

Innovation VOLUME II · 2013

MintWorld Compendium

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HIGHLIGHTS

Thoughts about Innovation and the Coin Industry

Latest Innovations

Successful Site Development

Vending: a Key Player in Innovation

Innovation

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EDITORIAL

The Coin Industry - Between Innovation and Tradition

It's become something of a buzzword – being 'innovative' is a must for our times. Innovation represents the ability to master the market of tomorrow. Even todays' governments are concerned with keeping their industries 'innovative.'

That being said, are constant innovations really the be all and end all? There has to be more to it than simply bombarding the market with unnecessary and unwanted new inventions. There's nothing I find more irritating than today's ever-changing computer programs. Do I really need all these muchtouted improvements and updated versions I only understand a fraction of anyway? These superfluous program changes and constant updates do nothing but get in the way of important work, since I now have to spend time reconstructing and figuring out under which new menu items all the old functions are hiding. In no other area of the economy is innovation so widespread as in the computer industry. And in no other field does the average user get so left in the dark. The only way the industry keeps us in line is with the threat that only the newest versions will be able to communicate with one another without any issues. Then we buy, buy and buy ...

Fortunately, the coin industry has not yet adopted 'innovation' as the only way of doing or looking at things. There are other values at play here. Let's take, for example, the issue of dependability. The best advancement in our field is not a brilliant invention, but rather a basic, underlying idea that is continuously developed and refined, with the ultimate aim of achieving perfection. It's no wonder then that this market is made up primarily of companies that have already been around for many decades. In our industry, having a precise knowledge of the market and its actual needs is a prerequisite for further developing new technologies.

To me, the true innovation that has led to the thriving evolution in coinage technology is something completely different: The close collaboration between mints in the MDC, the cooperation of suppliers and manufacturers and the contact between coin manufacturers and the Vending-Industry. Whereas once upon a time, one was careful to guard one's knowledge, today, development has been ac-



celerated by the fact that so much insight and knowledge, even just questions, can be easily shared. This open communication has also made it possible to better understand and classify the impact of a new idea in advance.

MintWorld also wants to make a contribution through the transfer of knowledge. And we thank all the contributors to this issue for their willingness to share their knowledge and experience with readers.

This booklet is intended as a sort of overview, taking stock of the topic of innovation – what is innovation exactly and, above all, how does one achieve innovative thinking? We look at what international collaboration has meant for the coin industry in terms of innovation, and also which major innovations have come about in recent decades.

The main section is dedicated to innovative thinking. Various authors have presented us with their latest innovations.

The third section is once again reflective. It takes a look at what other factors also must be taken into consideration in order for a valuable innovation to also have a place in everyday life.

As Louis I of Bavaria once said at the beginning of the 19th century: 'What is old and good should remain that way. What is old and in different might remain. What is old and bad, I want to overthrow, even if it has existed for a thousand years.' Allow me to modify this quote slightly: What's defining about a development is not whether it's innovative or traditional, but rather only if it is good and purposeful.

Ursula Kampmann

Editor of MintWorld and MintWorld Compendium

Title photos: Museum Münze Hall, Slovakian Mint, Museum Stuttgart Mint.

Innovation – Invention – Progress

Text Wikipedia

Innovation

Innovation is the development of new customers value through solutions that meet new needs, inarticulate needs, or old customer and market needs in new ways. This is accomplished through different or more effective products, processes, services, technologies, or ideas that are readily available to markets, governments, and society. Innovation differs from invention in that innovation refers to the use of a better and, as a result, novel idea or method, whereas invention refers more directly to the creation of the idea or method itself. Innovation differs from improvement in that innovation refers to the notion of doing something different (Lat. innovare: 'to change') rather than doing the same thing better.

Invention

An invention is a unique or novel device, method, composition or process. It may be an improvement upon a machine or product, or a new process for creating an object or a result. An invention that achieves a completely unique function or result may be a radical breakthrough. Such works are novel and not obvious to others skilled in the same field.

Some inventions can be patented. A Patent legally protects the intellectual property rights of the inventor and legally recognizes that a claimed invention is actually an invention. The rules and requirements for patenting an invention vary from country to country, and the process of obtaining a patent is often expensive.

Progress

In historiography and the philosophy of history, progress (from Latin progressus, 'an advance') is the idea that the world can become increasingly better in terms of science, technology, modernization, liberty, democracy, quality of life, etc. Although progress is often associated with the Western notion of monotonic change in a straight, linear fashion, alternative conceptions exist, such as the cyclic theory of eternal return, or the 'spiral-shaped' dialectic progress of Hegel, Marx, et al.

Progress, Innovation and Invention

Language Also Continues To Evolve

Text Björn Schöpe

Language can be viewed as a reflection of the needs of the society that uses it and their range of experience. Similarly, looking at the history of words themselves can reveal something about the society in which a term has been coined and used.

Progress

The English word 'progress' comes from the French 'progrès,' which, in turn, comes from the Latin word, 'progressus.' The initial meaning, both figuratively and literally, is the neutral 'to advance, to move forward/ahead.' We first encounter this sense of 'progress' in literature from the middle of the 16th century, but somewhere along the way, the connotation of 'moving ahead' or in a direction towards something was lost. In the 18th century, the Enlightenment appropriated the term 'progress,' and from then on, it took on the meaning of a 'positive development.' It became an ideologically based concept for the perceived forging ahead towards a better overall humanity, a sense that would be implicit in any scientific or technological advancement. Along the way, the word was adopted as a borrowed word on the other side of the Rhine, such that the word was recreated in German, with 'pro-grès' becoming 'Fort-schritt' (ahead step). The modern meaning that was already inherent in the French only caught on later. Before this, it described in German, much like earlier in the French, a concrete movement.

Invention

'Invention' underwent a similar transformation in meaning in France during the Enlightenment. The Latin origin of the word, 'inventio,' means to come upon, to discover something. As a matter of fact, the dictionary of the Brothers Grimm has an entry for the German word 'Erfindung' (invention) that refers to this

original meaning of 'discovery.' As such, one 'erfand' (past-perfect conjugation of German verb 'erfinden') a new continent, insomuch as it was 'discovered.' In the 15th century, however, the French used 'invention' not so much for the action as for the object, what was invented. A new machine or a particular piece of art were just as much 'inventions' as was discovering a new natural law. It was only more than a hundred years later that the word also began to be used for the actual act of 'inventing.' Much like 'progrès,' the word 'invention' has been used in its modern sense primarily in the fields of technology and science since the time of Enlightenment in the 18th century.

Innovation

Beyond inventions, innovations are another thing that bring about progress. Innovations offer a different way of thinking, a novel approach to familiar processes, and it's precisely this sense of novelty that is hidden within the word. Innovation - the French 'innovation' as well as the other Romance language counterparts of the Spanish 'novación' or the Italian 'innovazione' - still contain the Latin root 'novus' or 'new.' The word was originally used by French lawyers in the 13th century to convey that something new had been introduced to an already established context or connection. Three hundred years later, non-lawyers also took it to mean the act of renewal. The 'thing' that was being done differently however, the 'novelty' itself, only came to be described by the word 'innovation' in the 18th century. Once again, the enormous spiritual transformation initiated by the Enlightenment brought about a change in meaning. Today, the word is used extensively in both the world of industry and business.

The word 'innovation' only caught on in German during the 19th century, when it was imported from the English-speaking world. Still, even the Grimm Brothers' large dictionary of the German language that was started in the 19th century does not contain a reference to the term.

Today, it's impossible to imagine modern business parlance without the term 'innovation.' It has become indispensable. If you search the term in Google, you'll get an astounding 58 million results. Amazon lists 1,825 hardcover books, 5,484 paperbacks and 66 audio books on the topic!

The Innovation Indicator Innovation Measured From 1 to 100

Text Björn Schöpe

These words are spoken by the serpent in Irish playwright George Bernard Shaw's play 'Back to Methuselah.' They were also to become one of the favourite quotes of renowned innovator John F. Kennedy, who often used it to end off his speeches. It was a quote that underscored the conviction of his intentions and desire to overcome the challenges of the time through novel, innovative laws. I hear you say 'Why?' Always 'Why?' You see things; and you say 'Why?' But I dream things that never were; and I say 'Why not?' George Bernard Shaw, Back to Methuselah (1921), Part 1, Act 1.

Every society places great importance on creativity and innovation. But just how innovative are individual nation states and their economies? In Germany, the innovation indicator compares the innovative capacity of the most important industrial nations and then uses the data to extrapolate specific, concrete recommendations for action as they relate to economy and policy. The study, which is performed by a consortium of various institutes and founda-

Gesamtergebnis des Innovationsindikators



Main Results.

tions, describes innovation as follows: 'Innovation is defined in the innovation indicator as the execution of new ideas, meaning that innovation processes are regarded as a whole, right through from the initial idea through to the research, development and systematization to the later stages of market development, market launch and eventual market success.' The overall indicator therefore describes a complex system of innovation that involves an interplay of many factors.

How is Innovation Measured?

In the most recent 2012 innovation indicator (which uses the previous year's data as a base), Germany ranks 6th in the so-called overall global indicator, with 56 out of 100 points. Switzerland is in the lead with 77 points, followed by Singapore (63) and Sweden (60). So, Switzerland is the most innovative country in the world, with France sitting only at an average level in 13th place, with 50 points.

But how is innovation really measured and what do these striking numbers really tell us? And even more importantly, how do the numbers come to be? After all, innovation is a phenomenon that ultimately doesn't lend itself to description by absolute figures or data.

Indicators and Size Standardization

The simple score between 0 and 100 provided by the overall indicator offers a vivid measure of a country's rank when it comes to innovation. This number is composed of 38 individual indicators that all carry equal weight. These individual indicators evaluate aspects such as 'early phase investment of venture capital in relation to gross domestic product,' 'number of patents from public research per inhabitant," 'graduates (ISCED 6) in the MINT-subjects (mathematics, information technology, natural sciences and technology) as a percentage of the population' or 'number of personal computers per 100 inhabitants.' The values of these individual indicators are expressed in various ways, some in percentages, and others on a scale of 1-7, etc. In order to compare them to one another, they first have to be converted into a scale of 1-100.

Despite its visual clarity, the overall indicator doesn't reveal much concrete in-

formation about the individual countries in terms of which country does what particularly well or where there may be a particular need for improvement. More details are needed in order to really be able to use the study as a recommendation for action; these details are offered by way of subsystems comprising 5 central fields: economy, science, education, state, and society. The 38 individual indicators are distributed across these categories, but are weighted differently.

The weighting is carried out on a standardized size basis, so, in terms of innovative capacity in proportion to the number of inhabitants. Thus, Switzerland holds the greatest number of patents with respect to its size, which doesn't, indicator), for instance, in terms of number of patents or publications or added value per hour worked in industry.

Switzerland - Small Country, Big Success

If there's any continuity to be found in the results of these studies, it's in taking a look at the first place spot – since 1995, the small Alpine country has continuously ranked first in the overall indicator, despite the fact that there are some outliers for certain individual scores. To what exactly can Switzerland attribute its phenomenal success?

The Swiss economy is strong and committed to innovation, and its diversified structure is optimally suited and





Sub-indicator economy.

however, change the fact that the absolute number can still be much smaller than that of bigger nations like the USA.

Furthermore, the innovation indicator takes into account just how much countries invest in innovation (input indicator), for example, in areas like research or development in companies, and also how much they receive in return (output positioned to serve the demands of the global market. Moreover, its economy constantly demands new technological products, which has led to great research collaborations. The end result of this is an impressive number of patents (1st place in terms of transnational patents, 4th place in patents from public research per inhabitant) and scientific publications (1st place, always in relation to number of inhabitants, of course). The proportion of value added from high-technology is also huge (4th place). Switzerland ranks lower, however, when it comes to factors like intensity of domestic competition (16th place), added value per hour worked (13th place) and national funding of research and development (25th place). Ultimately though, the country always comes out on top, and its steady intensive research and solid education and training ensure it will also continue to excel in the future.

Switzerland is the only country that manages to shine in each of the sub-indicators, even if it does falter here and there in certain individual indicators.

The Sub-Indicators

Economy: Directly behind Switzerland this year in the economy sub-indicator was the USA, a surprising result considering that just one year earlier, they had been in 9th place. There was a great deal of investment following the severe blow dealt by the financial crisis, however, and not just by way of increased national funding of research and development, but also through companies investing much more heavily in this area. The USA was followed by Taiwan, and Germany was next, in 4th place, but also still had above average scores in the fields of 'proportion of value added from high-technology,' 'added value per hour worked' and 'transnational patent applications.' The study also put forward some criticism, noting that in order to emerge as a top future player, Germany should be promoting and funding research and development in companies much more heavily, either directly or through tax incentives. Germany's second major shortcoming is a lack of highly-skilled workers.

Science: Directly behind the Swiss frontrunners in this sub-indicator were the Danes. The Netherlands, with their numerous patents, was next, in 3rd place. Here, Germany once again finds itself among the middle ranking countries, in 11th place. Investments made by Germany in this area over the past years have still not proven fruitful. As was the case in earlier studies, the renowned scientific nations of Great Britain and the USA comprised the tail end of the middle rankings (15th and 16th place, respectively). As it turns out, individual beacons of scientific research like Harvard or Oxford can't compensate for the general average values alone.

Education and Training: Provides the basic foundation for all innovation, be it in research at universities or institutes management. In Finland, the innovation agency Tekes acts as a central point of contact for all stakeholders and communicates information and promotes individual projects and collaboration.





Sub-indicator society.

or in companies. Taiwan and Singapore lead the pack with their outstanding educational systems, showing the rest how it's done. Switzerland follows, in 3rd place. Incidentally, this is the area where Germany shows its greatest weakness - while its vocational training is still excellent, there's a lack of new blood when it comes to higher education.

Nation: Singapore shines here, with 100 out of a total possible 100 points. No other country thus far has supported the distribution of innovative products and development of innovation in companies as intensively as Singapore. As far as passion for innovation is concerned, model country Switzerland still exhibits a fair bit of potential, coming in 5th. Finland is in 2nd place, a result that can be attributed not just to a high national demand for innovative products, but also to their efficient resource

Society: This last sub-indicator evaluates a country's general social framework. Once again, Switzerland is not in the lead. Instead, the Netherlands take first place. The Dutch are very receptive to change and are, in fact, more able than other countries to manage administrative tasks virtually. A precondition for this, of course, is the widespread use of personal computers, and the Netherlands, along with Japan and Norway, leads the list of countries with the highest usage of PCs, followed by Sweden, Germany and Singapore. The USA. on the other hand - the birthplace of Apple and HP - only places among the middle rankings here, in 17th place. At the tail end are the BRICS countries, in particular - Brazil, Russia, India, China and South Africa.

Sweden and Canada are in 2nd and 3rd place, respectively, in the Society rank-



Gesamtergebnis des Subindikators Wissenschaft, 2011

Sub-indicator science.

ings. In Canada, in particular, researchers found a strong presence of so-called post material values, so, for instance, awareness of social and environmental issues. Germany, Switzerland, as well as Austria were next up in the rankings, while Japan and the USA placed only among the lower middle rankings.

Challenges and Problems

Although the study primarily looks at Germany and is geared towards German politics and economy, some of the findings are still relevant to all countries. The key concept is this: knowledge. Investment in education and research is central to all nations' economies. Saving and economizing takes its toll – it may take 9 to 12 years for the effects to be felt, but by then its impact is felt all the more, since failures can't just be ironed out again within a few years.

Moreover, the advent of the new industrial countries is just on the horizon. China, India, Brazil and South Africa will be increasingly shaping the world economy in the years to come, although they're still not investing enough, or the investments are not yet having a great impact. China invests more heavily than the other BRICS countries, mind you, but still sits only in 21st place, behind Spain. China's slow economic growth and inefficiencies with regard to public spending on research and development, in particular, still curb and impede the country's progress at the midway point. It remains to be seen whether or not the private sector can supplant previous state funding, should this at some point be adjusted or reduced.

Japan is an example of partitioning off from the global market and collaboration. This hinders the country from being able to position itself more opportunely and sustainably; it threatens to lose the affiliation.

Another important point highlighted by the study is the significance of women as an underutilized resource. There's an urgent need for a radical change in thinking – no country can afford in the long run not to take advantage of this huge untapped potential, particularly if they want to continue to be among the frontrunners.

The study has an extremely well designed webpage where all the material is presented, including graphics and interactive query options: www.innovationsindikator.de

Although the page itself is in German, there's also an English summary at http://www.innovationsindikator.de/ innovationsindikator-2012/englishextract/main-results/

Do not miss out on our website

www.mintworld.org

Happy Coincidence

or How To Recognize an Innovation When You See One

Text Ursula Kampmann

Naturally, it is prudent planning, thorough customer analysis and sophisticated investment policy that promote innovations. But how about the individual which happens to hit on a stupid idea that later turns out to be an egg of Columbus?

According to the relevant written sources, several important discoveries were made by a happy coincidence. Probably



Alexander Fleming.

the most famous incident of this kind was the discovery of penicillin by Alexander Fleming (1881-1955). However, when looking at this episode in closer detail, it becomes clear that coincidence played but a minor role there.

First of all, Dr Alexander Fleming was not just any doctor. He graduated with the highest distinctions and was actually working on fighting infections. The head of his laboratory, though, thought that infections could be fought with immunization by vaccination. Thus, the laboratory's research concentrated on that approach. Fleming was involved in the work.

In 1922, he observed that nasal mucus completely prevented certain bacteria from growing. That, however, was as far as his discovery reached. He never managed to isolate the substance responsible for that effect.

Finally the big day came when, on a Monday in the summer of 1928, after Fleming returned from a short break and noticed that his Staphylococcus aureus plate cultures had been contaminated by mould. Fleming also realized that the mould had discharged a substance that had inhibited the bacteria.

It was no easy task, however, to repeat that result. Fleming was lacking a skilled chemist in order to isolate and analyze the substance. In addition, his research challenged the life work of his head of laboratory who adhered to the idea of vaccination and required his employees to do the same. That was exactly was Fleming did. In the 27 scientific articles he published between 1928 and 1938 he mentioned penicillin as a possible antiseptic agent only one single time!

That very article was read by the chemist Ernst Chain. Being a German Jew, Chain had immigrated to England. From his native country, he already knew an antiseptic medication and was looking for other substances with similar potential. Fleming's paper drew his attention to penicillin. He successfully tried to concentrate the agent and used it in the animal tests necessary. When he published his discovery he aroused attention all over the world.

The further development was closely linked to World War II. A country in possession of a magic cure of gangrene could send cured soldiers to the front more quickly. Hence, research was done under high pressure. As a matter of fact, in the United States of America a mould species was discovered that allowed the production of penicillin in high quantities speedily and effectively. At that point, the big pharmaceutical companies entered the business and made penicillin become an inexpensive drug that saved the lives of millions of soldiers and civilians alike.



Ernst Chain.

For that discovery, Fleming and Chain shared the Nobel Prize. And the Oslo committee evaded the decision who of the two was of greater importance for the development of one of the most important drugs ever discovered.

Innovations and the Coin Producing Industry – Some Insights

MintWorld has asked a few questions about innovations and the coin producing industry to Prabir De, Director of Operations at the Royal Australian Mint and Head of the Technical Committee of the Mint Directors Conference.

Could you list for our readers the 5 most important innovations in coin production which have reached series-production readiness within the last 10 years?

The most important innovations in the coin industry over the last 15 years include:

- Bi-metal coins incorporating latent images which provide much higher security than mono metal coins.
- Coloured coins capable of carrying attractive colour designs and photographic images.
- Selectively gold plated coins.
- Hologram coins.
- Convex coins, which suit the use of intricate designs and colour images on the inner surfaces.
- Larger size 1 kg, 5 kg and 10 kg precious metal coins which attract investors who would not normally participate in the coin industry.

Which features are necessary to distinguish a nice idea from a real innovation?

I consider 'real innovation' to be any change that is a 'quantum leap' and 'nice idea' to be any change that is a 'small advancement.' The difference between the two concepts may be illustrated by their relative positions on the letter 'S'. The stiff rise in the middle section of the letter 'S' denotes a 'quantum leap' while the other (more gradual) rises are small advancements or 'nice ideas'.

What makes a company an innovative company? In other words: How can a company encourage the staff to search for new ways to solve old problems?

Innovation is a much used terminology with a variety of definitions. To me, innovation is a combination of two elements:

1. Corporate mindset - an innovative

company invests in its people and its leadership.

2. **Corporate culture** – together, people and leadership foster an innovative corporate culture where it is everybody's business to identify and contribute towards innovative products, processes and services.

People means both staff and customers. Each staff member should be encouraged to:

- continually develop the skills that the company needs;
- acknowledge and learn from those in the company with specialist skills;
- 'work locally, think globally' which means staff knows which piece of the company jigsaw puzzle their work represents, and also what the finished puzzle looks like;
- commit to gathering business intelligence and sharing ideas;
- understand their customers' needs even if they do not deal directly with them; and
- for those who deal directly with customers, encourage customers to offer ideas to improve products, processes and services

The leadership's job is to:

- support and promote professional learning and research and development;
- show willingness to experiment;
- ask questions not only to seek information but to challenge the status quo;
- not think that they are the only ones in the organisation with good ideas; and
- put in place systems that capture ideas from staff and customers.

Among your mint values I have found some lines about innovation: 'We continually seek to identify and implement bet-



Dr Prabir De Director Technical and International, Royal Australian Mint

Dr Prabir De graduated in Mechanical Engineering from the University of Calcutta in 1976. He finished his M.Sc in Machine Tool Technology and Design and Ph.D in Management Sciences from University of Manchester Institute of Science and Technology (UMIST). He was a Mohn Research Scholar of UMIST in 1979 and 1980.

Dr De began his career at the Royal Australian Mint in 1987 as the Mint's Production Manager. Over the last 25 years he has held different positions in the Mint – Production Support Manager, Production Director, Facilities and Quality Director, Operations Director and Chief Operating Officer.

Currently he is the Royal Australian Mint's Technical and International Business Development Director. He has been the Chairman of the International Mint Directors Technical Committee for the last 10 years facilitating projects in the international minting community and directly with other international Mints.

ter, safer and more cost-effective ways of doing what we do, encourage others to do the same, and keep ourselves up to date on relevant developments elsewhere.' Can you give us an example how you implemented these high demands?

These start from the Mint's annual strategic planning exercise. The Mint's Strategic Plan is formulated by senior and middle managers. Together, all managers commit to specific goals to be pursued with trust, honesty and integrity. We also try to involve other Mints and research institutions both in Australia and overseas, to avoid their having to reinvent the wheel. Our senior staff members mentor new industry comers to help them to establish quickly in the industry. The Royal Australian Mint has been responsible for developing new currencies of many different nations. Does this have an influence on a climate of innovation within the Royal Australian Mint? Or do we have to see it the other way round: Are new currencies a possibility to check the suitability for daily use of an innovation?

It is true that the Royal Australian Mint has been responsible for developing new currencies for a number of nations in the last two years. Reinforcing the point that innovation does not extend only to products, the Mint's innovation resides in an innovative business model.

Do you have an example for me?

Many small countries do not have expertise in the technical aspects of coin and/ or security logistics. Some do not even understand the seniorage system. They need assistance over and above the supply of coins. The Royal Australian Mint provides a one stop coin solution to these countries.

How important is the international cooperation within the MDC concerning the promotion of innovation?

MDC was originally established in1958 by seven influential European Mints for the purpose of promoting technical exchanges.

MDC has changed very significantly since its inception. As it grew, and particularly with the participation of non-European members, it was evident that some members were unwilling to share what they considered to be their hard earned innovations and commercial advantage. It was evident at the time that MDC was in danger of becoming a 'closed shop.'

All this changed under the leadership of Dr Horst Greger, the then Mint Master of the Munich Mint. Under Dr Greger, MDC developed into an organization with a culture based on a belief that knowledge grows faster when it is shared with others.

Through the Materials Committee and now the Technical Committee, MDC members have been sharing knowledge and expertise freely since. This is the right approach for MDC to take as an international organization as most member Mints are small and collaboration is vital to their success if not survival.

Can you name a project of the Technical Committee of the MDC that has led onto an innovation a lot of mints are using today?

The MDC Technical Committee has dealt with more than 12 projects each year for the last 10 years. It has delivered innovative projects such as laser technology, shaped bi-metallic coins, 3-layer coins just a few to name. Some of these innovations, such as laser application for micro text and die polishing, are now in normal use by many Mints, while other innovations are awaiting opportunities for implementation.

What does the Technical Committee do in order to promote innovation among the members of MDC?

The MDC Technical Committee consist of some 40 members includes official Mints, minting industries, universities and/or research institutions. Issues of common interest are identified and allocated to smaller groups for in-depth research and report back to MDC at its biennial conference.

How important is the cooperation with the supplying industry within the Technical Committee?

The MDC Technical Committee is very proud of the close association between Mints and the supplying industry. There is strong collaboration between Mint and industry members on research and development. Mints also provide valuable feedback to supplying industry members on the application of products developed for minting use such as coin design hand book developed by Association.

How is the supplying industry integrated in the Technical Committee of the MDC in order to facilitate the communication?

All R&D results are published at the MDC biennial conference. All members receive feedback on what was researched, the results and MDC's recommendations.

What do you think will be the scope of the most important innovations within the near future?

I am looking forward to seeing some innovative coinage materials to enhance the security of possible \$5, £ 5 and 5 Euro coins in the future. Also, there is enormous potential for laser applications to be used to embed additional security features in coining dies.

MintWorld has asked nearly the same questions about innovations to Günther Waadt, head of the Bayerisches Hauptmünzamt in Munich and Vice President of the Mint Directors Working Group. But this time we also asked, what influence the introduction of the Euro had.

Could you list for our readers the 5 most important innovations in coin production which have reached series-production readiness within the last 10 years?

Over the past 10 years, various committees in many areas of coin production have been working on innovations. These innovations don't necessarily just pertain to the final product, however. The industry is also seeing important innovations in processes and precursor materials, as well as in the machines used for product processing. I'm pleased to list what I believe, in my view, to be the most viable and sustainable of these developments.

- The coding of coins and the resulting use of decoding devices, such as: Simulan, Barcode (10 € commemorative coins Ski WM Garmisch Partenkirchen), microprinting (1 and 2 CAD), DNA
- Developments to do with the coin's visual recognizability, such as: shaped coins, flip flop coins
- Innovations in preliminary input materials, such as: multilayer material (plating technology), MCC (multi-clad coin, cladding technology)

Important steps have been taken in the collecting field, in particular, which have made the transition from manual tasks to automation of processes possible in, for example, the packaging area, blank and coin handling.

Other significant developments in the field of tool materials, production, handling and finishing also beg mentioning, such as: simulation of tool geometry with the finite element method, new tool steels and diamond coating of tools, just to mention a few.

Moreover, I would describe the development of the Coin Design Handbook as an innovation in and of itself, as it offers an unparalleled integrated, standardized summary of recommendations on coin design.

Which features are necessary to distinguish a nice idea from a real innovation?

The most basic requirement for innovation is first to have a concrete task at hand. Let's take the technical subgroup (TSG) of the Mint Directors Working Group, tasked in 2007 to develop a portfolio of security features for potential use on and in coins as a fitting example - the experts literally erupted with ideas. In order to distinguish 'nice ideas' from 'real innovations,' as I like to call them, it's essential that an evaluation scheme be used right at the outset that can help assess the feasibility of the innovation. Economic factors also play an important role here.

An evaluation becomes much harder when a 'great idea' presents itself in the absence of a concrete-defined task. To me, that simply means: I have a solution to a problem that doesn't exist yet! But these too have the potential to evolve into real innovation, over time.

What makes a company an innovative company? In other words: How can a company encourage the staff to search for new ways to solve old problems?

The staffing structure should, in principle, cover all skills and qualification levels, ensuring that creativity remains constant no matter what. But creativity must also be given free rein. The introduction of a suitable communications and bonus system should ensure that suggestions for improvement can be requested as needed, but also heard and acknowledged. All suggestions and proposals must be taken seriously, meaning that, in general, no suggestions or creative approaches should ever go 'unconsidered.' Sometimes the most unusual and unconventional of ideas can mature into an innovation and be of use to the company. A comprehensive, continuous improvement process must be integrated into any company's overall vision and mission statement. Contained

within this, of course, is the importance of promoting and fostering the ongoing development of employees' skills and qualifications.

Did the creation of the Euro have an influence on innovation within European mints?

Of course!

Do you have an example for me?

Let's take a look at the German mints. Prior to the Euro, bicolour stampings were not standard in the Federal Republic. Today, however, German mints are among those manufacturers with the most well engineered process.

Another example is the aforementioned development of production-ready security features under the direction of the TSG.

How important is the international cooperation within the MDC concerning the promotion of innovation?

The MDC is the umbrella organization, so to speak, of the coin world, where all the know how and entire creativity of this branch is essentially centred. As such, it really is an ideal network from which to initiate, communicate and implement innovation worldwide.

There is also a European subgroup, which is working on problems and their solutions. What is more important for you: The exchange with all coin producing nations in the MDC or the contact to close neighbours who might have similar technical problems you are facing.

The coin sector is a relatively straightforward world where all the same experts tend to meet time and again, which means that they see one another on both national and international committees. We're interested first and foremost in tackling the challenges set out by our customers, so by the minting authorities. These so-called 'problems' (although I'm not very partial to that term) tend to be identical for many colleagues and this is where the network comes in, as it well placed to allow for close collaboration and coordination. This close-knit effect also ensures consistency. I therefore consider it essential on both committees that one listen to and get to know divergent views on any given theme.

How important is the cooperation between mints and supplying industries concerning innovation?

When it comes to innovation, a large proportion of the supply chain tends to be affected by the supplier of blanks, through to the machine manufacturer, and all the way to the consumer. If it weren't for the supplier industry, innovation would seem inconceivable to me!

Does the competition within the supplying industry promote innovation? Or do you see a problem, when a new product or service is overvalued due to the need of selling it.

Competition is good for the marketplace. The same is true for innovation.

What do you think will be the scope of the most important innovations within the near future?

The competition offered by alternative means of payment will pose a unique challenge for us. The coin sector will have to continue to evolve so that its products remain attractive to the consumer, and so that the consumer always has greater confidence in cash than some alternative means of payment.



Günther Waadt

After his apprenticeship as car mechanic and several years of working in this field, Günther Waadt graduated in mechanical and afterwards in economical engineering at University of Munich.

He was engaged in the tool design department for the aircraft industry several years before he became head of project management at a supply company to the automotive industry.

In 1998 he was appointed as Director of the Bavarian State Mint.

massive improvements in supply chain

and manufacturing across industries.

How much of this improvement has

found its way into the coin industry?

We know that we can't decide what the

next big thing is going to be, but we can help to create the right conditions to

It starts by understanding who cares.

Not just customers - banks and govern-

ments who see coinage as fulfilling a commodity function and who are look-

ing for lower costs - but everyone else in

the extended value network of coinage:

vending machine manufacturers, retail-

ers, banks, and, of course, ordinary peo-

ple who pocket and spend coins every

day. Do we really have a deep and ac-

There's a lot of catching up to do.

drive innovation in our industry.

So what can we do?

Thoughts about Innovation and the Coin Industry

Text Maurice Biriotti

Coins were a major human innovation. The invention of coinage did two things. It liberated the concept of value from concrete goods, and paved the way for commerce and capitalism as we know it now. The second thing coinage did was to provide a vehicle with which the state could declare and under-write its authority: through the portrait of the head of state imprinted on each coin. smaller values, and increasingly, small volumes.

Nevertheless, the prevailing view amongst central banks, mints and suppliers is that coins are here to stay. Ironically, for such a disruptively important invention, the industry that makes coins today looks like the last place you'd want to go to for disruptive innovation.



Tetradrachm from Athens struck about 465-454 BC.

So the invention of coins made capitalism possible and contributed to the stability of the state - coins enable the free flow of goods and services and draw the limits of the forms of order in which those transactions can take place. Looked at in this way, it's hard to imagine an innovation that has had a more profound impact on human history. And the meaning of currency endures across history as coins are turned out of the soil, telling a story about the limits of trade and authority, about technology, and about the kinds of things people long since gone from the face of the earth found valuable.

For all that the invention of coins was an impressive and disruptive innovation in human history, and for all of the ability of coins to endure and carry their meanings with them, they are now, increasingly, seen as old-fashioned. Coins have given way first to notes, then plastic, and now to bits and bytes. Monarchs and other heads of state are no longer in such urgent need of metal tokens to declare their dominion. More and more, coins are associated with But can this be right? Is innovation bound to be such a stranger to the coin industry? Consider the following:

History suggests that the coin industry can't afford to be complacent. Industries that feel 'safe' - from whaling to steam, from book retailing to audio cassettes - have a ten-

dency to disappear, or dwindle dramatically.

The coin industry can't afford to miss opportunities to innovate. We're living in a world in which we are constantly finding new ways to use old things: a telephone is no longer just a telephone. There's an increasing need to look at what else we can do with what we have got.

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Banknote worth ten trillion mark issued in 1923.

The coin industry has, in many ways, an in-

credible head start. Imagine if someone told you they had a startup based around a product that was already in the pockets of almost all of the world's population. What an amazing opportunity.

All this, yet against many global benchmarks, the coin industry is lagging behind. The last twenty years have seen Innovation also requires leadership. It means being brave enough to take intelligent risks based on the best picture there is of what's happening in the industry and the ecosystem. We need to find ways to fail safely - and for this to be ok.

Innovation requires an openness to conversations and connections within our

to audio curate picture of who cares about coins we a tendramati-Is our industry genuinely oriented to customer and market insight in this way?



to compete effectively, companies are having to make thinking about customer and consumer wants and needs a part of their culture.

Reports of the demise of the coin industry are greatly exaggerated, but we remain vulnerable to new threats and developments if we as an industry don't open ourselves up to new and more pervasive ways of thinking about our customers, consumers and stakeholders, and embrace the spirit of 'coining' something fresh.

Credit cards.

organisations, and across organisations, that we don't currently have in any great measure. Inspired by a rich and truthful picture of our ecosystem, supported by leaders who are brave enough to make a difference, we need to come together to talk - really talk - about what's next for this industry. What can we really do to make a difference?

Over the past ten years, innovation around customer and consumer needs has become a core component of the working practices in many companies that, historically, were driven primarily by a concern for process improvement or efficiency. Amplified by the growth of the internet, the voice of customers and consumers is being heard and companies are responding - often in near

real time. Global FMCG companies are hosting online consumer discussions across their local markets, and using the insights to drive new product development, often with the active participation of the customers themselves. Management information systems provide key decision makers not only with an aggregate view of customer behaviour in chart form, but a picture of what customers and consumers are saying right now about the company and the brand. Employees are increasingly being given the tools to engage with consumers, learn from them, and share ideas back into the organisation.

The lesson of the past ten years is simple: it's no longer enough to think of innovation as an isolated process: in order



Maurice Biriotti

Maurice Biriotti is Chair of Medical Humanities at University College London and a visiting professor at Yale. He is the Founder and CEO of SHM, a Londonbased company that specialises in innovation and organisational transformation.

Send us your news to publish!

Our online journal MintWorld ist updated every month. We want to include news from your country, your mint, your company, too.

Send us your information at ukampmann@mintworld.org

Coins, Collectors, Innovations A Few Personal Impressions

Text Ursula Kampmann

I first took part in the World Money Fair in Basel in 1992. At the time, it was still known as the 'Europe-Coin Fair,' and as a 'classical numismatist,' I had not yet seen things as they were exhibited there. I marveled at the glossy prooflike commemorative coins in their plastic packaging and felt infinitely superior behind my trays of Roman denarii and Basel thalers. A year later at the same event, my boss stormed through the hall angrily, exclaiming, 'You have to be kidding me! Now they're making coloured coins! We may as well be selling Mickey Mouse!' From then on, my boss described every new stamping created expressly for collecting purposes as 'Mickey Mouse coins.'



Not the first colored coin in the world, but one of the first – and belonging to the same series the first coin formed part of: 5 Dollar Palau 1994.

Security Devices and Motivation for Innovation

At the time, I fully supported his sentiments. But today, I see things a bit differently. Numismatically speaking, I've gone from Saul to Paul, and the reason for this lies in the knowledge of just how much technical skill goes into coin production. What may have started as a gimmick for a few zany collectors is often seen today as a matter of course. The path of a technical innovation – from selling point for extravagant collector coins through to difficult to imitate security devices for attractive circulation coins – works and enriches the field of numismatics.

Private companies in particular, who launch coinage strictly out of commercial motives, can be seen as responsible for many defining technical innovations. Many techniques have been tried out on commemorative coins, with the hopes of (someday) undertaking the same techniques for circulation coins (or not): While new coinage metals, multi-layer materials and new alloys, extravagant blank forms and bimetallic stampings are standard nowadays, there's still a lot of experimentation afoot when it comes to the field of circulation coins with colour application and additional security devices, such as latent images. These techniques are quite normal for commemorative coins, however - be it holograms, use of non-metallic materials, nanotechnology or anti-tarnish protection, these are all often found today on attractive commemorative coins intended to entice the collector to spend money on an object that will likely never see regular circulation.

Mints Are Reinventing Themselves

There has been a radical change in thinking in mints towards the coin, an object that is generally taken for granted. And it's this shift, this reinvention that has really been the key, defining innovation. By now, this innovation dates back about half a century and has become a matter of course. We have broken down the functions of the coin and today sell different products with different functions to different customers.

Let's take a look at the Krugerrand as an example. When this coin was introduced in South Africa in 1967, it was a radically new take on something with a long tradition. It wasn't an easy to use means of payment (would you like to have to check every day how many cents the dollar is worth?), but rather a miniingot that was made into a functioning means of payment by the daily officially fixed exchange rate. Similar things had functioned for thousands of years. In fact, until well into the 19th century, almost every coin, with only a few exceptions, was a mini-ingot, whose market value was re-determined on the market daily. A coin functioned as both circulation- and bullion coin. The Krugerrand supplemented the new circulation coins that had lost their function as a means of hoarding. Today, the Krugerrand and all of its derivative products – from the Maple Leaf to the Golden Philharmonic – are extremely profitable elements on many mints' product portfolios.

The same is true of the entire range of collector products that have been produced in most mints since the 70s, in isolation from the circulation stampings. The change in thinking occurred here in Germany in 1972 with the advent of the Munich Olympic coins, which brought the treasury enough money to cover a portion of the necessary investments in infrastructure. Although their label may suggest it, today's commemorative coins don't bear the slightest resemblance to commemorative coins prior to 1972. Whereas in those days a commemorative coin was part of a normal stamping that was exclusively intended for circulation in order to document and publicize a significant event, today's commemorative coins are far removed from their original purpose. So far, in fact, that a large mint like the Royal Canadian Mint can afford to distinguish their products according to 'legal tender' and 'circulating legal tender.' Canadian collector coins cannot circulate as 'legal tender' and banks and businesses aren't obligated to accept these coins. And, of course, commemorative coins are not usually chosen for their state-supporting significance anymore, but rather for their saleability.

Therefore, it was innovative to split the coin as a product into 'circulation coins,' 'bullion coins' and 'collector coins.' Whether a further, radically new use might be uncovered in the future and, consequently, generate a new group of buyers, remains to be seen. The 'Monnaie de Paris' very successfully introduced the 'souvenir coin' (actually an inexpensive medal). And if you take a look at the long history of the coin, it's possible to conceive of a potential use as 'coin jewellery.' After all, there are nu-



merous instances in ethnology of tribes adorning their clothing with coins.

Mints -Mirroring the Progressive Automation and Computerization of Our Society

When I take a look at the technical advances that have been made in coin production, as a non-technical person, it's enough to make me dizzy! I first visited a mint in 2003 in Bern, and even then I was blown away by the commanding pace of things. Today, it's become even more incredible.

In high-performance stamping machines, by way of a constantly running inclined conveyor, blanks are automatically filled in and then stamped into perfect coins at maximum speed. Everything is automated: From the quality inspection of the coins right through to the mechanical packaging. Everything happens at a pace that seems almost superhuman. What's more, the traditional die-cutter has lost its importance, since every design scanned into the computer can be quickly and inexpensively transferred directly onto the stamp using laser technology.

On the other hand, I'm witnessing developments in the marketplace that seem rather removed from the current state of things. There are collectors that look through their wallets every night in the hopes of finding mis-strikes. They delight in the unusual and extraordinary, things that are entirely the opposite of perfection. The cast artist medal produced in a very small mintage has undergone a shocking renaissance over the last decade. And the personal medal, where a picture is directly transferred onto it, is becoming a very popular gift item.

So where is progress headed? Are we looking at a faster, more, cheaper type of scenario? Or is there a market for expensive, short, high-quality production runs? And what will the situation look like for medals? What about the future prospects of the medallist profession?

Customer Loyalty

Customer acquisition and customer loyalty have also virtually revolutionized themselves over the last years. Direct marketing and personalized customer management have made it possible to forge a closer link between the buyer and the mint. Social media merely takes things that one step further.

In the process, the (hunter and) collector has fallen by the wayside, since a great part of the joy of collecting lies in the fact that not everything is always readily available, and some effort must be made to acquire a rare coin.

Dealers also find themselves at a disadvantage, as Internet sales and direct sales mean that they are increasingly excluded from the direct customer relationship. This is a great loss, especially since it's not yet clear how the so-called 'secondary market' is expected to function without the dealers.

This poses one of the greatest problems for coin sales, one that doesn't yet have an innovative solution.

Another type of innovation might be of some help in trying to address and overcome the many unanswered questions: These questions have never before been discussed on a more international level. Close collaboration allows ideas to propagate themselves at lightning speed around the globe. International collaboration offers great opportunity, but may also pose dangers, as those who constantly watch what others are doing tend not to come up with their own creative ideas and solutions.

What the coin industry needs then is unorthodox, creative thinkers and people who dare to experiment in exploring new paths. But the industry also needs to reach back into the incredible pool of ideas of the past in order to gain inspiration for new, innovative solutions.



The Building of the Royal Canadian Mint.

The Royal Canadian Mint

Innovation Is in Our DNA

Text Ian Bennett

The Royal Canadian Mint prides itself on its passion for advancing the art and science of coin manufacturing and its ability to adapt to the constantly changing needs of the market of today and tomorrow. From refining the world's purest gold, to award-winning numismatic coins or engineering the most advanced coins in circulation, the Mint is renowned as a world leader in every field of endeavour.

We are especially proud of the mark our Multi-Ply Plated Steel (MPPS) technology has made on the coin industry of the 21st century. Introduced in 2000 on Canada's low denomination circulation coins, our revolutionary technology declared to Canadians and the world that coins could be made more economically, yet be more secure, visually appealing and durable than ever before. By plating a steel core with microns-thick alternating layers of copper and nickel, the combination of different metal grains in these layers is more resistant than any mono-plated or alloy coin in circulation today. By controlling the thickness of each base metal layer, the Mint can better control the electro-magnetic signature of each coin denomination and prevent fraud in a way ordinary coins simply can't.

This Canadian-made innovation is now benefitting over 30 countries around the world, which have specifically come to the Mint for 20 billion MPPS coins now circling the globe. As our MPPS customer list grows, so does demand for other Royal Canadian Mint innovations that have changed the face of today's coins.

Introduced in 2004 on a 25-cent coin honouring Canada's veterans, the Mint was the first to produce coloured circulation coins. We have since perfected our technology to enhance the durability of colour applications and even create complex, uniformly oriented colour designs with a high-speed robotic paint line developed by the Mint and a Canadian manufacturing partner. Since we produced the first coloured coin to circulate outside of Canada for Fiji in 2008, more and more coins are telling captivating stories in brilliant colour in Canada, and around the world.



The first coloured circulation coin.

In 2012, the Mint completed the modernization of its coinage system by changing the composition of its \$1 and \$2 circulation coins to Multi-Ply Plated Steel. These circulation coins became platforms for advanced security features



The \$2 circulation coin featuring latest security technology.

which demonstrate the Mint's unique capability to secure the integrity of the world's highest circulating denominations. These include a small maple leaf pattern, laser-engraved on the dies which strike the reverse (or tails side) of both the one- and two-dollar coins, which cannot be replicated without the Mint's proprietary technology. The addition of a shifting 'virtual image' and edge-lettering increases the complexity and security of our highest face value coin. For 2013, we've even added a similar laser security mark on our famous 1 oz. Gold Maple Leaf bullion coin.



Each Canadian Maple Leaf now owns its DNA.

With the help of a technology partner, the Mint has also created an innovative form of security called Digital Non-Destructive Activation (DNA), concealed in our ground-breaking circulation and bullion coins. This process essentially 'fingerprints' the surface of each coin to store a reading of their unique surface structure in a database. Genuine circulation coins can be individually identified through this anti-counterfeiting innovation and genuine GML coins can be reconciled with a known die set.

There are no limits to exploring coin solutions which genuinely benefit the world's coin users. With an eye on the future of currency, the Mint pursued a new kind of innovation by challenging developers from across North America



The MintChip[™] – The future of money?

in April 2012 to create applications to test our MintChipTM digital currency platform and confirm its feasibility in the real world.

We are proud to be the only mint in the world to launch an R+D project to explore an evolution of physical money; where many of the best attributes of cash are transferred to a secure, digital platform. The Mint has working prototypes and holds eight patents pending for this innovative technology, for which six enterprising developers created exciting applications demonstrating the power and versatility of MintChip™. We are now refining our business model and discussing our role in the market of the future with many stakeholders, including the Government of Canada, to continue to serve as the custodians of Canada's currency system as our world and our economy continue to change.

It is only through constant innovation that we can help our customers as the world changes around them. Fortunately, innovation is in our 'DNA' and we will keep tapping into this creative energy to make a difference for all our customers in all our business.



lan E. Bennett President and CEO of the Royal Canadian Mint

lan E. Bennett, a distinguished federal public servant, has held several positions within the Department of Finance including Deputy Minister from November 2004 to June 2006. Previously, he served as Executive Director of the International Monetary Fund representing Canada, Ireland and the Caribbean countries from September 2001 to October 2004. Mr. Bennett has also held other senior positions within the federal government including Associate Deputy Minister of Finance and G-7 Deputy for Canada from 1998 to 2001, Associate Deputy Minister of Revenue Canada and Deputy Secretary to the Cabinet (Operations). Born in Nelson, British Columbia, he holds a Bachelor of Arts (First Class Honours Economics/Commerce) from Simon Fraser University and a Masters of Arts in Economics from the University of Toronto.

Mr. Bennett has served as President and CEO of the Royal Canadian Mint since June 12, 2006 and was re-appointed for a period of three years effective June 12, 2011.

Shape Is the Answer

Challenges and Solutions in the Production of Non-Round **Bi-Metal Coins and Tri-Metal Coins**

Text Dieter Merkle

No matter where in the world a coin changes hands, it is likely to have been manufactured on a Schuler press. Schuler supports minting technology with innovative developments. For example, at the turn of the 19th century, it was possible to produce up to 60 coins per minute on Schuler presses: An astonishing achievement for the time. Today, high-performance machines from Schuler achieve performance levels of up to 850 coins per minute. Ongoing new developments supplement the extensive product range - such as the production of shaped bi-metal coins and tri-metal coins.

Today, many high value coins are bicolored. Looking at the purchasing power of coins and the short lifespan of low denomination banknotes, it would be beneficial for State Banks or the Ministries of Finance to have high denomination coins replace these banknotes.

However, volatile metal prices create headaches for State Banks around the world, and - as a consequence - the sizes of coins have decreased for cost reasons. If the diameter is not reduced, the material is changed from alloys to plated steels. In other words: Coins become hard to be distinguished. Whether higher denominations or unique coin designs are needed: shaped bi- or trimetal coins could be the answer.



The high-performance coining presses of the model range MRV can be equipped with a multiple-blow option.

ring

that

can

material.

taken

Complex Process of Joining and Coining

The challenge in the minting of shaped bi-metal parts is the joining and coining - especially when both ring and core, which has to be slightly thicker, are shaped. This is a very complex process that has to be completed within fractions of a second. The Schuler Ringmaster can be employed as a coin minting press and as a joining press for nonround bi-metal coins, and can guickly change from one operating mode to the other. Apart from that it can also be used to



The challenge in minting of shaped bi-metal parts is the joining and coining, especially when both ring and core are shaped.

out many changeover steps. When it comes to tri-metal coins and

Again, these tools can be installed with-

medals, three operations have to be carried out before they can be minted: Piercing the outer ring, piercing the inner ring and joining both rings and the core. Schuler's vertical coin minting press MRV-300 TM RM, for example, can process tri-metal coins with a diameter of up to 50 millimeters. With a nominal press force of 3,000 kN, it delivers a maximum of 500 strokes per minute in continuous operation.

In addition, the high-performance coining presses of the model range MRV can be equipped with a multiple-blow option. This means that the user can switch over from the maximum stroking speed applied for the minting of circulating coins, to a double respectively triple blow by simply pressing a button. The output in multiple-blow mode is then reduced with continuous feeding to not less than 100 - 250 coins per minute. The increased shine and detail

accuracy of the design are appreciated and honored by coin collectors.

For innovative products such as the shaped bi-metal coins and tri-metal coins described above, Schuler machines such as blanking, rimming, edge-lettering, piercing, joining, and coining equipment are needed.

From Coin Design to Packaging

As a systems supplier, Schuler's capabilities go well beyond delivering lines for the manufacture of coins. In the field of coin minting, Schuler delivers not only presses and other equipment, but also tool and die know-how. This includes blanking dies for coin blanks and/or coin rings, as well as rimming tools for our rimming machines. We also provide the contact to the coin designer, coordinate the preliminary design and the manufacture of the prototype die, as well as the coining punch and rings. For turnkey solutions, Schuler offers devices for monitoring, counting, and packaging coins to processors for weight data acquisition with printers to safety devices and floor-mounted conveyors. The range of services comprises delivery of spare parts, repairs, rebuilds, production support, preventive maintenance, and maintenance contracts. Last, but not least, Schuler provides practical know-how for your staff in our seminars.

As we have during the past 100 years, we will continue to be innovative leaders in the future and raise the bar for the industry standard when it comes to new developments in the fields of machines and products.

For more information go to www.schulergroup.com/branchen/ minting



Dieter Merkle, Schuler Presses

Dieter Merkle (54) has been working with Schuler Presses since 1975 and also completed his apprenticeship as an industrial manager there. His career comprised the sales of packaging and minting equipment, the business unit management (sales/ engineering) of the minting department, afterwards the business unit management Highspeed (minting, packaging, drives & generators), and finally the technology field management Highspeed Technology. Besides, he has been member of the board of Schuler India since 2004.

Innovative Clad Coins with High Anti-Counterfeiting Features

MCCs (Multi Clad Coins) & Flip-Flop Coins

Text Dr Wolfgang Bretz

Established clad coins like, for example, the 1 and 2-Euro coins, which are produced by cold roll cladding as 3-layer material, offer a high level of reliability in vending machines. Nevertheless, to some small extent, forgeries do occur. Working from the basic concept of "making as difficult a coin as possible," a project was launched within the MDC Technical Committee (TC) with the overall aim of cladding further layers with additional materials. The preliminary results have already been presented at the XXVII MDC in Vienna. Subgroup members of the TC are the European Vending Association, the Bavarian State Mint, Saxonia Mint of Finland and Wickeder Westfalenstahl.

During cold roll cladding, at least 2 strip materials are transformed in a roll-

ing gap of about 70% deformation into suitably effective cladding frameworks

(Fig. 1). What happens here is an intimate mechanical interlocking of the individual layers - so-called green adhesion. The subsequent diffusion heat treatment leads to an exchange of atoms between the individual layers, and the result is a metallic sandwich whose layers are now inseparably bonded and which can now be further processed as a single metal material.



Fig. 01



Figure 2 illustrates the principal symmetrical structure of a 5-layer MCC (Multi Clad Coin) composed of 3 different metallic components – alloys 1 through 3 – which are distinct from one another in terms of both their electromagnetic properties and colours. It should be noted that the edge can thus have a coloured mark as an additional visual criterion. If you imagine it without the two outer layers – alloy 3, it would be a familiar 3-layer sandwich.

um frequency

240 kHz

high freque

480 kHz

960 kHz

the readings of the coin checking device depending on the components used. The upper portion of Figure 3 illustrates the conductivity of the obverse and reverse of the 1 and 2-Euro as well as a 5-layer clad compound in relation to the test frequency from 60 to 960 kHz. It's clear that the dependence of the IACS-value on the test frequency for the 1 and 2-Euro is low, while the 5-layer compound, however, shows a very strong dependence on the test frequencies. As such, the theoretical preliminary considerations can, as expected, be confirmed by industrial production. Matching head and tail values point to a corresponding symmetry of the layers. It's clear that the use of 5-layer clad compounds makes custom-

2 € Belgium

- MCC-5-layer

MCC-5-layer side 2

1 € Germany

1 € German

tail

head 2 € Belgium

tail

side 1

ized solutions possible through the specific, careful selection of components, material thickness and arrangement of the layers. Moreover, in order to ensure high reliability in vending machines, the measurement tolerances can be constrained within narrow limits through the formation of very uniform cladding layers. Of course. conventional bi-colour coins can also be created from the 5-layer clad compound.

> In selecting the components, special emphasis is also placed on the recyclability of the production waste and stamping grid. Careful, skillful selection of the

components can mean scrap metal values that are close to 100% of the LMEvalue of the metals used.

Another consideration led to the production of so-called flip-flop coins. The objective was to implement an added optical security device to the coins' obverse and reverse sides (beyond the electromagnetic security devices) by cladding different coloured outer layers. The flip-flops can also be manufactured as bi-colour coins. Their particular appeal – beyond the optical security device – lies in the fact that scrap metal is reduced considerably. To that end, the flip-flop coin is produced from the same coil; the inner ring is turned, inserted back into the outer ring (flip-flop effect), then



Fig. 04

bonded and embossed (Fig. 4). As compared to conventional bi-colour coins, flip-flop production leads to a reduction from a 130% scrap metal rate with conventional bi-colour production to just 30%. As such, flip-flop coins, much like the MCCs, are characterized by high reliability in vending machines and antiforgery protection, additional optical features, as well as scrap metal reduction combined with high remuneration for the resulting scrap metal.



Dr Wolfgang Bretz Wickeder Westfalenstahl GmbH

Wolfgang Bretz has studied metallurgy at the Technical University of Clausthal. He made his PhD at the Helmut-Schmidt-University / Hamburg in Materials science and Welding technics. He has worked in various leading positions at today's Thyssen-Krupp VDM and served as senior engineer at Mobil Oil. Nowadays he is working with Wickeder Westfalenstahl GmbH as a key account manager.

Fig. 03

16

14

12

10

8

6

4

2

0

60 kHz

low frequency

medium frequency

high frequency

120 kHz

in % IACS

Coin checking devices measure the electromagnetic properties of the coins to be tested. The first reference points, as regards the selection of materials to be clad, are supplied by the electrical conductivities of the individual components. Depending on the test frequencies used, eddy currents are induced in the material (Fig. 3, bottom). According to the skin effect, high frequencies don't penetrate the material as deeply as do low frequencies. When using very high frequencies, induction only takes place in the outer layers. Another criterion with regard to the structure of a multilayer clad sandwich is the thickness of the individual layers and, associated with this,

The Relaunch of a Product That's Over 2000 Years Old?

Text Dr Andreas Schikora

Coins are truly among the most successful things ever developed. They have been around for 2,500 years, and represent an interepochal payment technology that was and has continued to be successful all throughout ancient times, the Middle Ages and through to the Modern Era. As such, coins seem to have their own inherent strength that shouldn't really require any sort of relaunch. Or do they?

Coins aren't just a means of payment – they're also collectibles. The act of collecting is well known as a basic human instinct. The Berlin Mint has learned from their products that collectors readily accept and welcome innovations. As opposed to other countries like China or Australia, Germany still doesn't have any coloured coins. As such, we wanted to adopt this colour technology and make use of it in the field of medal manufacturing.

The Berlin mint currently has several fully equipped colour printing workstations, including the required preparatory and post-processing stations.

At the Berlin mint, the colour print is done using the pad printing process, pad printing being an indirect gravure printing process. Indentations are applied to a flat plate, called the cliché. Filled with ink, a silicon rubber pad picks up the colour via imprinting and transfers it onto the medal.

Along with the question of whether the mint should take up this technical innovation, it's also important to clarify whether or not a minting site has the requisite skills and abilities to ensure a manufacturing process that meets the required quality standard. As regards the 'make or buy decision', we've definitely decided in favour of performing the process at the Berlin Mint. We were able to quickly determine that the skills required for the stamping of the medal also provide a good basis for an optimal colour print. Over and above



Colour printing workstation in the Berlin Mint.

technically flawless paint application, colour printing essentially comes down to utterly precise execution. These are reliefs that are being printed, not plane surfaces like pens. We always go on the assumption that the collector will be studying their pieces with a magnifying glass, and there's nothing more disappointing than an imprecise colour print. This is where our experience of stamping medals proves useful.

How does the colour make its way onto the medal? First, a printing plate has to be made. With the help of the finished struck medal, the image to be imprinted is designed on the computer. As a result, we end up with a film file from which the films for the plate making are produced.



Example of a film file (flag). The medal can be made out in the background.



Compressed cliché prior to taking up the colour via the printing pad.

To manufacture the cliché, a light-sensitive base plate is tempered by exposure to light at certain points. Using the previously manufactured films, a base plate is exposed for every single colour, which, in so doing, remains soft in the unexposed areas. The non-hardened material of the plate is washed out and then UV-tempered once more. Finally, the plates are 'baked through' in the oven.

During the printing of the medal, the ink that has been filled into the indentations of the cliché is picked up on the pad and then imprinted. The transfer pad moves vertically and is led to the individual print positions.

After a brief drying out period, the printed colours are scratch-and abrasion-resistant.





An unprinted, as well as ...

... a finished printed medal.

Upon first glance, customer requests for new medal features don't always fit with a mint's conventional production methods. The Berlin Mint has ventured into colour printing, a manufacturing process that is not among the core operating areas of a mint. We were able to determine that there are many competencies from the area of coin and medal minting that can be introduced into this non-core area of activity. We will meet the challenges head on.



Dr Andreas Schikora Born in 1964, married, two children

Business Administration degree in Berlin; PhD on the local behavior of companies.

Teaching and instruction activities at various universities and colleges; thereafter, business positions in various state agencies in Berlin.

He has been the managing director of the Berlin State Mint and on the board of directors in numerous national branches in Berlin.

What Is Innovative on Washing?

Text Ingo Löken

I remember very well my interview at Spaleck Oberflächentechnik in January 2009 regarding the vacant sales position. Thomas Hogenkamp as part of the management team was involved and he gave a brief introduction into the minting business. He was so excited about the technology, sophisticated machines and to be environment friendly and I was asking myself:

'What the hell is he talking about?'

Because, 20 years ago I did my apprenticeship at Spaleck Oberflächentechnik to become a mechanic. The treatment step prior striking was called washing. This process was done in tumblers, basically a rotating drum or in a vibratory finisher looking like a bathtub.

The washing agents have been sulfuric acid and soap. To drain the water

into the public sewage was the waste water treatment, environment did not matter.

OK, during this time the centrifugal finisher for the treatment of coin blanks started to be used, a system called ZS 3 is shown in fig. 2. The treatment of blanks was still called 'washing' and so Spaleck Oberflächentechnik has been the supplier of 'washing machines'.

So what is Thomas excited about?

Digging deeper into the todays machinery I recognized that over the years Spaleck Oberflächentechnik has created a complete new product line for the finishing of coin blanks prior to striking. The system to treat blanks for circulation coins was called **Z33B**lank **F**inisher **C**irculation and looked really significant different. The biggest change was visible at the system to treat Gold and Silver blanks in proof quality for the numismatic market. The machine is called **Z33B**lank **F**inisher **N**umismatic.

There are no more Gold or Silver blanks with scratches and spots today.

The corn cob dryer have been eliminated to ensure longer cleaning cycle of dies and an improved die live.

Due to computer controlled operation, the quality is consistent and there are no more 'Monday-batches'.

Process data capturing meets the requirements of modern quality systems regarding traceability and complained handling.

The consumption of water during the treatment process has been reduced by

60%. If you use a water recycling system the fresh water consumption can be further reduced to 5% of the original volume.

The usage of chemicals went down to 45% and the usage of strong acids is technically no longer necessary.

The washing soap is today a finishing compound with e.g. anti-tarnishing properties.

Instead of the big bang innovation inspiration, it was more a kind of an evolutionary step by step process to convert the drum and ZS3 washing machine into the different centrifugal finishers for the special needs for coin blank finishing. The most of these innovations were invented by intense discussions with the customers of Spaleck Oberflächentechnik.

This process was successful. Over the years Spaleck Oberflächentechnik has sold more than 35 finishing systems for the numismatic application and over 50 finishing lines for circulation blanks.

Off the record, I have to admit that technology has really changed. The step before striking is surface finishing, no longer washing.





Centrifugal finisher ZS 3.



Z33 Blank Finisher Circulation.

Tumbling machine.



Ingo Löken

joined Spaleck as an apprentice from 1989 to 1993. He came back to Spaleck after his degree in material science and different production and sales positions at the company Quadrant. Since 2009 he is acting as a Sales Engineer for the minting industry.





The Rainbow Effect

An Innovation From Lang GmbH & Co. KG

Text Nico Lubold

"At the end of a rainbow you will find a pot of gold". So says an old Irish myth. In this particular case it is no myth at all. Lang GmbH & Co. KG has invented a manufacturing process to bring the shimmering rainbow colors directly onto a coin - the Rainbow Effect.

Lang presented this new development at the Mint Directors Conference 2012 in Vienna for the first time. Under the eyes of a fascinated audience Lang demonstrated the first results in creating light refracting structures on metallic surfaces by the means of laser structuring. The resulting feedback was extremely positive and soon after the Mint Directors Conference there was worldwide interest in this new technology.

The primary field of application for the Rainbow Effect is the minting industry so far. With the proven printing capability it is ideal for the manufacture of high-value coins and unique collector items. The fact that the application of the Rainbow Effect (e. g. on a coin-sized work piece) takes only a matter of seconds adds immensely to its usability.

To get proof of that usability Lang conducted several tests regarding reproducibility and lifespan of the minting die. Single dies were used to mint 100 coins. Every coin received exactly the same optical characteristics proving the reproducibility. These minting dies were subject to a metallurgical analysis with promising results. Neither the surface quality nor the hardness of the dies had been compromised by the application of the Rainbow Effect structures. These conclusions do not only prove the usability, but also give a perspective for higher printing quantities and therefore for an even better feasibility.

By the laws of physics light refracting structures are to be in the size of nanometers. To create such it requires a machine tool that works with a very high accuracy and the needed level of detail. The platform whereon the Rainbow Effect is being manufactured is the stateof-the-art laser engraving machine Pulsaris 300. This machine and its larger counterpart, the Pulsaris 800, complete the versatile product range Lang is offering to its customers.

The Lang philosophy is "One concept - One partner". Lang supplies complete



The laser engraving machine Pulsaris 300.



high precision solutions for various production purposes. In the year 2012 Lang celebrated the 40th anniversary in bringing precision in perfection to its customers.

One branch of Lang is successfully developing and manufacturing high precision motor controls. These controls are incorporated in several own machines and are also sold in large numbers in the OEM market for high precision positioning.

The main branch of Lang is the longstanding manufacture of high precision machine tools. In this sector a customer has access to a wide range of options to choose from.

These options start with the digitizing system LDIGIT. It provides the basis for all workmanship on the Lang machine tools by conversion of sample data (e.g. from plaster models in the minting industry) into CAD-data. The generation and/or processing of CAD/CAM-data are being done with the proprietary Lang software LErgoCAD and ReliefDesigner. Based on this CAD/CAM-data the Lang milling and engraving machines, such as the worldwide known Impala or RM series, do their job. These machines offer unrivaled accuracy and reliability and are controlled by the Lang machine control software LDriver. Both the CAD/ CAM and the LDriver software are also used by the before mentioned laser engraving machines of the Pulsaris series, completing the Lang portfolio. Due to this continuous software concept, working with both conventional and laser machines requires only very little additional training and no long adjustment of the user.

Aside from producing the Rainbow Ef-

fect, the professional customer will find the Pulsaris machine series suitable for many more tasks. Top-notch engraving, smooth frosting, excellent micro lettering as well as versatile surface texturing are all part of its abilities and can be combined with the shimmering Rainbow

 $Effect \ to \ achieve \ the \ utmost \ effect.$

Having both the conventional and the laser engraving machines at hand is one of the key competences of Lang. This enables the unique possibility to combine the speed and quality of the conventional engraving with the accuracy and detail of the laser engraving. All are supported by data generation out of one hand.

But to feature one of the most sophisticating solutions on the market of high precision machining it is necessary to go one step further. The main goal of Lang is to find the perfect solution for his customers' needs. Therefore a team of experienced specialists pinpoints the exact requirements together with the customer, thus providing the perfect combination of manufacturing processes, machine tools and software. This can either complement an existing production line or build up a totally new



one, always finding the perfect balance between usability and feasibility. Accompanied by the typical longevity of all Lang machines and the skilled worldwide service, each customer will find his investment profitable and ready for the future.

Now the latest addition for even more creative and profitable products is the Rainbow Effect. Future prospects of this innovative development are very

promising, looking at the worldwide interest. With the ability to apply the light refracting surfaces on work pieces directly and the proven printing capability, this new technology from Lang opens up new markets for many different industry sectors. Whether it is high-value pack-

aging, complex logos, new types of security features or the finishing of precious items such as jewelry and watches - Lang can provide you with the perfect solution. Now more than ever.



Nico Lubold

Dipl-Ing. (FH) Nico Lubold is the Product Manager for Laser Systems for the Lang GmbH & Co. KG, Germany. Having been always at home in the optical and laser industry Nico Lubold started 2011 in this position. He is responsible for sales and development activities regarding the high precision laser engraving machines of Lang.

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Successful Site Development between Europe and Latin America

A Case for International Thought and Action

Text Thomas Köninger

When you visit the Amera homepage, you'll be met with a selection of sites to choose from – Germany, Slovakia, Switzerland, Costa Rica, the Czech Republic and Chile. And no matter which location you will step into, you'll find a staggering variety of languages spoken there as a matter of course. So many, in fact, that I feel somehow embarrassed at having only three languages at my command. In a single office of three to four people, you can easily have 20 different languages coming together.

Amera operates worldwide and thinks on a worldwide scale. For us, both are simply par for the course. True international though cannot and should not come exclusively from Europe to be transmitted exclusively by European minds. This is why Amera relies heavily on its international character and composition, in terms of both its employees and its various sites.

The Advantages of Site Diversification

There are a number of different reasons why we do this. First and foremost, we realized the potential in all of the sites to enter and supply new, emerging markets. This potential was evident with regards to geographical location, the already qualified staff and the existing machinery.

Sites should succeed in bringing us within close geographic proximity to our business partners, but should also help in terms of bringing us closer to a shared mentality.

Transport routes to customers are shortened. But language is of great importance as well. Managers are generally able to communicate with one another anywhere in the world, but as soon as we're dealing with day-to-day procedures and transactions, it certainly makes everything much easier when everyone speaks the same language. The Chileans' native language is Spanish, as it is the case in almost all of Latin America. The Latin American mints that purchase their blanks in Quilpué can rest assured that they will be able to clarify and resolve every little detail nize the inherent possibilities. The path towards reconciling one's own perceptions with those of others can sometimes be a difficult one, but in developing our sites, we've certainly learned a great deal of respect for the ability, skills and enthusiasm of our respective local colleagues.



Coin production in Costa Rica in the year dot.

relating to scheduling, technology and administration directly with the site or the individual in charge of the site. Communication and mutual understanding takes place at every level.

In my view, one of the most crucial advantages of a foreign site is the new competencies one gains through the new employees understanding the different mentalities and viewpoints. A foreigner can never actually get to know a foreign country when he is only making short fly-in visits. Many well-intentioned negotiations fail, simply because of the discrepancy between the actual production conditions and the real needs of the partners. Our local colleagues are well aware of the problems, but also recog-

Amera's Sites

Over the last four years, we've established four sites - Kremnica/Slovakia, Jablonec/Czech Republic, Costa Rica and Quilpué/Chile. At three of the sites, we were able to draw on existing production facilities. In order to turn these sites into true equal partners in the Amera family, however, there was a real need for 'rethinking' and innovation. Our employees already knew the business; they simply needed a new way of thinking about it. They had to internalize the Amera philosophy. And we had to learn to let go of our Eurocentric way of thinking and fully welcome and integrate the strengths of our new sites with an open mind.

Each site development case was different. I'd like to use two examples – Quilpué, Chile and Kremnica, Slovakia – to demonstrate which specific factors we focused on.

Quilpué, Chile

The small provincial capital of Quilpué is about 20 km east of Valparaíso and is part of a highly active economic agglomeration of several cities. Quilpué is particularly well-known thanks to its Mediterranean climate and many days of sun. The locals even refer to it fondly as 'Ciudad del Sol,' or 'City of the Sun.'



Quilpué, Chile: Latest equipment for electroplating.

Over 50 years ago, Armat established itself in this lovely location as a supplier of semi-finished metals and blanks. From the casting of the metal right through to the finished blank, Armat offered a complete product range that made it one of the leading providers of coins and coin blanks from alloys.

Amera took over Armat on June 3, 2011. As a first task, we set out to analyze the location's existing potential. This included a detailed investigation of the machinery. Which range of products could we offer given the existing machinery? And how long did it make sense to continue using the individual machines? Which machines had to be replaced and which overhauled to ensure process stability? The next step was to define our goal – how should the product portfolio be modified such that it could optimally cater to our target market? And to this end, which new machines needed to be specially purchased?



Quilpué, Chile: Accurate analyses guarantee a precise process management.

In the case of Armat, we decided, if necessary due to some special needs or requiremnets of the customer to outsource the production of the non-ferrous metal coils. The high price of non-ferrous metals, however, presented us with a new opportunity to also include galvanized coins in our portfolio. We then decided to establish a galvanization facility.

We also had to look at the matter of efficiency. Given the specialist knowledge that was already on hand, it was very important for us to take on as many of the existing employees as possible. And we did take them on, especially in the top positions of the technical department.

As such, we were able to transfer the know-how, even if we had to downsize other areas of the operation, which was founded in the 50s, to its present level, following the typical Amera-philosphy of a lean and cost-effective organization to the advantages of the customer. When it comes to current manufacturing processes and administration, we actually work more efficiently now, with considerably fewer staff, than we did at the beginning.

It's important to us that all decisions be made on-site. Therefore, as is the case with practically all our operations, we have established a dual top management system - consisting of both a commercial and a technical manager. During the initial phase, these managers were provided with on-site support from our experienced Amera team; but the aim from the outset was always to foster individual initiative and to help facilitate this through a wide array of responsibilities and competencies.

As with all Amera family sites, Quilpué is independently organized, both financially and administratively. Financial support was only provided during the conversion phase.

Kremnica, Slovakia

The romantic city of Kremnica boasts a rather impressive history as a minting site. Coins and medals have actually been produced here since 1328. We started getting involved in this site in 2005, and in the years since have as-



Kremnica, Slovakia: The stamping tools are the true heart of the punching machine.

sumed 100 % of the production of blanks formerly done in house by Mincovna Kremnica.



Kremnica, Slovakia: A lot of water, few chemicals and the so called satellites provide the blanks with their beautiful luster.

That being said, the initial starting point was obviously completely different than it was in Quilpué. Here, we already had a fully operative production unit that we hoped to guide to a new level by way of a five-point plan.

Our first objective was sustaining the motivation of our employees. It was crucial to let them know that they were invaluable to Amera. And so, to this end, before we'd even bought a single additional machine, we invested in renovating the social and sanitary facilities. The premises were completely refurbished, creating a comfortable environment. Making this a priority paid off in terms of our staff commitment.

The actual processes were our second goal. We inspected all production processes and restructured them as necessary in order to ensure optimal flow.

We then addressed the third point, the technology. We wanted to preserve and continue as much as possible, of course, but we did develop new technologies where it made sense to do so. These were developed by a method of 'trial and error,' and some decisions were successful while others had to be withdrawn.

It was only at this point that we began thinking about new facilities. We modernized and improved the machine park. As an example, we converted the entire wastewater system. Whereas before, the water from the cleaning processes had been treated chemically/physically, we now work with vacuum evaporation technology of water. The distillate can be used recycled back into the process, and consequently, we produce practically no wastewater.

This is where point 5 came into effect - the actual product portfolio. Amera decided that, wherever possible, they would offer the core products of our entire product portfolio at every site. These include full-alloy blanks, stainless steel-and aluminum blanks and, of course, the most economically practical solution available today, galvanized blanks. For Amera, innovation means the willingness to look at new, unconventional ways of thinking, to break the mould and try new approaches. Our extensive experience in the area of site development has been invaluable and rewarding to this effect, affording us the opportunity to get to know other people from different cultural spheres and different perspectives. It's an enriching experience that prevents complacency and inertia. Constantly having to confront and overcome new challenges ensures that we keep an open approach to any and all problems that the market may present, according to its ever-changing daily needs.



Thomas Köninger

Thomas Köninger, 43, married, father of a fourteen-year-old son, has been working in various positions of authority in the field of electroplating for more than 20 years. He has various degrees in surface technology. Since January 2009 Thomas Köninger has been supervising technical issues and process management as technical director of the Amera family. In addition he is the responsible executive director for Menden and Kremnica, the European locations of the Amera group.

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Vending: a Key Player in Innovation

Text Catherine Piana & Klaus Meyer-Steffens

Every week, over 295 million consumers in Europe use a vending machine for a hot or cold drink, a snack, and other products on offer in this convenient out-of-home retail channel.

Most people have no idea what there is 'behind the machine', whilst over 10,000 small and medium-sized businesses, employing 85,000 people, make sure that the machines are up and running to provide food and drink to go on the workplace, in hospitals, universities, public transportation, leisure centres, and many other locations.

Whilst earlier forms of vending machines appeared in the 19th century, the industry as we know it now really took off after WWII. Initially found in manufacturing plants, providing hot drinks mainly, it has since developed and diversified to cover all types of foods and drinks, at all temperatures, from hot to deep frozen. The annual turnover made by the companies operating vending machines in Europe is above $\in 11$ billion, but it generates much more indirect revenue for the suppliers of the industry.

The EVA – European Vending Association – is the association that brings together all the vending segments under one roof in Brussels and represent their interests vis-à-vis the European Union. It also promotes and supports the growth of the industry in Europe by creating a platform where the industry and stakeholders can exchange knowledge and experience, as well as network and start business relationships. The EVA members are both National Vending Associations (20) and 70 Corporations covering the following industry players:

- Manufacturers of vending machines and parts;
- Producers of food and drink products, mainly household brands;
- Operators of vending machines, the so-called "retailers of vending", who place, maintain, fill and service the vending machines;
- Manufacturers of cups and disposables;



- Manufacturers of payment systems, both cash and electronic, as well as manufacturers of coin and banknote sorting and counting equipment;
- Suppliers of so-called "vending solutions", enabling a more efficient management of the machines, thanks to technology.

The EVA explicitly excludes tobacco, cigarette, amusement and gaming machine operators. These are represented by separate organisations (ETV for Tobacco, and EUROMAT for gaming).

Coin Your Drink

The industry is closely associated to coinage, as it has in most cases used coins as only payment system for decades. Nowadays, there are other payment options, but coins remain the most frequently offered payment method in vending machines.

As vending machines are, by definition, unattended points of sales, and payment is made before receiving the product, it is crucial that coins are accepted at the first throw; otherwise consumers get frustrated and may harm the machine or lose their trust in it. Any consumer walking away from the machine without his/her product, represents a lost sale for the operator and chances are, he/she won't come back again. Once the operator has collected the cash, it is important that all coins are genuine, otherwise this means lost revenue for the company. People would be surprised to find out that some fraudsters go to great lengths to counterfeit coins or produce objects that wouldn't look like coins to a consumer, but may fool an electronic sensor because its 'electro-magnetic signature' matches the real coin.

When coins are collected by specialized companies, they are counted, authenticated and recirculated into the cash cycle. This operation is done by counting / sorting machines, which use similar sensing techniques to those used in vending machines, only they are incredibly faster.

For all these reasons, the EVA members have always put a lot of effort to produce high quality coin validators, and have cooperated with the Minting world, with a common objective: have coins that are secure, consistent and reliable.

The EVA Coin Group

In order to centralize knowledge and expertise, and produce well-substantiated opinions, the EVA runs a number of working Committees. In the area of payment there are 3 committees:

- The Coin Group
- The Banknote Group
- The Electronic Payment Committee

The EVA Coin Group brings together the major coin validator manufacturers worldwide. They produce validators in use in the whole range of unattended points of sales, and also in coin counting and sorting industries: Astrosystems, Azkoyen, Coges, Coinco, Cummins Allison, Glory Europe, Jofemar, MEI Conlux, Money Controls, NGZ, NRI (Crane Payment Solutions), and SCAN COIN.

The Coin Group is chaired by Klaus Meyer-Steffens (NRI) and interacts with the following stakeholders:

- European Institutions in general: Council, European Parliament, European Commission;
- European Commission's Economic and Financial DG, as well as the anti-fraud unit of OLAF;
- European Central Bank and the national Central Banks, Treasury;
- European Mint Directors Working Group (EMDWG), which is responsible for coinage in Europe, in particular the Euro specification;
- Mint Directors Conference (MDC) and its Technical Committee (MDC-TC) of which the EVA is the only trade association that has industry observer status;
- Individual Mints and Blank Manufacturers worldwide.

Other Vending Associations worldwide: in Brazil, Canada, the US, Colombia, Australia, Japan, South Corea, South Africa, Russia, Ukraine, Turkey and with vending stakeholders in Peru, Chile, China, Vietnam, India, etc.

The EVA is known as a center of excellence for coins by all those stakeholders. This status has been even reinforced by the publication in 2004 of the first edition of the Coin Design Handbook (then called "Future Selection of Coinage Materials to prevent counterfeiting in vending")

The Coin Design Handbook 2012

The Coin Design Handbook was produced by members of the EVA - fierce competitors on the market place - with the realization that there was a strong need to have a common reference book where all the knowledge of the industry would be centralized for the benefit of the Minting World. It would also serve as a common archive for specialists that work in the coin validating industry. Historically, Members of the Coin Group would receive requests to comment on specific coins, either existing or future, individually, and the Mint in question would then have to collect and process their views and summarise them. With the Coin Design Handbook, the cumulated knowledge of all the EVA experts (probably over 150 years cumulated intelligence and experience) was put in a widely endorsed manual, which rises far above vested interests of particular producers.

The current edition of the Coin Design Handbook was launched at the MDC in May 2012. It was written by Coinco, MEI Conlux, NGZ, NRI (Crane Payment Solutions) and SCAN COIN, and endorsed by all the EVA Members who manufacture coin validators as well as coin counting and sorting machines.

The Handbook was written from the perspective of both coin validator equipment and coin counting/sorting equipment manufacturers, which share similar principles of coin sensing technology. Although all coins may not be used in vending, the requirements in the Handbook still apply to all circulation coins, whatever their denomination, as they will be processed through automated equipment.

The document explains the validation process in detail, and the issues the industry faces. It provides a description of the coin sensing techniques and how Mints can further improve their product thanks to a better understanding of it. It describes some of the existing fraud cases, and how different coin constructions respond



in a validator (e.g. plating techniques, etc). Therefore it is the ideal basis for future coin innovations and it will be updated regularly.

The Handbook makes a number of recommendations and includes a chapter related to how Mints and Vending should cooperate in the process of designing and launching new coins or coin features. It is important to note that, whilst future coin security can be improved for use in the vending industry, there is an existing field base of over 20 million coin validators around the globe. These cannot be upgraded overnight and the cost of doing so could be significant to the vending industry. It is important that the Minting Industry understands that new coin designs and features should also be secure for today's environment.

Finally, the Coin Design Handbook provides a basis for coin design and validation excellence in the vending environment. This edition includes a Q&A chapter, as well as an MCC (multi-clad coin construction), Flip Flop clad construction and preliminary comments on taggants technology.

EVA and Coin Innovation

As indicated above, the Vending Industry and the Minting Community pursue a common objective: ensuring the consumers' trust in their cash. Therefore it is important that the EVA be contacted as soon as possible in the planning for a new circulation coin. In doing so, EVA and Mints can work together to make sure that the new coin (or coin set) will be as efficient and secure as consumers expect them to be.

The EVA acknowledges the Mints' demand for lower cost of materials for circulation coins and, at the same time, is offering its assistance and consultation to ensure that this trend in cost reduction does not jeopardize the security of the coins.

New security features do not automatically mean higher security in coin validation sensors. Therefore it is important that new features be discussed with the EVA, so that the Coin Group Experts can give their comments, test prototypes and give appropriate and useful feedback to the Mints.

The timing is particularly sensitive, because the coin validators' life cycle in the field base is quite long. The sensors created for new features may not hit the field base before 5 to 10 years. Meanwhile, coins have still have to be highly secure in the legacy validators.

In short, product strategies have to be managed as early as possible, to allow for a critical mass of new validators to take the full advantage of the new features.

Common Projects on Coin Innovation

The EVA is involved in a number of projects with Mints that are governed by Non-Disclosure Agreements. Therefore only projects that have become public are listed below.

Here are some innovative features on which the EVA has been consulted by the Minting world:

The multi-layer configuration: this is achieved by cladding, plating or a combination of both. Multi-layer or 5-layer material, also known as 'multi-clad coin' or 'MCC', is a recent development and an add-on of a 3-layer sandwich material to the present known clad coin material. To take full advantage of this construction, new designs of equipment will be required, namely an additional frequency will have to be added.

Flip-flop clad: the construction is that of a clad coin, where the surface layer on each side of the coin is of a different material and colour. This is a challenge for coin validators, as the sensors will get a different response according to the orientation of the coin as inserted into the coin slot.

High security shaped coin: the design is that of a non round shape with a scallop shaped inner part (see picture). This is a challenge for the coin pressing machine, and for the validator manufacturers alike. The picture below is the outcome of the project led by the MDC-TC and the coin produced for the MDC in Canberra.

The EVA Coin Group Is There To Help!

Cash is in a constant battle for its existence in a context where large card schemes and banks make regular aggressive announcements that they will 'go to war' and 'kill' cash. Coins, in this context, are under attack for survival, as the banking world would like to grab a part of the cake of low and very low payments, which so far has completely escaped them.

Furthermore, automation of coin validation has become ubiquitous, be it in payment or in counting and sorting, and the need for third party, like cashin-transit companies, to authenticate the cash before recirculating it, calls for a high level of security, consistency and reliability of the coins.

This means that new security features in coins are only going to work if they can be validated securely and the risk from fraud is as low as possible. The only way to make sure that this is the case is by working in close cooperation with the EVA Coin Group. The Coin Group experts will give you feedback in confidentiality (NDA's are signed on a regular basis to this end) and neutrality (all major manufacturers sit on the Group). The opinions given by the Coin Group are made according to a common test protocol, and concrete technical recommendations are made when relevant, so that the feature can be optimized.

For any further information, please contact Catherine Piana, Director General, EVA cp@vending-europe.eu

To find out how to get the Coin Design Handbook, please contact Maria Cummins, EVA mc@vending-europe.eu



Catherine Piana

Catherine Piana is an experienced EU lobbyist (20+ years). She has been the DG of EVA since 1997 (15 years), where she deals with a wide range of subjects. Her first lobbying challenge at the EVA was the preparation and smooth introduction of the euro; she managed to have the EU Council of Ministers withdraw and modify the coin specification Regulation. Since then, she has built on this success to establish cooperation with the Mints and Central Banks worldwide, and has become an expert in coin and banknote validation issues.

She started her lobbying carreer in Brussels at EuroCommerce in 1990, where she gained experience as Adviser to the Director General for Public Relations, New Methods of Payments and, later, the introduction of the euro.

Catherine can communicate in 6 languages: French, English, Italian, Dutch, German and Spanish. Her academic background is a Masters Degree in Translation. In the course of time, she has also acquired an MBA, become a Certified Master Practitioner in NLP, a Professional Trainer and a Life and Executive Coach. In addition to her position within the EVA, Catherine Piana has set up and manages Gecko Strategies, a Consultancy, Training and Coaching business.



Klaus Meyer-Steffens

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The World's First Stamping Press

... And Why It Would Be a Few Decades Before It Caught On

Text Ursula Kampmann

The early modern era wasn't just marked by reformation and a fundamental change in worldview. It was also accompanied by an unprecedented flood of economic activity. Merchants and producers were virtually crying out for more coins with which to pay their bills, and yet the mints were not complying in terms of production. Ultimately, minting was done just as had been customary since ancient times – piece by piece and by hand.

Naturally, this prompted those in positions of leadership to look for new possibilities for coin production since at the time, minting coins was still a good business for the state. The difference between the face value and manufacturing costs went as a seigniorage to the minting authorities. It was low risk, firstly because minting was only done when a seigniorage was expected and, secondly, because the minting right was leased to private operators who had to pay a predetermined sum, and nevertheless earned good money.

Centre of Innovation: Augsburg

The south German city of Augsburg became the birthplace of the rolling press, a coin-stamping machine that was based on the principle of a mill. Hydraulic energy drove a flywheel, which then set two rollers in motion in which the face design of the coin was already engraved. These two rollers pressed the face design simultaneously into the front and back of a strip.

Although it may sound simple, this offered a whole host of difficulties in terms of detail. How, for example, could it be guaranteed that the coin's obverse was always pressed congruently with the coin's reverse into the strip? And which slightly different form had to be engraved in the rollers to ensure optimal equalization of metal flow during the pinching?

These two issues alone make one thing quite clear: Anyone who had learned engraving or stamping in a mint prior to



Reconstruction of a rolling press in the Hall Museum of Minting Technology.

1550 was now faced with having to radically rethink his way of doing things and learn new things. To this end, far more highly trained technicians were needed at the new machines. A few henchmen were also needed, but considerably fewer than before. Those who lost their work with the rolling press were primarily those who weren't highly qualified, but had completed a good basic technical training. What's more, this profession in particular had been especially privileged and well paid since the Middle Ages. The resistance of this group of individuals proved fatal for the rolling press in one incident, at least.

In any case, we know that the first rolling presses were built and sold in Augsburg around 1550. Although many princes expressed interest, only a few countries actually gave it a try.



Two rollers pressing the design simultaneously into the front and back of a strip.

First Attempt: Paris - Unsuccessful

The first person that decided to use the machine for minting coins was King Henry II of France (1547-1559). Accompanied by the mint master of Lyon, the king's ambassador took a trip to take a firsthand look at the new machine. The mint master was then sent home - he appeared unable (or unwilling) to recognize the advantages of the new method. Instead, they picked a young mechanic without a numismatic background who learned to use the technology, accompanied the machine back to France, and then worked for approximately 10 years at the Ile de la Cité in Paris, producing coins faster, more attractively and, most importantly, more cheaply than the traditional mints were doing at the time.

But in 1560, production stopped almost entirely, with only trial and commemorative pieces being carried out on the rolling press. Why? Well, time-wise we find ourselves in the heated stages of the religious wars, so the kings had other issues to contend with than trying to convince reluctant mints of the new method. And the traditional busi-

Second Attempt: Zurich - Unsuccessful

In Zurich, an innovative silversmith by the name of Jakob Stampfer once again adopted the principle of the rolling press. At the time, Zurich was producing an enormous quantity of coins. Initially, they had brought in a mint master from out of town who, with 58 coiners, produced 984,772 thalers, over 60 million groschen and 2.6 million fractions over six years. These were extremely impressive figures for the middle of the 16th century!

For a few years, at least, Stampfer was minting in parallel with him. Then, in 1561, Stampfer assumed sole production of Zurich's coins and became THE go-to person for the city's coin-related matters. Council sent him all over the place whenever there were currency issues to discuss. As such, Stampfer got to know many politicians of the Swiss Confederation and tried to convince them of the advantages of his rolling press. After all, he produced more attractive and cheaper coins than all his



Pressed strip - one made of tin, one of birch bark, please note the slight form difference in the imprint.

nesses would simply have given up their own privileges had they been converted over to the new production.



French coins of the year 1554 - the left one struck by hand, the right one produced by the rolling mill.

colleagues. We know numerous trial strikes that are among the most attractive (and – today – most expensive) coins that Swiss numismatics has to offer. Nevertheless, Stampfer didn't receive a larger order from any potential clients. It seems he was not, in fact, a master of negotiation.

Stampfer had a competitor in his own city that spoke disparagingly of him to all the negotiating partners. His name was Rudolf Rordorf, and he portrayed himself as an inventor, despite never having successfully invented anything. Naturally he was cheaper than Stampfer, as Stampfer actually knew just how much knowhow and work was required to set up a rolling mill such that it worked. Many fell prey to Rordorf, including the emperor. Allow me to elaborate.

The simple end result of the Rordorf smear campaign against Stampfer was that the true craftsman lost interest. As lot of debt. A friend of Rordorf's stepped in and actually got the machine up and running after months of effort, but only received a pay-off of 800 gulden. This was a catastrophe for him – he had invested considerably more money in the rolling mill than he actually received after completing the work. The chancellery had even generously increased the pay for the job to 2,500 gulden, but his two predecessors had already taken so much money that only 800 gulden remained.



Zurich thaler of the year 1558 - the left one struck by hand, the right one produced by the rolling mill.

a shrewd politician, Stampfer had many options, and so, he gave up coin production. All his knowledge and experience was lost. Jakob Stampfer instead earned his living as Bailiff of Wädenswil.

Third Attempt: Hall - the Breakthrough

At the beginning of the early modern era, Hall was the most important coinminting site in the empire. Before the leap into the New World, nearby Schwaz had produced the silver that was used for payment in the Habsburg Empire. The revenue from the silver mines of Schwaz and the mint in Hall had made the Tyrolean archduke rich, so it's little wonder that he had a particular interest in optimizing profits through the use of new technology.

His relative, the emperor, had recommended Rudolf Rordorf to him, who had promised to build a rolling mill extremely cheaply. Rordorf was to receive 1,500 gulden if the machine functioned properly. Just as a point of comparison: Stampfer had turned down 2,000 gulden as too small an amount when he was offered the same commission by the Archbishop of Salzburg.

Rordorf accepted, however, perhaps also because he had never intended to take care of the rolling mill himself anyway. He sent a relative who lost interest after half a year and left them not only with no stamping machine, but a Now, the rolling mill was running in Hall. It ran and produced coins more affordable and more attractive than anything that had come before. The prince was proud of his machine and made it into a regular attraction for all noble guests who visited him at his ancestral seat in Innsbruck.

The machine brought him money and prestige. He was now the one who could offer a technological transfer, but only for his relatives, of course, and only when it proved beneficial for his own prestige. And so, the rolling press



The so called 'Angel thaler' from Zug, 1565, is one of the rarest and most beautiful coins of Swiss numismatics. It was designed by Stampfer and produced by a rolling mill.

came to Spanish Segovia, where they stamped the silver of the New World using the newest technology. From there, the rolling mill took over Latin America, where local silver was processed on site.

In Hall and in all the other new locations, it was a prince who insisted upon the new technology and forced his workers to accept it. Without a forced change, one tended to stick to the conventional way of doing things.

Today, we no longer have a prince compelling us towards innovation. Instead, it's the rules of the free market that demand economic efficiency. When it comes to any innovation, however, it's always important to remember the human factor. After all, it's this human factor that is at a disadvantage in the face of newness, and it will try its hardest to prevent change. We are looking forward to your contributions! Our next issue will be dedicated to museums of mints and central banks featuring the monetary history. Please contact us, if you want to be part of the MintWorld Compendium.

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