

Gravure Stamp Cylinders: Part 2

by Glenn H Morgan FRPSL

With traditional cylinder production techniques covered in Part One, Glenn now integrates the story of modern production methods with his visit to Saueressig.

It was inevitable that newer technologies would one day take-over from many of the old-fashioned procedures described in Part One as a means of getting stamp imagery onto a cylinder. However, unlike the video recorder wars (Betamax *versus* VHS), where the latter was to reign supreme, the two main engraving systems co-exist, with each having their devotees.

These systems are now the most commonly used means of cylinder imaging for postage stamps and commercial printing worldwide, coming about as a direct result of advances in electronic technology. They have their origins back in 1959 when the first gravure reproduction based on electronic engraving techniques occurred at what is now Hell Gravure Systems, but around three more decades were to pass before these advances were utilised for British stamp production.

Engraver brands and systems

The 'wars' relevant to electronic engraving are DLE (Direct Laser Engraving) *versus* EME (Electro Mechanical Engraving), with the short form EME wrongly being applied by most collectors to both types of engraving method. Perhaps 'electronic engraving' is a better generic expression, as used here, because it can apply equally to DLE and EME.

DLE These electronic engravers are mainly supplied today by Hell Gravure Systems GmbH [Germany] which uses lasers to create the cells. Hell (who also offer EME equipment) are the market leader in DLE with its roots being in the invention of EME by Dr Rudolf Hell. Core areas today are 'packaging and publication gravure and flexographic printing'. Daetwyler, from Graphics AG [Switzerland], is a brand once utilised by Walsall in the 1990s.

EME The current leading brand name for EME engravers is Ohio from Ohio Gravure Technologies Inc. [USA], which employs a diamond stylus tool to create cells. Ohio describes itself as 'an engineering research and development, manufacturing and software development company'. Founded in 1978, it has 'a broad and deep expertise in gravure printing' with its customer and equipment base extending to 50 countries.

Incidentally, whether acquiring Ohio, Hell or Daetwyler engravers, the purchaser is buying from the same group, as all three companies are partners of Heliograph Holding GmbH of Germany.

Usage of electronic engraving on GB stamps

Royal Mail standardised on gravure as its preferred method for printing definitive stamps, since it is considered to be a more secure process. Gravure is expensive, hence its limited use on special stamps, although it is still used for Pressure Sensitive Adhesive (PSA) specials because printing on the web is a necessity for these stamps as there is the need to die-cut and, invariably, matrix strip the stamps. These procedures are not feasible if printing on pre-cut sheets, which is often the method used for litho-printed stamps.

Electronic engraving offers far better detailing, with the differences being quite noticeable when comparing actual stamps side-by-side with traditionally etched examples.

Cylinders for the long-running Machin head design have moved from an etching method to electronic engraving...

Traditional method

Acid-etching and original multi-positive head.

Basic quality

Interim EME

An advance, but still using original multi-positive head.

Improved quality

Modern EME

Eventually, a digitally remastered Machin head was made.

Finest quality

All printers of British stamps eventually utilised electronic engraving and details of when they adopted a system along with initial output for Royal Mail follows.

1990: Enschedé This Dutch printer produced the 18p definitive in late 1990 using cylinders that had been electronically engraved in-house using its Hell EME Klischograph system, virtually eliminating constant flaws and sharpening stamp images at a stroke. 1994 saw the release of the *Europa: Medical Discoveries* set, the company's first British commemoratives by this method. Enschedé had set a benchmark that other printers of stamps had to follow.

1996: Harrison This printer continued with acid-etching until 1996, first using the Hell DLE system for the *Centenary of Cinema* commemorative issue. Its initial use of electronic engraving for definitive stamps was probably in late 1996 for 2nd class NVI coils.

1997/8: Walsall and House of Questa Having to purchase gravure production equipment if they wished to continue printing definitive stamps for Royal Mail meant that Walsall and Questa were late-comers to that process and could go straight to electronic engraving, bypassing traditional carbon tissue methods of cylinder making. Walsall's first gravure definitives appeared in 1997, along with the *Europa: Horror Stories* commemoratives that same year. Questa followed, with definitives in 1998 and the *Millennium: Patients' Tale* set in 1999.

1998: De La Rue The first De La Rue imprint appeared on a British gravure commemorative set in 1998 (*Children's Fantasy Novels*) after having bought Harrison the year before and continuing to use its High Wycombe facility and equipment, thereby re-entering the stamp production market by default. The company continued to use cylinders with a Harrison imprint in the margins of its definitive sheets for some considerable time after 1997, as they were perfectly serviceable.

A strategic decision was made by De La Rue that it would outsource cylinder making, possibly as a result of its 2002 purchase of Questa, for they were primarily using Apex Cylinders by this time.

A clash of screens...

Collectors had generally understood that there was no way of identifying whether a stylus or a laser had created the cylinder cells when examining an enlargement of a multi-coloured postage stamp, however this is not the case according to Saueressig.

To tell if an EME or a DLE engraver was used, check for 'screen-clash', as only EME can create a complete 'rosette' pattern - DLE rosettes will always look imperfect.

(Unsurprisingly this method cannot be used if examining a mono-coloured stamp, such as most Machin definitives, as there is only one screen used and therefore nothing to clash with.)

With the background story behind competing electronic engraver types and initial usage on British stamps now told, it's time to go behind the scenes at stamp cylinder manufacturer Saueressig and to record the current processes used by them for Royal Mail products.

From Apex to Saueressig

'Apex Cylinders Ltd' was founded in Bristol during 1990, initially as specialist engineers manufacturing gravure printing cylinders, later adding graphics division 'Studio 404'.

After five years experience in the high quality end of the gravure market (mainly tobacco), Apex first approached The House of Questa in 2000 regarding manufacturing stamp cylinders for them. The first orders were received in 2002 with the intention of Apex supplying 10% of their requirements. Within 12 to 18 months, 90% of Questa's requirements were being met by Apex. This formed the basis of the current relationship with Royal Mail.

De La Rue (purchasers of Harrison in 1997 and Questa in 2002) and International Security Printers (ISP) both outsource to Apex, or rather to 'Saueressig Ltd', for on 20 July 2015 there was a company name change to reflect the title of its parent company, which had been founded in Germany during 1953. Saueressig has always been a part of the Apex business, having been an initial shareholder.

At the time of the change, a spokesperson for Saueressig Germany said: *"The qualities that gave Apex Cylinders its competitive advantage - its diverse range of products and services, a strong commitment to customer service, a firm belief in core values and most importantly, a skilled and dedicated workforce - remains unchanged. Subsequently all rotogravure companies within the brand deployment division of Matthews International will be aligned within the Saueressig brand. This move will both enhance and enrich our identity, ensuring a more unified and successful future."*

Important though this name change is to the group, for the 50 staff at the Bristol site it is very much 'business as usual', with everyone continuing to meet the diverse requirements of its many clients and adhering to the ever-present (and ever-tighter) deadlines.



Fig 1 A general view showing part of the Saueressig UK cylinder production area.
 Image © Saueressig Ltd.

A visit to the firm afforded an opportunity to witness modern developments (*Fig 1*) and to see how electronics have improved the quality of modern stamps. Emphasis is on Ohio stylus engravers, but general principles apply equally to the Hell laser machines used at the Haarlem premises of Joh. Enschedé, as it is primarily cell creation methods that differ.



Fig 2 The first ever Daetwyler multi-tasking robotic crane system is in use to ensure maximum use of automation.
 Image © Saueressig Ltd.

Saueressig provides Britain's most comprehensive range of highly automated production facilities (*Fig 2*) in the tobacco, security, flexible packaging and decorative markets and is the only company in this country that engraves postage stamp cylinders. The Saueressig presence in Turkey (trading as Kroma Pre-Press Preparation Systems until last July) produce cylinders for printers that supply Posta Telgraf Teşkilatı (Turkey Post) with its stamps.

Being a part of the much larger Matthews International group (a global brand based in the United States with main interests in memorialisation services), means that Saueressig UK has access to a full range of equipment worldwide (such as Hell DLE machines) to meet the needs of its customers in rare instances when it cannot fulfil directly from Bristol.

Modern cylinder production

Artwork, 'repro' and colour management

For 14 of its 25 years, Apex, currently via De La Rue and ISP, has worked with Royal Mail, providing it with artwork, repro, colour management and cylinder making facilities for British stamps in all formats.

Criteria Stamp work is undertaken by Saueressig's graphics division, Studio 404, based on the same site as the engineering division. When a new Royal Mail stamp project is presented, the studio will need to know various criteria before it can start work, such as:

- type of **substrate** to be used (water-activated [WAG] or pressure-sensitive / self-adhesive [PSA]),
- what **printer** will produce the job (generally De La Rue or ISP, but it could be others, such as with the Olympic Games in 2012),
- what type of printing **process** will be used (usually gravure, but offset pre-press work is also undertaken, but not the subsequent making of offset plates), and
- whether there is an agreed **ink supplier** (invariably Sun Chemicals or SICPA).

The answers provided to these questions will enable an appropriate workflow unique to that project to be created, as with other retail products such as cigarette packets and crisp bags.

Visuals These are produced by Royal Mail, the creative agency or solo designer and are sent to the chosen stamp printer to indicate how the stamps might look. Most of the time an Epson or other digital proof will be supplied to Studio 404 and while it is a good rendition of the final stamp, it is not a fully accurate version. It does not, for example, take into account that the proof may be on a slightly yellow paper, or that it is to be printed on a self-adhesive stock so may eventually have a slight grey or blue hue to it.

Artwork The printer supplies the basic artwork file (i.e. any material or image prepared for graphic reproduction) and once it has been booked into the production system it will be examined to see if there are any immediate questions. When all answers are to hand, the file is manipulated and output as a solitary image file (i.e. one copy of a single stamp design).

With artwork files (as created by Royal Mail or its agency), every colour butts-up to each other without any white gaps or overlapping between design elements. It is not a file that can be used to print from, that is called 'repro' (reprographics: the process of producing colour separations from artwork for image carrier production).

Repro Clients may choose to let Studio 404 undertake repro from supplied artwork, or the studio uses pre-supplied repro direct from the client, in which case *Postscript* files (a page description language from Adobe that describes the contents and layout of a page) are created enabling the studio to turn the file into electronic engraving data. This is achieved by a software package called *ArtPro* (a full-featured pre-production editor, similar to Adobe *Illustrator*) that is highly accurate allowing massive enlargement on screen and colour separations.

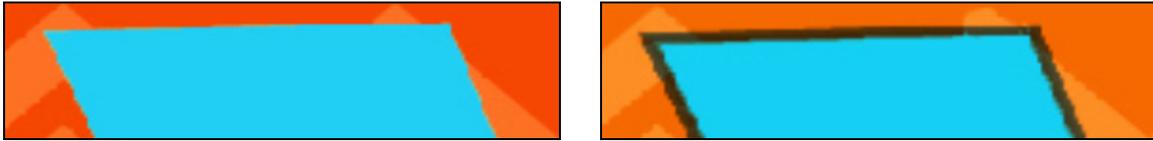


Fig 3 Artwork: pre-trapping (left), Repro: post-trapping (right). Images © Saueressig Ltd.

Colour 'traps' (trapping: the ability to print a wet ink film over previously printed ink) are added, whereby certain colours are overlapped by other colours (Fig 3) to avoid white lines between design elements. Generically within security print traps are much smaller than for commercial print.

Marginal inscriptions are specified by Royal Mail and, depending on the printer, Studio 404 will either incorporate the inscriptions or they will already be on the complete repro supplied. Registration markings that are unique to each press type are also added to the electronic file at this stage to ensure accurate registration when printing is underway. Much to the disappointment of collectors, a good deal of this information gets removed when guillotining the printed press sheet down to counter sheet size (or other format, such as booklets). That said, some colour control strips frequently remain on the margins of the issued item.

The image for a stamp is invariably stretched beyond its intended size when preparing repro, as most materials are unstable and the gravure process involves solvent-based inks that have to pass through a drying unit at each colour station and this intense heat progressively removes moisture from the substrate, shrinking each stamp as it passes through the press until it eventually reaches its intended size.

Inks It may seem odd that Saueressig is involved with inks, but the formulation chosen is a crucial element because, even for the same colour, the ink mix used with WAG papers would be different to that used with PSA papers. This is because the translucency of the ink takes on some of the colour of the substrate below it and impacts on the appearance of the finished stamp. If this aspect was to be ignored, an identical stamp printed on both WAG and PSA paper would potentially be visually different.

With the creation of any ink mix, you start with a range of 12 colours to make all other colours and shades required for the printing process. Inks are of different formulations, so Pantone 123 (yellow), for example, does not exist as a pure yellow ink but comprises yellow, plus some red and maybe a little orange. The 'recipe' will be tweaked until the correct printed result required by Royal Mail is obtained and will be saved as an ink formulation for the next time that it is required on the same substrate. This attention to detail by Studio 404 is a great help to the stamp printer, as it gets them 95% of the way there, leaving the stamp printer to simply make final adjustments.

The smaller the engraved cell, the larger proportion the pigment represents and the greater chance of ink getting stuck in a cell, especially for metallic or white inks with their platelets (particle sizes) gradually clogging-up the cells. While normal organic inks are fine, it is a further reason why Saueressig needs to be involved with knowing what inks will be used.

There are times when 'electrostatic assist' (ESA), known as Electrosist in America, is used by printers, whereby electrostatic forces help draw ink from the gravure cells, ensuring fine reproduction and the avoidance of white unprinted cells (the 'snowy' effect sometimes seen on stamps without ESA). If organic inks are used at the beginning of the press and the printer

wanted to use the assist, that would be fine, similarly if they then wanted to print metallics that would also be OK. However, if the printer needed to print metallics first and then follow that with organic inks they would not be able to use ESA because of the fear of arcing and other fire risks that health and safety regulations rightly control.

Substrates and cylinder circumferences also play a part in releasing ink from cells. Depending on the press, paper may run through at between 60/100 metres a minute for stamps, whereas commercial packaging is around 300/500 metres, as final quality is less critical. Similarly, a 350mm or a 700mm circumference cylinder react differently when on press owing to rotation speeds.

Mock-ups The studio now has a full mock-up facility for packaging prototypes ('concept proofing'), but this would not generally be of use to Royal Mail unless a major new packaging format for a product such as presentation packs was contemplated.

Colour management Much of the work done within colour management is software based, with GMG being the favoured suite of packages used by Studio 404. Adobe describes CMS as: *"a collection of software tools designed to reconcile the different colour capabilities of scanners, monitors, printers, image-setters, and printing presses to ensure consistent colour throughout the print production process. Ideally, this means that the colours displayed on your monitor accurately represent the colours of the final output. It also means that different applications, monitors, and operating systems will display colours consistently"*.

Single image proofing

With preparatory work completed, 'contract proofing' in the form of a paper proof ('hard copy') or online proof ('digital PDF'), is undertaken. The importance of stamps to Royal Mail means that they will go back and forth via its printer, retouching and amending for up to a week, until it gets a single-image proof that has the quality of reproduction that it seeks. Incidentally, what a collector calls a proof, Royal Mail refers to as an essay, even in instances where the proof is not changed prior to sign-off.

Once the Stamp Advisory Committee has given its approval and the proofs (essays) have been provisionally approved by Royal Mail, they are submitted to HM The Queen for her approval. Only after Royal approval has been given can the printer get Saueressig to manufacture final cylinders with multiple images for printing.

From one stamp image to many

The process of turning an approved single stamp into many stamps is known as the 'step-and-repeat' stage, and involves production of a computer file for counter sheets, booklets, miniature sheets or other format. This replication is done at Studio 404, by the printer or at Royal Mail.

Image Processing

Two different methods can be used for image processing (the creation of a master computer file of stamp repro in a press-sheet format) when using electronic engraving systems. The first type involves a direct positive photographic film image mounted on a synchronised rotating drum. The data is read by an electronic scanner, digitised and processed ready for

subsequent engraving. The second method, as at Studio 404, is via direct electronic transfer, where the image information is scanned and transmitted to the engraver for outputting.

A greyscale TIFF image file is created for each colour separation, which is passed to the engineering side of the business to create the cylinders.

EME Cylinder preparation

Timescales Two decades ago a cylinder maker might have been given five weeks to turn around a job, but today that timescale is down to between five and ten days. This is partly due to newer technologies, but also higher client expectations.

Physicality Stamp cylinders are created uniquely for each printing press, so there is no standard specification, sufficient to say that they vary from roughly 500mm to 1,100mm in width, weigh between 40kg to 150kg and have a circumference of circa 500mm to 700mm.

Components Cylinders comprise three parts: a **hollow tube**, or inner core, made from ex-Russian gas pipeline, **end caps** welded to the tube and a **spindle** (or shaft) fixed centrally to each cap to enable mounting and subsequent rotation on the press.



Fig 4 A De La Rue printing cylinder with its identical shafts.

Upright and inverted The shape of the spindles are identical at each end, so a cylinder, as seen on a De La Rue dummy stamp (*Fig 4*), could potentially be mounted onto the press one of two different ways, resulting in the complete sheet coming off the press either inverted or upright. This difference is not noticeable, or of concern, when single sheets or individual stamps are viewed by an average stamp collector. However, for philatelists interested in the Direction of Print (DOP), they may find that a stamp reprint has a different DOP to the original printing, meaning cylinders had all been mounted the opposite way when reprinting.

The nightmare scenario would occur when one cylinder out of, say, four is mounted the opposite way to the rest, hence Harrison at one time using 'Gear designation' markings (see Part One) to avoid this unthinkable prospect.

Base stock Engraved cylinders are produced from two types of base stock. There are the old cylinders (*Fig 5*) that have been returned to Saueressig for re-use bearing an obsolete image and a chromed surface, and new cylinders (*Fig 6*) with a bare steel surface. Both types are processed in a different manner before being put into initial, or repeat, service.



Fig 5 Cylinder deliveries back from the printers, covered with grease and ink and awaiting processing.



Fig 6 Brand new steel base cylinders for future use.



Fig 7 The copper bath, which uses a similar procedure to the nickel and chrome baths.

Old cylinders are first chemically 'de-chromed', which still leaves the imagery on the cylinder at this stage. The top layer of copper with its obsolete design is then 'skimmed off' on specialist equipment and a new, additional, layer of copper is deposited on the surface (*Fig 7*), building up the circumference to the precise measurement required.



Fig 8 A cylinder after receiving its primer layer of nickel.



Fig 9 Cylinders with a copper layer grown over the nickel.

New base cylinders comprise 10-15mm thick mild steel tubes with a specially finished surface. These are given a layer of nickel (*Fig 8*), which acts as a 5 to 10 micron primer layer and gives the subsequent copper layer (*Fig 9*) something to grip onto, for without it there would rapidly be de-lamination and separation of the surface because steel is not a suitable face for copper to adhere to.

Metal deposition Both the nickel and the copper deposition is applied by the electro-plating method using electrolytes and a charge. The cylinder is fully or partially immersed in a bath containing copper or nickel ingots, which are given an electrical charge and the rotating cylinder slowly becomes plated with either the nickel or the copper. In the case of the copper, it is applied just in excess of the desired circumference to allow a 'surface profile' to be created (see Part Three). This whole process can take up to eight hours, depending on the amount of metal to be deposited, and is a process virtually unchanged for more than a century.



A copper-faced plate about to receive a nickel deposit at printer Eyre and Spottiswoode. Aside from it being a plate instead of a cylinder, little has changed in more than 100 years. The modern-day baths at Saueressig would be instantly recognisable to the young man in this 1913 photo.

Image entitled 'The Nickelling Bath', as printed in Stanley Gibbons Monthly Journal, 30 April 1913.

Next time: Glenn concludes the story of modern electronic engraving and his visit to Saueressig.