase digital instead of physical products, such as newspapers, music and books

Forty percent would consider using a self-driving car in future

Sixty three percent would replace a non-emergency visit to the doctor with a video call

The research also highlighted potential areas for future carbon emissions reduction from transport. More than half of the car drivers surveyed (55%) would consider having a device fitted that would reduce car insurance if they drove in a safer, more environmentally friendly way. Four in ten (40%) would consider using a self-driving car in future. And just under half (48%) would



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be more likely to use public transport if they had a mobile app to see precisely when the next service would arrive.

There were also indications for how lives might be lived in a more efficient, environmentally friendly way in the near future. 68 percent of smartphone users are willing to use an app to control electrical devices and heating or cooling at home. 63 percent would use mobile to access public services in the future. 49 percent would replace the use of their debit or credit card and cash with their smartphone. And 63 percent would replace a non-emergency visit to the doctor with a video call.

The possibilities for the peer-to-peer and sharing economy were also highlighted in the research. 49 percent would be willing to replace a visit to a hotel with staying in someone's home. And 50 percent would be willing to use their smartphone to sell, rent or share items that they own, with others.

The report also contained the Carbon Trust's quantification of the impact mobile communications technology is having today across all of its applications, including machine-to-machine (M2M) connections. This analysis found that the use of mobile technology in just the USA and Europe is enabling a saving of more than 180 million tonnes of carbon emissions a year, an amount greater than the total annual emissions of the Netherlands.

Luis Neves, Chairman of GeSI, said:

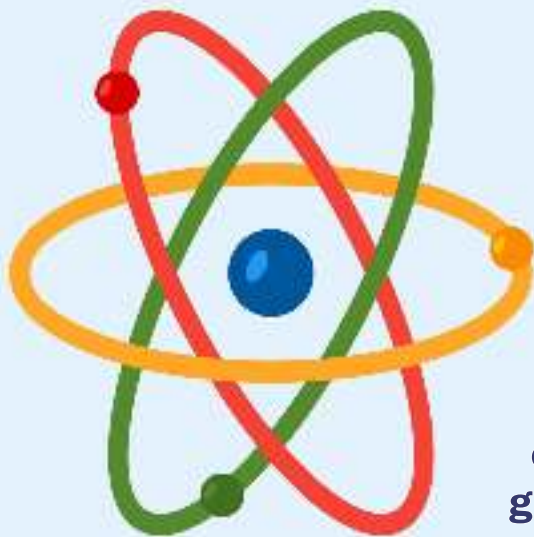
"Advances in Mobile Communications over the last few years are helping to transform the world for the better. We are just at the beginning of an accelerating adoption curve, where businesses, governments and society recognise the wealth of possibilities offered by the technology to do things differently. This report shows that Mobile is already making a real difference across the global economy, helping us to shape a more sustainable world."

Andie Stephens, Senior Consultant at the Carbon Trust, added:

"Mobile is going to have a key role to play in helping to tackle climate change. But the impact the technology is having today is just a fraction of its full potential. Given the urgency of the

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challenge the world faces then there is a clear case to accelerate the adoption of the various mechanisms through which mobile can help to cut carbon. It should also help promote green growth in the developing world, helping them to leapfrog their way to a more sustainable economy.”

Louise Harry, Head of Safety & Sustainability at EE added:

“As the UK’s largest mobile network operator we do our best to reduce our own environmental impact. But we also recognise that we can help our customers to reduce their own environmental impacts through the use of mobile communications. This analysis by the Carbon Trust, on behalf of GeSI, highlights the power of technology to enable organisations and individuals to take action on climate change today across a range of sectors, as well as the growing role it will play in the future.”

Jim Gowen, Chief Sustainability Officer, Verizon Communications, said:

“No single company, and no single country, can realize the full promise of the mobile innovation era on its own. Just as new devices and readily available applications are the technology platforms of the future, we believe collaboration and openness will be the operating platforms of the future – requiring new kinds of partnerships among all the different players in the ecosystem. Verizon is proud to be a part of GeSI and looks forward to continuing the momentum of enabling the reduction of carbon emissions through mobile technology.” 

The report has been funded by GeSI, BT, EE, Telefónica UK (O2) and Vodafone. Technical guidance was also provided by representatives from: Bell Canada, BT, EE, Ericsson, Swisscom, Telefónica UK (O2), Telenor, Verizon and Vodafone.

To read the report and see the infographics in full please visit: www.carbontrust.com/mobilecarbonimpact or: <http://gesi.org/portfolio/report/84>

For more information please contact Ainslie MacLeod or Jamie Plotnek at the Carbon Trust press office on +44 (0) 20 7170 7050



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► Saving time



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Artificially Intelligent Teaching Assistant

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By David J Hill. First published on Singularity Hub, a publication of Singularity University

Meet Jill Watson, a first-time teaching assistant at Georgia Tech assigned to moderate an online forum for a computer science class. Jill was 1 of 9 Teaching Assistants assigned to help answer questions about coursework and projects from the 300 students enrolled in the advanced course.

During the first few weeks in January, Jill really struggled. This was Knowledge-Based Artificial Intelligence, after all, a course with the goal to “build AI agents capable of human-level intelligence and gain insights into human cognition.” It was also a requirement for graduate students to earn their master’s degree. It’s no surprise then that she needed some coaching, especially since feedback is so critical to student success.

“The world is full of online classes, and they’re plagued with low retention rates,” said Professor Ashok Goel. “One of the main reasons many students drop out is because they don’t receive enough teaching support.”

Now a typical class posts approximately 10,000 messages in a given semester. Even though many of these questions are routine, the other Teaching Assistants monitored Jill’s answers until they saw improvement.

“One of the secrets of online classes is that the number of questions increases if you have more students, but the number of different questions doesn’t really go up,” Goel said. “Students tend to ask the same questions over and over again.”

Eventually, Jill got her bearings. By the end of March, she was freely responding to student questions (well, at least, when she was fairly certain of the answer). She was also posting reminders of due dates and providing midweek prompts to encourage discussion.



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However, near the end of April, Professor Goel had to come clean to the students: Jill was in fact software powered by IBM Watson.

Here's the problem: Since the class first launched in the fall of 2014, the online forum had logged 40,000 posts, many of which were straightforward questions, such as inquiring about the location of assignments and readings. But even with a large team of Teaching Assistants, the number of posts was simply overwhelming. Last year, Goel decided to work with his Teaching Assistants to leverage this database of questions and code a virtual TA.

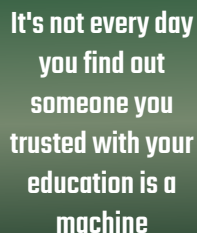
They gave Jill a threshold of 97 percent certainty before answering a question. They had her post answers in a private forum first so they could be screened. And of course, everyone had to keep up the ruse that Jill was actually a person.

Because of how well Jill performed her tasks, Goel plans on bringing her back next semester under a different name with the goal of accurately answering 40 percent of all questions by the end of the year. With Watson fielding the questions that have clear answers, the other Teaching Assistants are freed to tackle the more technical or even philosophical questions that arise in the course.

It's not every day you find out someone you trusted with your education is a machine. So how did students respond to the news that they had an AI among them?

According to Georgia Tech, the class was surprised though the general response was fairly positive. Student Jennifer Gavin told *The Wall Street Journal*, "It seemed very much like a normal conversation with a human being." The ruse, however, wasn't perfect—a few students suspected early on that Jill might be a computer (although other human Teaching Assistants also were suspected of the same). Still some of the students were inspired to start an open source project to make their own version of Jill.

Perhaps it isn't too shocking that the computer science students reacted this way, given that it is a course on building AI. However, this is likely not how the general public would react.



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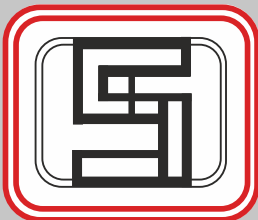
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In a recent online survey on artificial intelligence conducted by the British Science Association, nearly half (46 percent) of respondents opposed imparting AI with emotions or personality. Additionally, 60 percent felt that AI will lead to fewer jobs in a decade's time, with 27 percent indicating that decline would be significant.


Watson is demonstrating the kind of feats artificial intelligence will continue to accomplish in coming years, especially involving tasks that process information with clear connections. AI will allow human workers to focus on more complex tasks that require creativity, critical thinking, communication and collaboration (also known as the four Cs). The fear, which the survey reflects, is that this transition will ultimately lead to significant job loss.

The fear, which the survey reflects, is that this transition will ultimately lead to significant job loss

In the case of Jill Watson, no TA lost their job...yet. But if the AI can handle 40 percent of student inquiries, will they really need 8 humans in years ahead?

Another interesting aspect of this story is how students associated personality and characteristics to Jill. Even though the priority wasn't to make a personable AI, there was a certain threshold of believability to be maintained that required emulating personality.

On its own, personality isn't actually a concrete thing—it's something we infer from a collection of behaviors that map onto a mental matrix we label as personality types. Given the constraints of an online course forum where one judges personality from Q&A exchanges, Jill seemed to pass most people's rudimentary Turing tests.

With this experiment, it's fairly safe to say that AI is coming of age. That means, we'll be finding ourselves in more situations where we ask someone, "Are you a computer?" 



David J. Hill

Managing Director, Digital Media at Singularity University.

I've been writing for Singularity Hub since 2011 and have been Editor-in-Chief since 2014. My interests cover digital education, publishing, and media, but I'll always be a chemist at heart.

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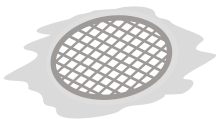
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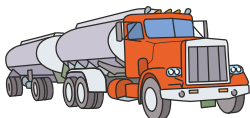
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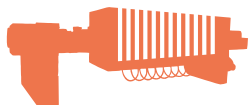
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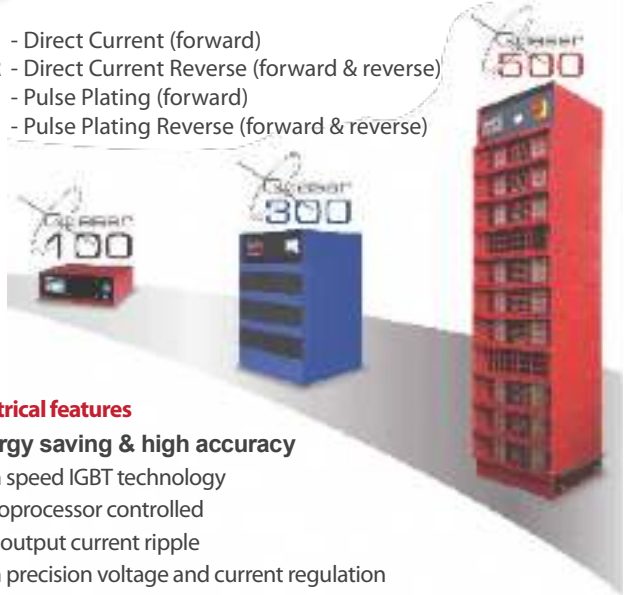
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