

A photograph of three men in safety gear (hard hats, orange vests, and orange jumpsuits) standing on a construction site with scaffolding and steel structures in the background.

2018

SEA LOCK IJMUIDEN:
"WE MONITOR QUALITY IN
SOUTH KOREA AS A TEAM"

**FURTHER AUTOMATION OF
EUROPEAN LEACHING TESTS**

INTERVIEW:
THE DEVELOPMENT
AND FUTURE OF THE
CSC CERTIFICATION SYSTEM

SGSINTRON BULLETIN

SGS

COLUMN

We live in a time where “change” seems more important than ever before. We know: if you do not change in time, you will be changed by someone else. We at SGS INTRON are not very keen on the latter, as we prefer being behind the wheel ourselves. In and of itself, however, change is not that bad, provided you take the initiative yourself.



SOIL QUALITY TIME!

Sometimes, however, “not changing” can be more sensible than changing. More specifically, this is currently an important issue in the context of the Soil Quality Decree for construction products. So what is the situation?

Within Europe, in particular with regard to the CPR, a rather pragmatic attitude towards the implementation of the essential “dangerous substances” requirement is threatening to emerge. I do not oppose pragmatic solutions per se, but if this means throwing the baby out with the bath water, we, as the Netherlands, would be making a dire mistake. The direction Europe is headed in would mean that our uniform Dutch quality principle, which forms the basis for the Soil Quality Decree, would no longer apply, so that no distinction would be made between primary and secondary materials and there would be no different requirements for different product groups. Not only would this undo 20 years of progress, but it would also mean that we would have to go back to the drawing board for all the great ‘circular economy’ initiatives that have been introduced in recent years. It would also involve tremendous disinvestment in our environment, our soil quality, and our quality-centric attitude.

You might think: surely it won’t come to that... That, however, is far from certain. Until recently, our own Ministry of Infrastructure and Water Management appeared to have refrained from joining European discussions about this topic. And if you are not behind the wheel, the outcome of any discussion is all but certain. In any case, we know that the Netherlands is joined by just a few other European countries in its position in favour of implementing the current policy within European frameworks. This policy, we can tell you, is a far cry from having every CEN commission, i.e. around 60 in total, determine independently how often products must be tested, how often primary and secondary materials must be tested, and which harmful substances are relevant. Many European countries want there to be as few requirements for construction products as possible, proposing company-specific requirements at AVCP level 4. In the Netherlands, we know that this can lead to major problems, such as unwanted leaching into the soil and surface water.

Fortunately, the Soil Quality Platform has sent a strongly worded letter to the Ministry. The Soil Quality Platform is an independent policy group consisting of organisations with immediate interests, i.e. contractors, producers of primary and secondary construction products, and businesses in the soil industry. SGS is also involved in the platform and is a stakeholder with regard to this issue. We were responsible for relevant elements of the Soil Quality Decree, as well as its testing methods and interpretation. We are the main independent experts in this field in the Netherlands. We would like to see the AP04, the quality programme governing analyses performed in the context of the Soil Quality Decree, to be retained as is. Sometimes, you have to resist change.

RON LEPPERS



Theo Salet

Five years ago, Theo Salet, professor of concrete structures at Eindhoven University of Technology, announced his intentions to kick-start a digital transition in his introductory speech.

“Isn’t it odd that virtually all sectors have become automated, but that the construction industry still works with printed 2D drawings?” he asked. “Robotisation, linked to data from a Construction Information Management (BIM) system, would generate substantial cost savings and greater operational reliability. Greater sustainability, achieved by only using materials where necessary and therefore resulting in considerably less waste, was also a key argument to start investigating the possibilities of 3D-printed concrete. Three years ago, we managed to find 10 partners in the construction sector that were willing to join us in investing in this technology, despite the crisis.”

WILLINGNESS TO INNOVATE

“This allowed us to start a large-scale study,” Theo Salet explains full of enthusiasm. “We have designed and created a large, robot-controlled printing system, which we have been testing for 2.5 years now. Remarkably, the partners involved in developing knowledge in this field come from all corners of the construction chain: Ballast Nedam, BAM, Bekaert, Concrete Valley, CRH, CyBe, SGS INTRON, Verhoeven Timmerfabriek Nederland, Weber Beamix, Van Wijnen, Witteveen

“WE CAN PRINT 3D CONCRETE SUITABLE FOR CONSTRUCTION ALL YEAR LONG”

MORE INFORMATION: GERT VAN DER WEGEN GERT.VANDERWEGEN@SGS.COM



+ Bos, and the SKKB Foundation. To me, their joint willingness to tackle this project is a beautiful thing. The construction industry is happy to innovate, as long as the idea is a good one.”

FREEDOM OF FORM

Salet believes that this technology will have more benefits for the construction industry than just in terms of digitisation and sustainability. “This construction method also provides a lot more freedom of form. Our current built environment is determined by the construction methods available to us: we pour concrete into moulds with certain standardised dimensions. In principle, printed concrete can be made into any shape or size, which has the positive effect of allowing the end user to play a more central role. You’ll end up with an enhanced version

of the IKEA kitchen planner, of sorts: depending on your preferred layout, you can print all walls in a building exactly to size. I’m even thinking of the next step, towards the circular economy. Suppose that the next resident would like an extra bedroom. You could disassemble all current elements and reuse some of them. Sure, some pieces will be missing, but all you’ll have to do is go to your concrete printer and print the element you need.”

ROBUST PROCESS

It’s still early days for printed concrete, but significant progress has nevertheless already been made. “One of the main obstacles that we have had to navigate was making the printing process robust,” Salet explains, “which actually involves nothing more than superimposing layers of wet concrete. You can imagine

that your 'construction' will topple if you print it too quickly. If you print too slowly, however, you'll be putting a layer of wet concrete on top of hardened concrete, which means you won't have sufficient adhesion. We're now so familiar with the printing process that we know exactly how to tackle this issue. In other words: regardless of the circumstances, rain or shine, we know that the printing process will function properly. We also want to automate the process until we have a 'learning' machine that is capable of improving itself. A second scientific success is our ability to reinforce the printed concrete by adding wiring or fibres, which greatly increases the likelihood of finding applications for the printed concrete."

PRINTED BRIDGE

"That's also where you'll find the key benefit of our practical partnerships: there's a whole range of projects in which we can apply the knowledge we've acquired. Take the bicycle bridge in Gemert, the Netherlands, for instance, the very first construction produced by our 3D concrete printer that has actually been put into use. This was a BAM project that also included a number of other industrial partners involved in the study, as well as the Province of Brabant. Their involvement was key, because rules and regulations are down to the authorities. Printed concrete hasn't been standardised yet, which is why the first question we come across is often 'Is it safe?' My main task at Eindhoven University of Technology is making sure that the concrete constructions we



3D-printed bridge in Gemert

design are also safe. We do not just subject the material properties of printed concrete to extensive testing, but also run tests on the entire system. The bridge in Gemert, for instance, was first tested in the lab, followed by a second stress test on-location, before it was put into use."

ENTHUSIASTIC INPUT BY SGS INTRON

Salet is convinced that standards and regulations will make the technology a lot more accessible and more widely applicable. "Kick-starting that process is one of the challenges we will face in the foreseeable future, and SGS INTRON is consulting with us on that matter. How can we set up a quality control test, for instance, that will allow for long-term testing and certification? When it comes to research, SGS INTRON also has a lot of materials knowledge to share, but the enthusiasm contributed by Gert van der Wegen (SGS

INTRON) is no less important in my eyes. Whenever he attends a meeting, you can be sure that the overall mood will be optimistic and that we'll think in terms of solutions rather than problems."

LEADERS IN KNOWLEDGE DEVELOPMENT

"Our research is significant," Salet states firmly. "Hundreds of parties worldwide are working on this technology, but we were the first to tackle it from a research perspective. As a result, we are known leaders in knowledge development. We're glad, though, that we can see this technology stretch beyond science, as a new, imaginative project will soon see the light of day. The first printed houses will be located in Eindhoven. When you see the design, you'll know why there are five of them and why printing was the obvious way to go. It's going to be great."

THE FIRST CIRCULAR VIADUCT IN THE NETHERLANDS

MORE INFORMATION: GERT VAN DER WEGEN GERT.VANDERWEGEN@SGS.COM

In 2017, the Circular Design Consortium was launched with the aim of building the first circular viaduct in the Netherlands in 2018.

SGS INTRON is part of this consortium. The circular viaduct will consist of components that can be disassembled without producing any waste, after which they can be used for a new construction project. The project is

now in its preliminary stages and all circular design principles have been determined. The design is complete and when the future location for the viaduct is known, the project will enter into the realisation stage. The consortium consists of, amongst others, Van Hattum en Blankevoort, VolkerInfracore, Spanbeton/VBI, SGS INTRON, and The Ministry of Infrastructure and Water Management. They form an innovative partnership between market parties, knowledge

institutes, partners in the concrete chain, and the public authorities.



JINKOSOLAR RECEIVES CRADLE TO CRADLE CERTIFICATE

MORE INFORMATION: JÖRN BREMBACH JOERN.BREMBACH@SGS.COM



JinkoSolar, a global player in the field of solar energy, recently received a Cradle to Cradle certificate for four solar panels in their Eagle range. This makes the Chinese company one of the first and largest manufacturers of PV panels to be Cradle to Cradle certified.

UNIQUE MARKET POSITION

JinkoSolar produces solar cells and full PV panels for various energy companies, commercial organisations, and private customers. "This certificate allows JinkoSolar to occupy a unique position in the Chinese market for solar panels," says SGS Search director Udo Waltman,

who oversaw the assessment for this certification. "The Cradle to Cradle certificate demonstrates that their products and production methods meet a number of key requirements for the circular economy."

GREAT MATERIAL HEALTH SCORE

"We checked whether the product contained any harmful chemicals and therefore whether it was safe to be recycled, even after use," Waltman continues. "The production of solar panels requires materials that are not naturally healthy and suitable for reuse, such as lead and cadmium. This makes the fact that JinkoSolar still managed to score highly on "Material Health" extra special." SGS Search also inspected the carbon emissions, waste water, and energy consumption of the factory where the products are manufactured. Waltman: "It was to be expected

that JinkoSolar, as a manufacturer of solar panels, would score highly on this element. Finally, the inspection also addressed social aspects, such as working conditions and suppliers."

COLLABORATION WITHIN SGS

The assessment of JinkoSolar's Cradle to Cradle certification is a great example of how SGS colleagues collaborate all around the world. SGS INTRON served as a PV panel consultant. The Consumer and Retail Services business line of SGS Shanghai acted as the fixed point of contact for JinkoSolar. In the Netherlands, SGS Search was involved in supporting the Chinese company during the certification process. This level of collaboration makes SGS an incredibly interesting partner in the search for solutions to the most diverse questions.

NOTIFICATION FOR EN 438-7 HPL – DECORATIVE HIGH-PRESSURE LAMINATES

MORE INFORMATION: BERT CREEMERS BERT.CREEMERS@SGS.COM
AND CAS DE ROOS CAS.DEROOS@SGS.COM

Since 1 December 2017, the SGS INTRON lab has supported notified façade panel testing in line with EN 438-7 HPL: – high-pressure decorative laminates.

Façade panel producers can now use the test results to declare the properties of their products in the context of CE marking. Having these tests performed externally by a notified laboratory can also have added value for producers in that it can substantiate their Declaration of Performance (DoP). Another advantage is that SGS INTRON test reports are recognised worldwide.

The SGS INTRON laboratory has conducted façade panel tests for KOMO certification for years. CE marking tests must be carried out by a notified laboratory.

Photography: Wil Klarenaar



Jan Schuttenbeld

Why would you source primary raw materials if you can reuse old materials? Twee “R” Recycling Groep B.V. believes in the circular economy. “We want to become the quarries of the future,” director Jan Schuttenbeld explains.

“That’s why we’ve mainly focused on creating replacements for sand and gravel for the concrete industry ever since 2010. By now, we supply almost 70,000 tonnes of recycled concrete aggregates and 60,000 tonnes of sand replacements to producers of prefabricated and transport concrete. And demand is still increasing.”

GROWING DEMAND AND TRUST

Major clients, such as housing corporations, real estate entrepreneurs, and municipalities, are demanding more and more recycled products, Schuttenbeld knows. “On top of that, the concrete industry has learnt to trust the quality of our products. Concrete producers still demand KOMO-certified products, which is why we have individual KOMO certificates, issued by SGS INTRON, for all particle sizes we produce. As such, our customers can be certain that our products will always satisfy their demands. We do everything we can to meet the needs of our customers when it comes to quantity and quality.”

FILTERING GRAY CONCRETE

In doing so, Twee “R” Recycling takes things one step further than traditional waste-recycling companies. “We use two UHR cameras (ultra-high resolution) to separate concrete waste from all the other construction and demolition waste (CDW) we receive, which allows us to efficiently separate more than 100 tonnes of material by colour per hour. 98% of all CDW that we remove from the mixed CDW flow based on its gray colour with the help of air pressure turns out to be concrete.

CLEAN AGGREGATES

This is not the only investment that was made in order to provide a high-quality product to the concrete industry. “We have fitted magnetic head pulleys under the conveyor belts at all our locations, which extract any concrete needles from the aggregates. On top of that, we also windshift and wash our aggregates,” Jan Schuttenbeld explains. “Windshifting involves large fans blowing lightweight materials out of the CDW. Washing, however, remains necessary, because concrete producers must be able to accurately determine the grain size gradations in their mixes. That is why we have a washing installation in all our facilities which flushes particulate matter from the granules so that only clean aggregates remain.

OLD CONCRETE IN NEW CONCRETE

Making new concrete from old concrete is beneficial for the environment, espe-

JAN SCHUTTENBELD, DIRECTOR OF
TWEE “R” RECYCLING GROEP B.V.:

“THE CONCRETE INDUSTRY STILL WANTS KOMO CERTIFICATES FOR GRANULAR BASES”

MORE INFORMATION: ERIK HOVEN ERIK.HOVEN@SGS.COM

cially if the CDW used is sourced locally and re-used in the same region. “That is possible, and we see it happen as well,” says Schuttenbeld. “Our debris comes from demolition projects within a radius of about fifty kilometres around our facilities in Hengelo, Almelo, Emmen, Veen- dam, and Groningen. Any other sourcing strategy would lead to higher transport costs and would be detrimental to the environmental benefits of this method.”

ENVIRONMENTAL GAINS

The reduction of carbon emissions is one of the key benefits of concrete aggregates as opposed to sand and gravel, raw materials that often have to be transported across large distances. “There is plenty of local demand, which allows us to retain the environmental benefits,” Schuttenbeld says. “Currently, two to three percent of all aggregates used in concrete in the Netherlands has made way for recycled concrete aggregates. Various studies have shown that if you were to crush and sieve all the concrete



involved in demolition projects, you would only be able to replace about 15% of the aggregates used. Our bottleneck is the available amount of concrete waste, which we simply cannot control. For now, however, growth is definitely an option. This year, we want to upscale our aggregate sales to 90,000 tonnes.”



NOW AVAILABLE: DUTCH CUR RECOMMENDATION 121:2018

MORE INFORMATION: MICHEL BOUTZ MICHEL.BOUTZ@SGS.COM

Reliable information about the residual structural lifespan of concrete structures such as bridges, tunnels, and viaducts is of key importance for owners, managers, construction companies, and research and advisory firms. This provides them with certainty about the condition and safety of infrastructure and allows them to make the right decisions in terms of management and maintenance. When will repairs, structural modifications, and/or newly constructed replacements be necessary? The recently published CUR Recommendation 121 provides a reliable method for determining the lower limit of the expected residual lifespan.



PROVEN IN PRACTICE

Up to now, various models were used in the Netherlands to determine the residual lifespan of civil concrete constructions, which could lead to different outcomes. "The main added value of CUR Recommendation 121:2018 is that there is now a single, widely supported method that has been proven in practice to be easy to implement and reliable," explains Michel Boutz, senior consultant at SGS INTRON, who helped draw up the CUR Recommendation as the rapporteur for the SBRCURnet committee.

IMPROVED MODEL

In July 2014, the SBRCURnet committee was given the preliminary recommendation to draw up a practical guideline based on current knowledge and experience within a year. The committee started the process in November 2014, commissioning SGS INTRON and TNO to survey and assess national and international models used to determine residual lifespan with the aim of selecting the best model for inclusion in the CUR Recommendation. That proved to be slightly more difficult than had been anticipated. Michel Boutz:

"There turned out to be a wide variety of approaches and none of the available models used to determine residual lifespan was usable in practice, which is why we ultimately opted to draw up a new, improved model."

WIDELY SUPPORTED

This was finally achieved more than 3 years later. "We had thorough discussions about how reliably models for determining residual lifespan can be implemented," says Michel Boutz, "but ultimately we developed a method that was supported by all members of the committee. The regulation committees of concrete technology experts and constructors have also approved the CUR Recommendation, thus guaranteeing its status and implementation in the market. The SBRCURnet committee included representatives from all parties involved in the management and maintenance of constructions: large infrastructure managers such as The Ministry of Infrastructure and Water Management, ProRail, and the Port of Rotterdam Authority, and consultants and engineering firms such as Dura Vermeer and Heijmans. All stakeholders were given the opportunity to share their knowledge and expertise."

IMPORTANT FOR CONSTRUCTION COMPANIES

"We are seeing more and more often that contractors are held responsible for maintenance for up to 25 years after the completion of certain infrastructure projects, such as the widening of motorways," Michel Boutz indicates, "which means that it is important for them to know how long the construction will continue to function safely within that extended period of time and what would be necessary to extend their lifespan by another 25 years."



OUTCOME = LOWER LIMIT

The CUR Recommendation defines residual lifespan as the minimum amount of time for which a certain construction will still meet safety requirements. Applying the model will not generate a number, but an interval that specifies a residual lifespan of e.g. less than 5 years or more than 25 years. In case of reinforced concrete structures, unsafe situations might arise over time due to reinforcement corrosion. However, the period of time within which this damage develops, spanning from the first hints of corrosion up to levels of corrosion that create an unsafe situation, is difficult to predict. The CUR Recommendation, therefore, defines the moment that the reinforcement structure starts to corrode as the 'end of life'. Practically speaking, no unsafe situation has arisen at that time and there is plenty of time left to take measures to prevent an unsafe situation from occurring, including maintenance, further reinforcement, or replacement.

CROW TAKES OVER CUR RECOMMENDATIONS INITIATIVE

SBRCURnet was disbanded in early 2018. All of the organisation's infrastructure activities have been transferred to CROW, a non-profit knowledge platform that, like SBRCURnet, will initiate research projects and combine market knowledge to draw up new national guidelines, which will, as of yet, still be published under the familiar name of 'CUR Recommendations'.

HXRF METAL ANALYSES – A VALUABLE ADDITION TO POOL INSPECTIONS

MORE INFORMATION: PETER CRUCQ PETER.CRUCQ@SGS.COM

Since 2016, SGS INTRON has conducted inspections of metal suspension constructions and fasteners used in indoor public swimming pools. In the event that the inspections identify non-resistant stainless-steel components, these components have to be replaced by resistant materials in line with the applicable regulations.

In 2017, SGS INTRON purchased a handheld X-Ray Fluorescence Spectrometer (or HXRF). The HXRF allows SGS INTRON to determine the composition of metals quickly and efficiently, which makes it very suitable for additional investigations during pool inspections. The HXRF is also used for other purposes, such as investigating the presence of harmful metals in coatings (hexavalent chromium and lead).

When conducting an inspection, it is not always clear whether or not a fastener is actually made of stainless steel: there are other metals that are just as non-magnetic and that can be hard to distinguish from stainless steel. The HXRF has already been used several times to help solve such issues, which means we avoid incorrectly declaring metal parts unfit for use.

An example: wood wool cement slabs are nailed to a wooden frame above the basin of a swimming pool. The nails are not magnetic, which generally indicates that they are made of stainless steel. To be sure, the HXRF is used to check the composition of a single nail, which showed that it was made of aluminium. This insight meant that the owner did not have to take drastic measures to reinforce or replace the fasteners used to fix these slabs in place.



© Thermo Fisher Scientific

FIRST **CSC CERTIFICATES** AWARDED IN THE US AND SPAIN TO CEMEX USA AND HEIDELBERGCEMENT SPAIN

MORE INFORMATION: ERIK HOVEN ERIK.HOVEN@SGS.COM

We are very proud to have awarded the very first CSC certificates in the United States to CEMEX USA and in Spain to HeidelbergCement Spain. The Concrete Sustainability Council (CSC) certificate demonstrates that an organisation uses sustainable production methods and sources its concrete, cement, and aggregates responsibly.



The bronze certificates were issued to CEMEX locations in the San Francisco Bay Area, in Santa Clara, Oakland, Pier 92, San Carlos, and San José. Heidelberg's Hanson Hispania Hormigones' Zona Franca concrete plant in Barcelona received a silver level certificate.

CSC CERTIFICATION: FOR SUSTAINABLY PRODUCED CONCRETE

In order to help producers meet industry and customer demands and to provide insight into sustainable developments, the Concrete Sustainability Council (CSC) has set up a worldwide certification system to demonstrate responsible concrete sourcing. The certification system was developed to provide concrete, cement, and aggregate producers with insight into their environmentally, socially, and economically responsible performance. Performance is based on the origin of raw materials, production methods, and a range of economic, social, and environmental parameters.

AEB AMSTERDAM BUILDS INSTALLATION AIMED AT **100% REUSE RATE**

MORE INFORMATION: ARNO MEIJS ARNO.MEIJES@SGS.COM

Every day, 600 trucks filled with waste from Amsterdam and the surrounding area come to AEB Amsterdam. In total, the waste energy company processes 1.4 million tonnes of waste every year. "We incinerate this waste and use it to generate as much energy and collect as many (re)usable materials as possible in a clean, responsible way," says Business Developer Joost de Wijs. His main task constitutes setting up a mineral upcycling facility where WtE bottom ash is upcycled into 'freely applicable construction materials', following the requirements set in the Soil Quality Decree. "The process is not robust enough yet, but we are certain that we are capable of creating freely applicable construction products by reusing any and all waste flows, which is our main objective and one that is shared by the city of Amsterdam."

PRODUCER AND SUPPLIER

AEB, which used to be part of the city of Amsterdam, became independent in 2014. "We help municipalities and companies realise their sustainability ambitions. The decision to assume responsibility ourselves for the products that our Waste-to-Energy Plant (WtE) and High Efficiency Plant (HEP) introduce to the market was a strategic one. This gives us the certainty that they have the sustainable quality we aspire to. AEB wants to be a sustainable supplier of raw materials and energy, which goes hand in hand with staying in control of the upcycling of waste incineration residue.



WTE BOTTOM ASH

In terms of volume, by far the largest component of this residue is bottom ash, of which AEB 'produces' 350,000 tonnes every year. Bottom ash has been used as a secondary construction material for over 20 years, serving as foundation material used under roads, amongst other things. When not upcycled, this is a so-called IBC construction material, which can only be applied if IBC measures are taken (Isolate, Manage, Control) in order to prevent substances that are harmful for the environment from leaching out. In practice, this can be done by completely wrapping the material in foil, for instance. There are various ways in which bottom ash can be upcycled to a freely applicable construction material (unrestricted by IBC measures). Most waste processors opt for wet methods, which always result in a residue sludge that has to be disposed of.

UPCYCLING TO A FREELY APPLICABLE CONSTRUCTION MATERIAL

With an eye on achieving a reuse rate of 100%, AEB has opted for a semi-dry method, based on the EquiAsh technology developed by TAUW. "This method allows us to reuse all mineral materials. Moreover, we expect that it will enable us to produce high-quality, clean construction materials that do not belong to the IBC category and can be used as a gravel substitute in concrete bottom ash aggregate, as road base material, as filler material, etc."

AMBITIOUS OBJECTIVES

AEB's new mineral upcycling facility is expected to be completed in 2019. "We had intended to start this new process in 2017, but it was more complicated than we had anticipated, especially because it's our objective to completely reuse all streams of waste. We have noticed that if you want to fix one component, it often has the opposite effect on another component, which will start to leach more. Finding a good balance was the major challenge we faced. By now, we've found a solution for all key bottlenecks in the process. What remains is getting all process conditions under control so that we can be certain that every single gram of the large quantities of bottom ash that we process will have undergone the right treatment.

AGEING, SPRAYING, RECLAIMING

Joost de Wijs explains that treatment in general terms: "First of all, we age the material by blasting it with CO₂. We bring the pH value of the bottom ash to the natural pH end value, which it will ultimately reach in the long term. This helps us ensure that its leaching behaviour will not change in practice and that the product will continue to meet the requirements of the Soil Quality Decree. We then spray the bottom ash with exactly the right amount of water and additives to remove any salts without producing any sludge. Naturally, we also recover all metals. This will be our spearhead for the next two years, and I expect

that we'll be able to separate more and more metals and increasingly finer components as time goes on."

GREEN DEAL

Until 2019, AEB will temporarily be outsourcing the upcycling process of the bottom ash to a third party. Joost de Wijs: "This sees us comply with the Green Deal that WtE plants have struck with the government: as of 1 January 2017, at least half of all bottom ash must be applied as a clean construction material that does not belong to the IBC category. By the time our new installation will have been completed, we'll have sufficient capacity to upcycle our entire stock of bottom ash ourselves."

QUALITY CONTROLS BY SGS INTRON

AEB has been working with SGS INTRON for years, and Joost de Wijs does not expect that to change any time soon. "SGS INTRON carries out quality inspections of our bottom ash. They know the material and its characteristic properties, they know how to analyse and process it properly, and they are aware of regulations and potential applications. Besides, the people at SGS INTRON always come up with a good solution when we're looking for something that's a bit off the beaten track. I think that we will also call on SGS INTRON for the quality controls needed for our new process."

THE DEVELOPMENT AND FUTURE OF THE CSC CERTIFICATION SYSTEM FOR RESPONSIBLY SOURCED CONCRETE

AN INTERVIEW WITH CSC CHAIRMAN DR. ALEXANDER RÖDER AND VICE-CHAIRMAN DR. CHRISTIAN ARTELT



Concrete becomes more sustainable by the day. Transparency, accountability and legitimacy have become common practice in the building industry. Consequently, the Cement Sustainability Initiative (CSI), supported by the WBCSD, was founded together with industry partners including certification institutes and associations as well as the Concrete Sustainability Council (CSC).

The goal of the CSC is to develop a new global responsible sourcing certification system for concrete. The CSC certification system has similarities with the Forest Stewardship Council (FSC) certification system for wood and the Marine Stewardship Council (MSC) system for fish. The CSC certification system is designed to help concrete, cement and aggregate companies all over the world obtain an insight into the level at which a company operates in an environmentally, socially and economically responsible way.

The CSC certification system aims to improve transparency and highlights the essential role of concrete in creating a sustainable construction sector by getting recognition in green procurement government policies and building rating systems such as BREEAM, LEED and DGNB. This is highly ambitious and the scope is global.

SGS is one of the CSC's founding members, being present quite early in the development process of the CSC. SGS issued their first CSC certificate at Building Holland in June 2017 to Bosch Beton B.V. In the meantime, more than 49 ready mixed and precast concrete plants from different market actors are CSC-certified throughout the Netherlands and Canada.



Alexander Röder



Christian Artelt

The leading professionals of CSC, Dr. Alexander Röder (CEMEX), chairman of CSC and Dr. Christian Artelt (HeidelbergCement), vice-chairman talk about CSC and its future.

WHY DID THE CSI AND ITS PARTNERS LAUNCH A RESPONSIBLE SOURCING SYSTEM FOR CONCRETE?

Alexander Röder: It all started a couple of years ago when a study revealed that in many green building labels, such as LEED and BREEAM, there was a credit for responsibly sourced materials, but in reality for most materials, including concrete, there was no corresponding certification in the market. In other words, there was a credit, but it was almost impossible to obtain. During

initial research around the topic we quickly realized that many stakeholders were asking for guarantees that the production of our materials complies with minimum sustainability standards. As our sector nowadays has very good sustainability performance, the decision to develop a responsible sourcing system was straightforward. This led to the CSI teaming up with a number of trade associations in the concrete and related sectors and starting to develop the certification process.

WHY HAVE YOUR COMPANIES CHOSEN TO PLAY AN ACTIVE PART IN THE CONCRETE SUSTAINABILITY COUNCIL?

Christian Artelt: With the decision to join the CSC as a founding member, HeidelbergCement committed to actively contribute to the development of a certification system for responsibly sourced concrete that promotes transparency of a company's regard for sustainable actions and management. The system helps develop a better understanding of the positive characteristics of concrete. Concrete is indeed a plentiful and ubiquitous construction material: it is characterized by excellent technical, performance and aesthetic properties. Concrete is fabricated in Europe in compliance with the highest environmental and social standards and is the sustainable backbone of modern societies – often without being acknowledged as such. The CSC system today values environmentally and socially compliant practices during the production of concrete, enabling sustainability to become “measurable” in an objective manner.

Alexander Röder: At CEMEX we share the view of HeidelbergCement. As a global player we definitely see the worldwide relevance of CSC certification. It is a perfect fit not only for increasing stakeholder demand for responsibly sourced materials, but also for our own sustainability strategy, in which providing sustainable products and services is a priority.

HOW DO YOU LOOK BACK AT THE FIRST PERIOD UNTIL NOW AND WHAT ARE YOU PARTICULARLY PROUD OF?

Alexander Röder: It has been very rewarding to see how our initial, broad idea

of a certification for sustainably sourced concrete has gradually developed into what we have now. All the discussions about how to define the criteria, the growing interest from concrete producers, associations and certification bodies such as SGS. The very productive stakeholder consultation workshop we did last year with experts from IUCN, WWF, UNEP and other organizations, the formal set-up of the CSC as an organization. The handover of the first certificates at the Building Holland fair in April this year, and the ongoing expansion of our certification system... it is like watching a child growing up.

At this point I would like to take the opportunity to thank all those individuals and organizations who contributed to our development in different ways. For example, as volunteers to pilot our certification, as members of the various committees of our organization, as well as the critical but fair stakeholders who reviewed our technical framework. In particular, I would like to acknowledge the continuous financial and in-kind support that we have received from the CSI over the last couple of years. Without all this commitment and expertise there would be no CSC today. This commitment is an indicator for what I am particularly proud of. We have created a certification system for sustainably sourced concrete that our stakeholders believe in. This is true for the CEOs of the CSI member companies, who decided to support us, to the operators of those concrete plants that have already been certified. It also applies to representatives of environmental non-governmental organizations (NGOs) who have supported the development of the technical framework, and to the Dutch government that has recognized CSC certification through a tax incentive for sustainable construction.

IN THE MEANTIME, THE CSC CERTIFICATION SYSTEM HAS BEEN SUCCESSFULLY IMPLEMENTED IN THE NETHERLANDS AND CANADA WITH MORE THAN 49 CERTIFICATES ISSUED. WHERE AND WHEN DO YOU EXPECT MARKET UPTAKE NEXT?

Alexander Röder: In our view, CSC certification will have most value in those countries where sustainable

construction is high on the agenda and green building labels have a noticeable market share. For example, North America and Europe can certainly be expected to see the majority of certifications in the near future. First certificates have been issued to concrete plants in Canada, and we already have so-called Regional System Operator (RSO) agreements with associations in the Netherlands, Germany, Italy and Turkey. Nonetheless, we are also in active talks with entities in other regions such as the Middle East and India. Latin America is also a very interesting prospective market. The Latin American umbrella trade association for ready-mixed concrete, FIHP, is a member of the CSC. We have been awarded a UNEP grant to prepare the rollout of our certification on that continent. In the long run our vision is to have a global reach to maximize the benefits of our certification for the sector, the environment and all our stakeholders.

WHY SHOULD COMPANIES APPLY FOR A CSC CERTIFICATE?

Christian Artelt: I see many good reasons for companies to apply for CSC certification.

CSC certification is a fantastic opportunity for concrete producers to strengthen sustainable thinking amongst customers and society as a whole to underline the environmental, social and other benefits related to constructing in concrete. An important reason for companies to apply for CSC certification is the unique opportunity offered by the CSC to be part of a successful campaign to explain and promote the positive characteristics of concrete and to participate in implementing an adequate appreciation of concrete in our society. Being part of this campaign will allow companies to enter into a more in-depth dialogue on sustainability with their customers and a broad range of other stakeholders.

The CSC certification system will enable participating companies to learn more about their own sustainability performance and to identify levers for improving their sustainability

practices. Certification will of course also provide an insight into the sustainability performance of the supply chain and to identify opportunities for action. Finally, another key-reason to apply for CSC certification is the positive business impact that this will have in the near future. The CSC is in dialogue with the respected Green Building Label owners, namely USGBC, BRE and DGNB and expects recognition of the CSC system within the respective labels (i.e. LEED, BREEAM and DGNB) shortly. This will enable CSC-certified concrete suppliers to provide their customers with the opportunity to additionally gain responsible sourcing related points in certified Green Building projects. Although this opportunity will be new for certified concrete, it is already current practice for other construction materials. Other business opportunities, many of them already implemented in the NL, relate to public tendering, tax incentives or access to more favorable interest rates.

WHAT IS THE AMBITION OF CSC IN TIME AND WHAT IMPACT IS THE CSC SYSTEM EXPECTED TO ESTABLISH ENVIRONMENTALLY AND FOR THE CHAIN OF CUSTODY?

Alexander Röder: The CSC certification was designed to improve the sustainability performance of single plants and the whole sector. A transparent points system, together with several certification levels, will allow plants to identify gaps and become better over time. Even if a plant does not aspire to a higher level its management cannot just lean back and do nothing. In close collaboration with internal and external stakeholders our technical framework will be regularly updated and strengthened, so when a re-certification is due after three years, the same performance level may not be sufficient to keep the certification level. In terms of credits covered by the certification we have identified those that are most relevant to our sector and we also differentiate between the various products covered by our certification system. In the environmental category, for instance, we cover a broad range of topics including product information for energy

and climate, water, biodiversity and others. The biodiversity credit for example, has a much higher weight for cement and aggregates plants where we have mining operations, compared to concrete plants that cover only a relatively minor stretch of land.

Fortunately, the supply chain for the concrete business is very short and normally very local, which means that chain of custody is not a major topic for us. Our concrete plants typically know very well where their raw materials come from. If we are successful with our approach we will create multiple benefits, a reduced environmental footprint, ever improving social standards, a more transparent communication with our stakeholders, additional value for our clients and an opportunity to demonstrate leadership at both plant and sector level.

WHY ARE COMPANIES LIKE SGS INVOLVED?

Christian Artelt: Credibility is one of the CSC core-principles and that is why certification institutes such as SGS get involved. While the CSC is supported by regional system operators (RSOs) with excellent knowledge of the local concrete business in implementing and developing the certification system, independent certification bodies (CBs) ensure, that the quality of the evidence provided by candidates undergoing certification is in line with the CSC handbook and the organization's expectation. The task of a CB consequently, is to carefully evaluate the soundness of the evidence provided by the applicant via the "CSC Toolbox" and to perform selected on-site visits to verify this evidence in more detail. The CSC obviously ensures that certification is only performed by qualified CBs with proven in-depth certification know-how and a good understanding of the concrete sector. With this, the CSC secures that certification is done in a professional and efficient manner.

For more information about CSC certification, please contact SGS INTRON Certification.

ALMOST 300,000 CUBIC METRES OF CONCRETE FOR THE WORLD'S LARGEST SEA LOCK

MORE INFORMATION: MICHEL BOUTZ MICHEL.BOUTZ@SGS.COM



Photography: Topview Luchtfotografie

The new sea lock built by the OpenIJ contractor consortium in IJmuiden, commissioned by the Dutch Ministry of Infrastructure and Water Management, will be 500 metres long, 70 metres wide, and 18 metres deep. In this SGS INTRON Bulletin, you can find out how SGS INTRON is assisting in the quality control of steel lock gates for this impressive construction in South Korea. Concrete is another key building material for the world's largest sea lock, and SGS INTRON is also closely connected to OpenIJ in this respect.

TWO TYPES OF CONCRETE

The OpenIJ contractor consortium, consisting of BAM-PGGM and VolkerWessels-DIF, started construction on the new IJmuiden sea lock in July 2016. In total, it will contain 290,000m³ of concrete: construction concrete for the lockheads and slurry concrete for the sea lock's slurry wall panels, which will have a total length of over 1.6 kilometres. "We helped OpenIJ by optimising the

quality of both types of concrete for this rather special application," says SGS INTRON consultant Michel Boutz.

THE LOCK HEADS: LARGE-SCALE GRAVITY ABUTMENTS

The two lock heads made of construction concrete are enormous structures that were built according to the caisson method, using floors and walls with a thickness of four metres or more.

"Creating such concrete gravity constructions that have to be both water-proof and durable requires specialists," Michel Boutz knows. "In structures with this thickness, enormous amounts of heat are generated when the cement reacts with water during the hardening process. Because embedding cooling pipes is an operation of considerable magnitude and difficulty, the contractor decided instead to use a cement with a low hydration heat. Slag cements seemed like the obvious choice."

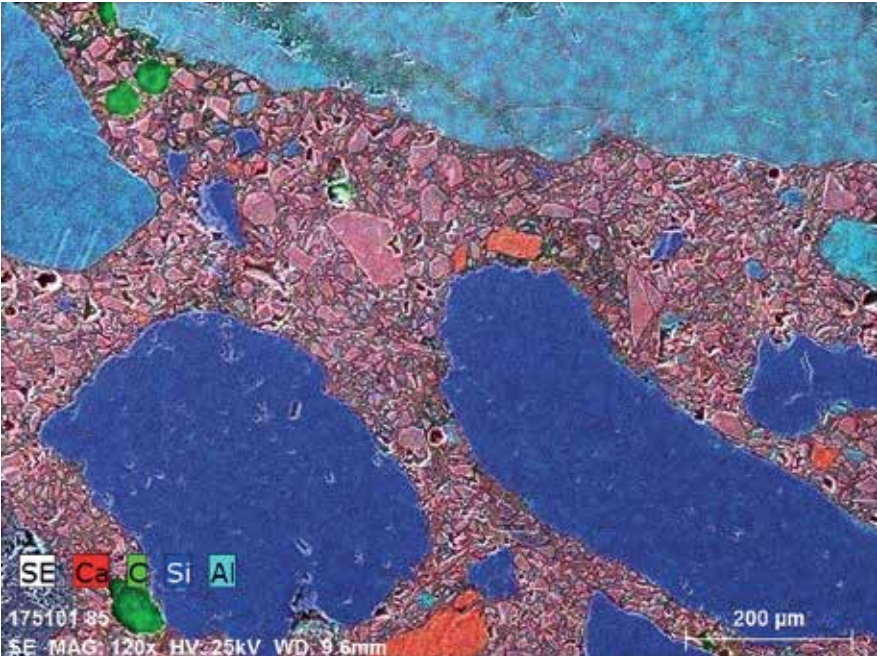
RESEARCH INTO THE PROPERTIES OF SLAG CEMENTS

SGS INTRON was commissioned to map the properties of concrete mixes consisting of various slag cements. Blast-furnace slag levels in these types of cement range from approximately 70% in Cem III/B, which is commonly used in the Netherlands, to about 85% in Cem III/C. Michel Boutz: "This was a very interesting and extensive study into concrete. We mapped the mechanical and especially the durability properties of as many as twenty different concrete mixes. In addition, we investigated the autogenous shrinkage of these types of concrete in a series of long-term tests. This type of shrinkage can occur without the concrete drying out or cooling down and can lead to unwanted cracking in the construction. On top of that, we looked at how we can reduce shrinkage through certain additives. Ultimately, the results of this research project allowed the contractor to pick the most suitable type of cement." A special concrete mix was also chosen for the slurry walls, based on extensive research. You will be able to read more about this in the next SGS INTRON bulletin.

CONCRETE PRODUCTS WITH A GEOPOLYMER BINDER

MORE INFORMATION: GERT VAN DER WEGEN GERT.VANDERWEGEN@SGS.COM

The concrete industry is taking its responsibility in reducing the environmental burden of concrete as much as possible. Although the ‘carbon footprint’ (CO₂ emissions) of concrete in the Netherlands is already the lowest in the world, Dutch concrete producers are seeking to reduce it further still. A potential technology that might lend a helping hand is the use of alkali-activated binders in concrete. Suitable binders for concrete can be obtained by activating reactive fillers, such as granulated blast-furnace slag and fly ash, with highly alkaline materials, such as sodium hydroxide and sodium silicate.



The properties of these alkali-activated binders, which are also known as geopolymers, share many similarities with those of Portland clinker-based cements, but also have a few notable differences. The literature and practical research have shown that some geopolymers may be susceptible to ageing, which, in this case, refers to the atmospheric effects of CO₂ and drying. The influence of these factors on the relevant performance of a concrete product must, then,

be known and deemed acceptable. European standards are available for concrete products manufactured from cement, including pavers, tiles, and curbs (NEN-EN 1338-1340), which are based on many decades of practical experience and which include the relevant properties, requirements, and testing methods. These standards can also be used to assess concrete products made with geopolymers if the testing methods take the effects of ageing into account.

SBRCURNET RESEARCH

Commissioned by the SBRCURnet ‘Geopolymer’ task force, SGS INTRON conducted an extensive study into four geopolymer concrete mixes with different binder compositions with a focus on ageing, as determined with adjusted testing methods for freeze/thaw with tensile splitting strength and resistance to deicing salt. A concrete cement mixture was also included in the test as a benchmark. This study was conducted on concrete pavers (SBRCURnet report ‘Study into the suitability of testing methods for geopolymer concrete products’). The geopolymer concrete mixes (M1-M4) carbonate faster than the benchmark cement concrete (M5) at natural and enhanced CO₂ levels (see Figure 1). It also appeared that the carbonation rate could vary greatly between the various geopolymer concrete mixes. As is shown in the table 2, ageing did not have a negative effect on tensile splitting strength, both at natural and enhanced CO₂ levels. In the case of accelerated carbonation, higher tensile splitting strengths were found. Only the M1 mix showed a decreased split tensile strength after 162 days, although the absolute value was still far above the requirement set in NEN-EN 1338 (>3.6 MPa) at that point.

The influence of ageing on the resistance to deicing salt of pavers was tested by determining this property for test samples that had been sufficiently carbonated, which is understood to be about 2 mm, corresponding to a mass loss of 4.5 kg/m², which is 4.5 times higher than the requirement set in NEN-EN 1338. Average scaling, supplemented with the carbonation depth at the time of testing, is shown in the table 3. Concrete mix M2 displays a high degree of scaling due to its relatively young age and production method. With natural carbonation, the other concrete mixtures hardly displayed

any scaling at all (more than 50 times lower than the requirement set at ≤1.0 kg/m²). It should be kept in mind, however, that the age of the test samples at the time of testing (4-6 months) is significantly higher than the time specified in the standard NEN-EN 1338 (1 month).

CUR RECOMMENDATION

CUR Recommendation 123 was drawn up on the basis of the insights gained from this research. The adjusted testing methods and associated requirements are included in the recommendation, supplementing the aforementioned European standards, in order to guarantee the long-term performance of these concrete products as a result of ageing. This means that the producer must determine the tensile strength, resistance to freeze/thaw with deicing salt, and wear resistance of its products at an age of 28-35 days as well as after 120 days.

DECISION

With these regulations, this type of concrete products, manufactured with a geopolymer binding agent, can now confidently be used in practice, putting the Netherlands ahead of the curve. SGS INTRON is proud to have made an important contribution, and we expect that geopolymers will start playing an increasingly important role in the coming years to which we would gladly commit our expertise.

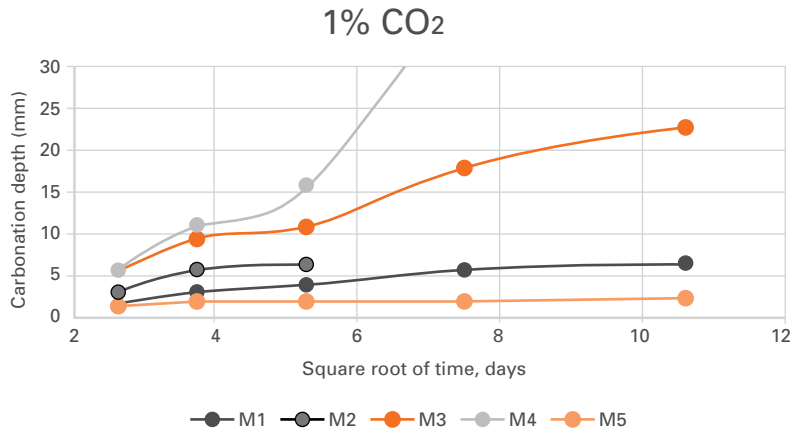
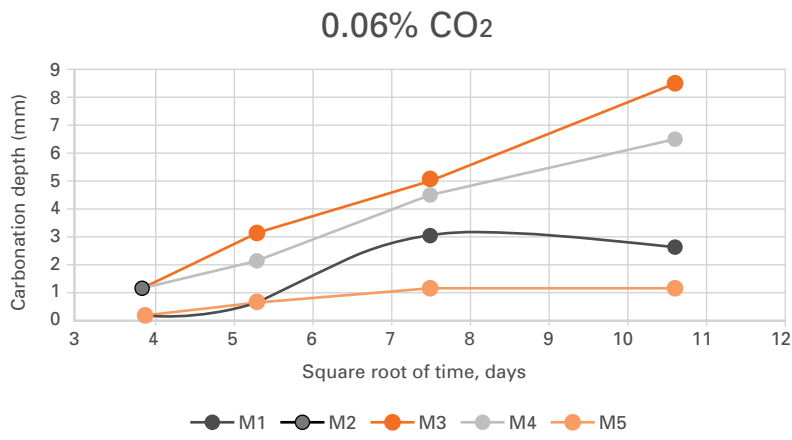


Figure 1. Carbonation depth as a function of the square root of time for both contents of CO₂

Mixture	M1			M2		M3		M4		M5	
0.06% CO ₂ (days)	28	112	162	28	112	28	112	28	112	28	112
Indirect tensile strength (MPa)	7.8	7.7	6.7	2.9	-	5.0	5.0	4.9	5.2	5.2	8.0
Carbonation depth (mm)	1	2.5	-	3	-	3	8.5	2	6.5	0.5	1
1.0% CO ₂ (days)	28	112	162	28	112	28	112	28	112	28	112
Indirect tensile strength (MPa)	7.6	7.7	-	4.1	-	5.3	5.6	5.2	6.4	6.2	6.9
Carbonation depth (mm)	4	6.5	-	6.5	-	11	23	16	>40	2	2.5

Table 2

Mixture	M1		M2		M3		M4		M5	
0,06% CO ₂ carbonation depth (mm)	2,5		3		8,5		6,5		1,5	
Scaling (kg/m ²) after:										
7 cycles	<0.005		5.9		<0.005		<0.005		<0.005	
14 cycles	<0.005		11.3		<0.005		<0.005		<0.005	
28 cycles	0.02		-		0.01		0.01		<0.005	

Table 3

“WE MONITOR **QUALITY** IN SOUTH KOREA AS A TEAM”

MORE INFORMATION: ROBERT HAVERKORT ROBERT.HAVERKORT@SGS.COM

In South Korea, the lock gates for the new sea lock in IJmuiden are currently being constructed: steel colossi that are 25 meters tall, 72 meters long, and 11 meters thick. They feature countless tiny details that require precise measurements with tolerances of less than a millimeter. Ample reason for the OpenIJ construction group to deploy a full-time on-site quality team, including an employee of their own as well as SGS INTRON and SGS South Korea experts. Door and Movement System Project Manager Menno Moerman of the OpenIJ construction group (BAM-PGGM and Volker Wessels-DIF): “We are one team, with one goal: achieving high quality whilst sticking to the schedule and the budget.”



INGENIOUS STEEL CONSTRUCTION

“Only the steel structure of the gates is produced in South Korea,” says Menno Moerman. “The movement system is being made in the Netherlands by Hollandia Infra and Bosch Rexroth, but in South Korea we still have to take into consideration all components that still have to be installed in or on the gates. Because of the limited space around the lock, for instance, the levelling channels and sliders will be placed inside the gates, along with the entire movement system housed in the ‘trolley’ at the top of the gate. Watertight spaces are required for all the corresponding hydraulic and electrical installations. Ballast tanks will also be installed in the gates, which can be filled with air or water so that they can be transported afloat and sunk once they reach their destination. Briefly put: creating enormous lock gates in such a way that they are strong enough and that all their future components will fit perfectly is a challenging task that we have to follow closely on the spot.”

CONTINUOUS SUBCONTRACTOR INSPECTIONS

After all, we are working on the gates of a primary flood defense: a lock that has to protect the North Holland hinterland, including Amsterdam, against the sea. “We have stricter requirements than what they are used to here,” says Frank van Eijnatten, one of the two SGS INTRON experts on the OpenIJ quality team. “I have spent three weeks a month in South Korea for almost a year now, but I still enjoy going there. We have a very pleasant, very skilled team. Besides, OpenIJ is a great project to work on. With every visit, we perform constant visual tests and digital inspections at the three production sites. It is important that we know whether the welders are doing their jobs properly, for example, as almost all components are welded together. We make sure that



this is done properly and conduct tests to measure the strength of the welds.”

DUTCH-KOREAN TEAM

“We do not have the same technical expertise in the field of steel and welding within our organisation that SGS INTRON has,” Menno Moerman explains, “which is why we asked SGS INTRON to assist in the quality assurance process during production. It is a real desk job: we have to keep checking the drawings and purchase orders of the subcontractors based on our own technical specifications and need to answer a lot of technical questions. It is a great advantage for us that Frank van Eijnatten was also involved in the construction of the lock gates for the Deurganckdok lock in Antwerp, which were made in China. The fact that SGS has skilled people in place in South Korea is another major benefit.” “Mr Park, our Korean colleague, is a pleasant person who knows a lot about steel,” says Frank van Eijnatten. “Because he is the only member of the

quality team with a grasp of the Korean language, he can translate or explain an issue in further detail when required. He studied the dimensioning standards, for instance, and gave a series of presentations to the members of the dimension team, whose English is not that good.

ESSENTIAL FOR GOOD RESULTS

The South Korean production culture, which is not based on production and tolerance plans as in the Netherlands, was definitely a source of frustration for the quality team at first. Menno Moerman: “We have now found the golden mean. We largely follow their procedures but warn them immediately when we see potential problems on the horizon to make sure they take everything into account.” “We are here to be critical,” Frank van Eijnatten adds, “which means we sometimes have to intervene, offer ideas, or give tips. We are not trying to be difficult but are just trying to help, we always add, because ultimately we all share the same goal: making sure that

we have a high-quality finished product by the end of February 2018.”

SATISFIED

Sticking to schedule will remain a challenge until the very end. As the deadline approaches, pressure increases, but Menno Moerman is very satisfied with the quality that has been produced so far. “We can trust the members of the quality team because of their expertise, but also because of the people themselves. They are a close-knit team and incredibly engaged. They really see it as their own project and are right on top of it. The sheer frequency of the checks can only benefit quality.”

This project showcases the strength of the multinational nature of SGS: by cooperating with SGS colleagues abroad, who are familiar with the local language and culture but have the same sense of quality, we can serve our clients all around the world.

The Burgerweeshuis Amsterdam (Public Orphanage of Amsterdam), designed by Aldo van Eyck, is a young, architecturally intriguing National Monument. The building was constructed as an orphanage in 1960. Remarkably, it consists of no fewer than 328 units, featuring a limited number of parts applied systematically and repetitively, such as columns, architraves, eaves, and certain façade elements. Current owner Zadelhoff has commissioned architect Wessel de Jonge and BAM contractors to thoroughly renovate the property, revealing the original, rough concrete structure again. SGS INTRON was asked to investigate whether and how this could be done in a responsible manner.

PRESERVING AS MUCH AS POSSIBLE

"A fairly complex but very appealing commission," says SGS INTRON consultant Maarten Swinkels, "because it's a beautiful monument and requires considerable expertise. At SGS INTRON we often work closely on surfaces, concrete, and monument renovations, including younger monuments with a characteristic appearance, such as the Burgerweeshuis. The interesting thing about this type of renovation is that you have to try to unite two different worlds. It is always difficult to find a middle ground between repairing a concrete construction as well as is technically possible, which often includes the preventive removal of concrete, and as well as is acceptable from the point of view of a heritage preservation. When working on a monument, you want to retain and restore any existing, original elements as much as possible, which requires cutting-edge techniques and methods."

ATTENTION TO STRUCTURAL DIFFERENCES

The Burgerweeshuis was painted in 1995 in order to protect the concrete and to conceal repairs that had been made at an earlier stage. "The first question we

AN ARCHITECTURAL ICON OF AMSTERDAM REGAINS ITS ORIGINAL APPEARANCE

MORE INFORMATION: MAARTEN SWINKELS MAARTEN.SWINKELS@SGS.COM

were asked was: 'How do we remove that coat of paint while limiting damage to the building?'" Maarten Swinkels remembers. "It was important that this would be done very carefully, because each concrete component of the Burgerweeshuis has its own, individual structure. The architraves above the windows, for instance, are very sleek and smooth, whereas you can still see the coarse formwork used for the concrete in the eaves. These differences in structure help determine the character of the building, which means you would want to restore them as accurately as possible when renovating the property.

EYE-CATCHING CONCRETE

"Together with the contractor, we investigated several options for removing the paint, testing a number of promising methods on test surfaces. We even considered replacing the top layer of the concrete with new concrete with a similar structure. Ultimately, we advised treating the building with solvents and high-pressure washers, which has yielded great results virtually everywhere." A number of methods aimed at repairing the concrete were also tested. Maarten Swinkels: "If you pay enough attention, you'll find that you can make repairs that are hardly visible from afar. The concrete,

which largely determines the appearance of the Burgerweeshuis, is a sight for sore eyes once again.

CAREFUL PROTECTION

The next challenge for SGS INTRON involved finding a good method to protect the cleaned, repaired concrete, ideally an invisible one. The renovation process, after all, is followed carefully, especially when it comes to retaining the original architecture and appearance of the building. "There is a wide range of alternatives," Maarten Swinkels can tell us, "but most of them will change the appearance of the concrete. In consultation, we have chosen to merely 'hydrophobise' the concrete, which involves coating it with a water-repellent layer. The product we have opted for now, which we still have to demonstrate to be effective enough, is hardly visible after it has been applied, which is an important criterion for the Dutch Cultural Heritage Agency. Even then, we still had to work hard to convince them of this solution, because they had had bad experiences with hydrophobic agents applied to masonry (delamination in case of frost). In the case of concrete, hydrophobic agents prevent damage because they dehydrate the material, which ensures that the reinforcing steel will not rust."



PARTICIPATION IN INTERREG PROJECTS 'CONCRETE TO HIGH-QUALITY CONCRETE' AND 'PV OPMAAT (CUSTOM FIT)'

MORE INFORMATION: GERT VAN DER WEGEN GERT.VANDERWEGEN@SGS.COM EN RON LEPPERS RON.LEPPERS@SGS.COM



HIGH-QUALITY CONCRETE REUSE

SGS INTRON is a partner in the Interreg project 'Concrete to high-quality concrete'. The reuse of concrete as a material, primarily as mixed recycled aggregates or concrete recycled aggregates, is already very common in the Netherlands. However, the vast majority of these recycled aggregates are used as foundation material in the civil engineering sector. Despite current technological know-how, regulations, and initiatives, concrete is only sparsely reused as an aggregate. Developing closed cycles while retaining raw material value is of great importance when it comes to establishing a circular economy, and concrete, being by far the most commonly used construction material in the world, has a crucial role to play. This Flemish-Dutch project has the potential to substantially improve the position of concrete: by combining SmartCrusher technology with microwave treatment, the original components of the concrete (sand, gravel, and (dehydrated) binders) can be reclaimed. This method makes it possible to completely reuse the raw materials used for old concrete in new, high-quality concrete.

In order to reduce raw material consumption even further, special fibre-reinforced concrete will also be developed. This recent Interreg project is carried out by a consortium consisting of the Vrije Universiteit Brussel (B), KU Leuven (B), VITO (B), MEAM, CBS Beton, Concrete Valley, SCC, the Innovation Centre for Sustainable Construction (ICDUBO), and SGS INTRON. We contribute our expertise in the field of concrete technology, sustainability, lifespan, environmental impact, and quality assurance.

PV OPMAAT: RESPONSIBLE INTEGRATION OF PV ELEMENTS IN CONSTRUCTION COMPONENTS

SGS INTRON also takes part in a second Interreg project: 'PV OpMaat'. Supported by various partners, this project aims to determine how solar panels can be integrated into home and buildings more efficiently and in a more customised way. The objective of the project is to determine the feasibility of producing thin PV film cut to custom sizes and integrated into custom construction components, such as roofs, windows, conservatories, and façade panels. This development

will be the prelude for the increasingly large-scale application of aesthetically pleasing PV used to generate electricity in the built environment. The project involves, amongst others, 8 knowledge partners and 15 companies, including the Solliance partners TNO (project coordinator), ECH, IMEC (B), FZ Jülich (G), the Eindhoven University of Technology, and Hasselt University (B) as well as the Zuyd University, KU Leuven (B), and SGS INTRON. These partners are joined by suppliers, PV producers, PV integration companies, construction companies, end users, and knowledge and educational institutions.

EUROPEAN REGIONAL DEVELOPMENT FUND

Both projects are funded by the Interreg V programme for Flanders and the Netherlands, the cross-border cooperation programme that has received financial support from the European Regional Development Fund. More information: www.grensregio.eu.



DRONE INSPECTIONS: A QUICK AND DETAILED INSIGHT INTO HARD-TO-REACH AREAS

MORE INFORMATION: BAS BRUINS-SLOT BAS.BRUINSSLOT@SGS.COM

Risk-based building inspections are commonplace at SGS INTRON. But what if certain parts of an object are hard to reach or would create an unsafe situation for the inspector? In that case, drones, officially known as Remotely Piloted Aircraft Systems (RPAS), can be deployed. “I was truly surprised by the high quality of the pictures,” says SGS INTRON inspector Bas Bruins-Slot.



COMPLETE OVERVIEW WITH THE OPTION TO ZOOM

Commissioned by the National Railway Company of Belgium (NMBS), Bruins-Slot used drones for his inspection of Leuven train station. “This was the first time that I used this technology professionally. It is a very effective way to inspect large areas that are difficult to reach, such as the roof of Leuven train station, which is partially made of glass. An experienced BAFA pilot, a drone operator recognised by the Belgian Directorate General for Aviation,

controlled the drone. Initially, a preset flight plan was followed, which involved the drone mapping every square inch of the roof by taking photographs. I could watch it in action on a live feed. Afterwards, I asked the pilot to have the drone return to a number of specific, possibly critical points so that I could have a closer look at them. This method allowed us to check the entire roof and identify any problems in just a single day. And everything was recorded in photographs, which means we can review any problem areas if necessary.”

WIDE APPLICABILITY

SGS Infrastructure & Construction coordinates all drone inspections carried out in Belgium. Together with the Directorate General for Aviation, they supervise all RPAS operations, including the one in Leuven. RPAS inspections are becoming a viable option in more and more research and inspection projects, not just for construction inspections, but also for inspections of cranes, process installations, chimneys, large heaps of material, masts, high-voltage power lines, and solar panels. Drones can work even in places that are hard to reach for people, areas shrouded in darkness, or confined spaces such as storage tanks.

HIGH RESOLUTION, HIGH ACCURACY

High-resolution aerial photos can be used to map large areas whilst displaying even the tiniest details, which means they can provide insight into state of repair, for instance. However, the modern recording and inspection technologies used by SGS can also be implemented to make accurate volume measurements and emission measurements and to detect leaks in process installations. Heat leaks, for example, can be detected with the help of infrared cameras.

PARTNERSHIP WITH BAFA AVIATION EXPERTS

RPAS can be used as an effective tool to answer a wide range of research questions. SGS-BAFA provides RPAS inspections throughout Belgium, always putting safety first. Before a drone takes to the skies, SGS and BAFA ensure that the required permits and a detailed flight plan are in place, thus complying with all safety rules and standards. BAFA has considerable expertise in the field of



aviation regulation and procedures and only works with certified pilots, which makes this leading aviation training centre a solid partner for SGS in Belgium.



Dak station Leuven

INSPECTION OF SBR RUBBER USED IN ARTIFICIAL TURF IN BELGIUM

MORE INFORMATION: ULBERT HOFSTRA ULBERT.HOFSTRA@SGS.COM

As in the Netherlands, the potentially hazardous effects of SBR crumb rubber used in artificial turf have been a source of great concern in Belgium. The level of carcinogenic PAHs in the SBR rubber was at the heart of the issue. Research conducted by the Dutch National Institute for Public Health and the Environment (RIVM) and the European Chemicals Agency (ECHA) have shown that playing on artificial turf featuring SBR crumb rubber does not constitute a health risk. This applies to the type of SBR crumb rubber that was studied by the RIVM in the Netherlands on about 100 pitches. Pitch owners, however, want to know what they are dealing with.

As such, the management organisation responsible for waste tyre processing in Flanders, the non-profit organisation Recytyre, has opted to give pitch owners the opportunity to have the SBR crumb rubber used in their pitches tested. Recytyre called in SGS INTRON to run these tests because of its prior experience in similar large-scale studies in the Netherlands.

Pitch owners could register for the test via the Recytyre website. Recytyre passed on their contact details and pitch information to SGS INTRON, which sampled and analysed the pitches independently. Sampling was carried out by taking 6 sub-samples from various areas of the pitch. The analysis was carried out by SGS Fresenius following the AfPS GS 2014:01 PAH method and using GC-MSD.

SGS INTRON compared the results with current European regulations and immediately shared the reports for the individual fields with the field owners in question. In total, about 100 artificial turf pitches (out of the approx. 300 artificial turf pitches across the country) were sampled, analysed, and reported on. As a result, pitch owners now know what they are dealing with and, in case of new developments, they will be able to compare the composition of their own SBR crumb rubber with any new requirements published.



AGGREGATE IN PRACTICE

MORE INFORMATION: GERT VAN DER WEGEN GERT.VANDERWEGEN@SGS.COM

Household waste and equivalent industrial waste is incinerated in order to generate energy and reduce the amount of waste in so-called Waste-to-Energy Plants (WtE). In the Netherlands, about 6 million tonnes of the 16 million tonnes of household/industrial waste produced every year are incinerated, yielding approximately 1.5 million tonnes of bottom ash. After processing, which includes sieving and removing metals, what is left is known as bottom ash.



Photo 1. The production of concrete paving blocks by Façade Beton

In the Netherlands, bottom ash has been applied in foundations for roads for over 20 years, with over 20 million tonnes of the material already having been used as road foundation material or filler material. In all these cases, the bottom ash is a so-called IBC construction material, which, according to the Soil Quality Decree, can only be used when accompanied by Isolation (Isolatie), Management (Beheers), and Control (Controle) measures, because the application of the material without these measures would lead to unacceptable emissions.

AGGREGATE IN CONCRETE

Government policy has been formulated with the aim of developing higher-quality application of bottom ash. One of the objectives of the 'Green Deal for the Sustainable Development of Useful Solutions for Bottom Ash', dating to 7 March 2012, was to ensure that as of 1 January 2017 at least 50% of all bottom ash would feature in non-IBC applications. A target of 100% was set for 1 January 2020. In order to achieve the objectives set by this policy, an investigation into higher-quality alternatives is underway. Part of bottom ash is made up of particulate matter, but it also contains materials with the same

grain size as sand and gravel, which means that bottom ash can be made suitable for use as a concrete aggregate through additional processing.

RESEARCH AND REGULATIONS

In order to steer the application of bottom ash aggregate in concrete in the right direction, CUR research was carried out between 2007-2012 by the CUR regulation committee VC89 'Processed Waste Incinerator bottom ash as a concrete aggregate'. The results of this study were recorded in CUR report 234. Based on the results and insight obtained, CUR Recommendation 116 'bottom ash aggregate as a concrete aggregate' was drawn up 2012. This CUR Recommendation describes the procedures, requirements, and test methods to demonstrate the suitability of bottom ash aggregate as a concrete aggregate. A CUR Recommendation can be seen as a precursor to further standards and regulations, allowing parties to gain practical experience in a responsible manner.

FURTHER RESEARCH INTO PERMISSIBLE METALLIC ALUMINIUM LEVELS

One of the aspects addressed in CUR Recommendation 116 involves the maximum metallic aluminium levels of bottom ash aggregate, which comes from aluminium cans, foils, etc. The metallic aluminium levels of aggregate must not be too high due to the buildup of tiny hydrogen bubbles in the fresh concrete mortar (comparable to an air-entraining admixture), which can bring about undesirable changes to the properties of the concrete. High levels of metallic aluminium may also bring about an increased risk of expansive reactions in the hardened concrete. For this reason, the CUR Recommendation has restricted the metallic aluminium levels in bottom ash aggregate to < 1.0% (m/m). This requirement is based on a limited number of tests run on plastic fresh concrete, while current applications mainly concern earth-moist fresh concrete.

That is why SGS INTRON and Façade Beton were commissioned by Inashco to investigate the permissible levels of metallic aluminium in earth-moist fresh concrete.

RESEARCH DESIGN

In Maastricht, Inashco upcycles bottom ash into bottom ash aggregate, which is used by e.g. Façade Beton to produce concrete paving blocks. This bottom ash aggregate was analysed by SGS INTRON in order to determine the levels of metallic aluminium in particles of various sizes. Using metallic aluminium separated from the bottom ash by Inashco, SGS was able to establish three levels of metallic aluminium contents in concrete produced with bottom ash aggregate, set at 7.7, 10.0, and 14.6 kg/m³ respectively. Three concrete mixtures were studied, each with a different level of metallic aluminium (WtE concrete 1, 2, and 3). These mixtures were compared with a benchmark concrete that did not contain bottom ash aggregate and metallic aluminium. Façade Beton used the four mixtures to produce concrete paving blocks according to the standard process (See photo 1). The 4 series of concrete pavement blocks were then tested for volumetric mass, tensile splitting strength, and resistance to deicing freeze/thaw with salt in accordance with NEN-EN 1338. The risk of expansive reactions caused by the metallic aluminium in the hardened concretes (pop-outs) was checked by embedding aluminium particles with dimensions ranging from 4 to 11 mm at a depth of 5 mm below the surface of the concrete paving block. After curing at 20°C and >95% RH, these test samples were subjected to 20 wet/dry cycles (4 hours under water + 20 hours of drying at 20°C and 50% RH), before being exposed to outdoor conditions without any shelter.

RESEARCH RESULTS

The relationship between the average tensile splitting strength and levels of metallic aluminium are displayed in figure 1. The tensile splitting strength decreases significantly with a metallic aluminium content of 14.6 kg/m³, but still meets the requirement set in NEN-EN 1338 (> 3.6 MPa).

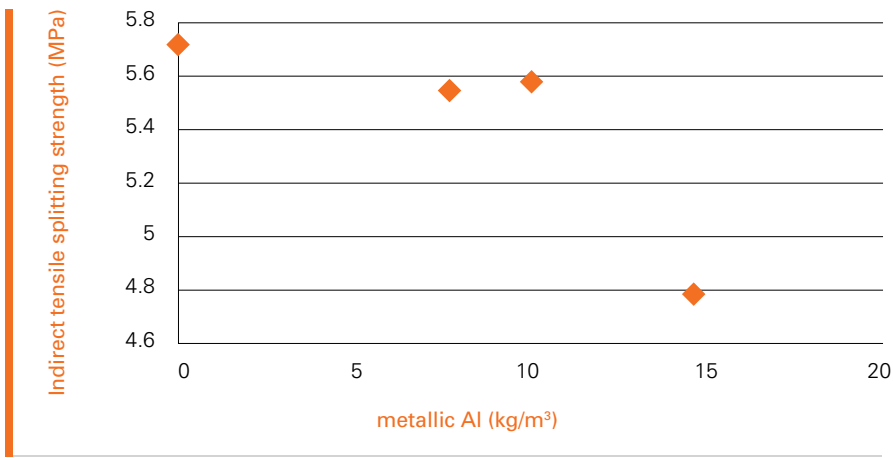


Figure 1. Relationship between tensile splitting strength and metallic Al levels

CONCLUSION

In terms of resistance to deicing salt, both mixtures of WtE concrete outperformed the benchmark concrete mixture (see Table 1). This can be attributed to the buildup of tiny hydrogen bubbles caused by the metallic aluminium, which can be compared to the effect of adding an air-entraining agent to the concrete mortar.

Bottom ash aggregate is a suitable aggregate for concrete products made from earth-moist fresh concrete. Metallic aluminium levels of 10 kg/m³ or higher are permissible. At this level, the study observed no adverse effects on the relevant properties of the concrete. No defects such as tears and pop-outs caused by particles of

Table 1. Resistance to deicing salt

PROPERTY	UNIT	REFERENCE	WTE CONCRETE 2	WTE CONCRETE 3
aluminium content	kg/m ³	0.0	10.0	14.6
resistance to deicing salt: average material loss	kg/m ²	1.59	1.16	0.67

The concrete paving blocks that had metallic aluminium particles embedded 5 mm below the surface were subjected to 20 wet/dry cycles after a 28-day hardening period, after which they were exposed to outdoor conditions without shelter. After 28 days of hardening, 20 wet/dry cycles, and 15 months of outdoor exposure, no cracks, pop-outs, or other defects were observed.

metallic aluminium embedded just below the surface of the concrete were found. In practice, our experience with earth-moist bottom ash aggregate concrete is positive, both during production and application of the products in question.

CUR RECOMMENDATION REVIEW

CUR Recommendation 116 has been reviewed and updated on the basis of the most recent insights.



Photo 2. Cross-section of a concrete paving stone with bottom ash aggregate

PROJECT HEALROAD: SELF-HEALING ASPHALT THANKS TO INDUCTION

MORE INFORMATION: BIANCA BAETENS BIANCA.BAETENS@SGS.COM

The expansion and optimisation of the lifespan of roads is crucial for the free movement of people and goods. However, it is becoming increasingly difficult for the traffic network to deliver reliable performances due to outdated infrastructure, increased traffic, climate change, and an increase in freight traffic. The number of maintenance and restoration interventions is only set to increase, for instance to repair cracks in the road.



Approximately 1% of the Gross Domestic Product (GDP) in the entire EU is lost as a result of disruptions in the flow of transport, which are partly caused by repairs, maintenance, retrofitting, and renovation. In addition, considerable natural resources are required to expand the lifespan of a road. A recent study conducted by the Organisation for Economic Co-operation and Development (OECD) emphasises the high number of natural aggregates used during road construction, i.e. 10,000 m³ per km on dual-carriage roads. Further research conducted in the asphalt industry has shown that constructing a 1-km section of road requires about 158 tonnes of fuel.

THE HEALROAD CONSORTIUM

Since the end of 2015, SGS INTRON has been one of the partners involved in the HEALROAD consortium, which strives for the development and acceptance of a technology that provides the best value for money and allows for the most efficient use of raw materials in road maintenance and measures for the improvement of road management. In doing so, sustainable materials, such as non-renewable raw materials, must be used as efficiently as possible. The consortium consists of the Bundesanstalt für Straßenwesen (BASt), Heijmans, the University of Nottingham, the University of Cantabria, the European Union Road Federation (ERF), and SGS INTRON.

HEALROAD is co-funded by the ERA-NET Plus Infravation 2014, focusing on cost-effective advanced systems, materials, and techniques for the construction and maintenance of road infrastructure.

RESTORING ASPHALT WITH INDUCTION HEATING

The development of the induction heating method has put researchers on the right track towards creating a new, cost-effective solution to extend the lifespan of asphalt mixes. The HEALROAD concept uses asphalt to which steel fibres have been added. When micro cracks start occurring in the wear layer, normally between 3 to 5 years after construction, an induction generator is passed over the road surface, melting bitumen that will then flow through the micro cracks and close them. This new technology involves heating up and renovating the upper layer, which effectively extends the lifespan of the road.



HEALROAD can be applied to road sections such as bridges, tunnels, or congested areas where small disruptions can have serious consequences for the flow of traffic. This preventive type of maintenance will not just postpone the replacement of the asphalt by many years, but is also a cheaper process that has a minimal impact on road traffic.

COLOGNE TEST RESULTS

Since 2010, self-healing asphalt can be found in several places in the Netherlands, including Vlissingen, Tilburg, Enschede, and the N348 in Gelderland. Last summer, Heijmans installed a test section at the BASt test location at Autobahnkreuz Cologne-East (DE), consisting of two



sub-sections. These sub-sections were subjected to the Accelerated Pavement Test, which saw each section exposed to 150,000 loads within a space of two weeks. The first section was used as a benchmark. The asphalt of the second section was heated up after undergoing 20%, 40%, 60%, and 80% of the total testing load, using the induction generator to 'heal' the micro cracks. In addition, stone loss through fraying was measured. The stone loss detected in the test section was compared to the Rotating Surface Abrasion Test (RSAT), which was conducted with the same mixture by Heijmans in Rosmalen.

CURRENT SITUATION

The test results show that the mixing process and installation process for the test section of the HEALROAD asphalt mixture was not structurally different from traditional porous asphalt (ZOAB). The asphalt in the test section is homogeneous and does not contain any metal clusters. No relationship between samples treated with induction and samples that were not treated with induction was found. Key reasons may be the fixed speed (4mm/s) of the lateral movement of the Mobile Load Simulator (MLS30) used to simulate heavy traffic and the low number of wheel loads due to the short load time. The RSAT produced ten times more stone loss [g/cm²] than the Accelerated Pavement Tests during the load time, but the stone loss process [g/h] was quicker in the Accelerated Pavement Test.

More research is required to determine the optimal time for repair work using the induction technique. The final results are described in a report presented at the Pavement Recycling and Preservation Summit (PPRS) that was held in Nice in March 2018. Another presentation is scheduled for October 2018 at the Infravation Annual Event in Rotterdam.

RENOVATION OR REPAIR? RESEARCH INTO THE PRESENCE OF HEXAVALENT CHROMIUM IS VALUABLE

MORE INFORMATION: WIL KLARENAAR WIL.KLARENAAR@SGS.COM

“Everyone knows that you have to be alert to the presence of asbestos,” SGS INTRON consultant Wil Klarenaar establishes, “but not everyone is aware of the importance of checking old layers of paint in renovation and repair work for the presence of hexavalent chromium. The method we have developed, which can be used on the location, allows you to determine the presence of this toxic substance accurately and immediately. It is a valuable tool, because hexavalent chromium is not something that you will find everywhere. However, we are yet to come across a building or bridge where chromium paint was not used somewhere.”



THE ASBESTOS APPROACH

SGS INTRON and SGS Search work together in performing hexavalent chromium tests. “This is an important point of attention for both organisations; our areas of expertise complement each other well. Together we have a lot of experience with building inspections and SGS Search also has a lot of experience with asbestos surveys and asbestos-free declarations. The approach to detecting and handling hexavalent chromium is comparable. For processes such as the grinding, blasting, and milling of coating layers with hexavalent chromium, additional safety measures have been required in the Netherlands since March 2017, because of the strict Dutch legal requirements with regard to the maximum concentration of hexavalent

chromium in the air. After the layers of paint containing hexavalent chromium have been removed, we therefore also offer our customers hexavalent chromium-free certificates.”

FROM FACTORIES TO NAVY SHIPS

One of the very first surveys of hexavalent chromium in old layers of paint conducted by SGS INTRON was on the equipment of the Zuid-Limburgse Stoomtrein Maatschappij (South Limburg Steam Train Company). By now, SGS INTRON and SGS Search have closely examined a whole range of different objects. Wil Klarenaar: “It can vary from large bridges, chemical plants, and factories converted into apartment complexes to old office buildings, stations, locks, and navy ships. Unlike asbestos, which

you can usually find at specific locations, the presence of hexavalent chromium is unpredictable. We have found it in all sorts of unpredictable places, such as handrails, window frames, doors, and markings. Our surveys allow for the targeted treatment or removal of all these elements.

DIRECT CLARITY

Hexavalent chromium, then, is a factor to be reckoned with. The surveys performed by SGS INTRON and SGS Search provide immediate clarity about whether the substance is present or not. “Our approach is unique. We do not just take a few samples that have to be examined in the lab first, but survey the entire object on-site, which provides immediate answers. Because the results are available immediately, we can adjust the survey strategy based on what we learn. First of all, we use mobile measuring devices to take measurements in dozens of spots throughout the object. Hexavalent chromium has been used as a pigment in paint with stable colours, but also as an anti-corrosion agent to help protect steel objects. This means that hexavalent chromium can be found in top layers just as easily as in primers, which is why we also measure the deeper layers of paint. To do so, all we have to do is scratch the painted surface. The advantage of our measuring equipment is that it allows us to give a complete picture: we detect chromium and other heavy metals, such as cadmium and lead, in the layers of paint and also determine where and to what extent these metals can be found throughout the object. However, it cannot distinguish between hexavalent chromium and other forms of chromium. If we detect chromium, we use our rapid test to determine on the spot whether it is hexavalent chromium or the much less dangerous trivalent chromium, which is also used as paint pigment. In the case of the latter, decontamination is not necessary and the renovation process will be cleared to start without implementing any additional safety measures.”

FURTHER AUTOMATION OF EUROPEAN LEACHING TESTS

MORE INFORMATION: LOUIS GRANNETIA LOUIS.GRANNETIA@SGS.COM EN ULBERT HOFSTRA ULBERT.HOFSTRA@SGS.COM



The SGS INTRON laboratory in Sittard occupies a prominent position in the field of leaching research. We have obtained the most extensive accreditation possible under the Soil Quality Decree. We regularly conduct the two most common, standardised leaching tests in the Netherlands (the column percolation test (NEN 7383) and the tank diffusion test (NEN 7375) for a range of construction products.

SGS INTRON also has all necessary equipment to conduct the latest versions of European leaching tests, which will replace the current Dutch leaching tests. An increasing number of national and international producers have their products tested by SGS INTRON on the basis of two new, harmonised leaching tests, which will soon be the industry standard in all EU countries:

- For granular materials (recycled granules, steel slag, crushed stone, etc.), a new European percolation test has been developed (TS 16337-3 – up-flow percolation test).

- For structural materials (concrete, brick, asphalt, roof tiles, bituminous sealing materials, etc.) a diffusion (tank) test has been developed (TS16337-2 – dynamic surface leaching test).

In order to meet the requirements set by TS 16337-3, the leaching process has been fully automated. In addition, both the 7-stage and 2-stage column percolation tests can now be completed in a continuous process without manual intervention.

It is important for producers to know what the application of new European leaching tests means for the leaching data of their construction product(s). After all, they will have to include these data in their Declaration of Performance (DoP): the environmental performance declaration prescribed by the Construction Product Regulation (CPR). It is also interesting to know that European leaching tests no longer solely focus on the leaching of heavy metals and salts. These new tests can also be used to measure the leaching of organic components, such as PAHs and oil. This allows us to investigate the market perspectives of products for which the leaching of these components might be a critical factor.

CONCLUSION OF LCA CONFERENCE:

THE CONSTRUCTION INDUSTRY PUTS GREAT EFFORT INTO MAKING ITS ENVIRONMENTAL PERFORMANCE MORE MEASURABLE

MORE INFORMATION: ULBERT HOFSTRA ULBERT.HOFSTRA@SGS.COM

Using the circular economy to constructively build towards a more sustainably society. It was with this ambition in mind that the chain partners came together for the third LCA conference at the Oude Magazijn in Amersfoort. This attractively repurposed structure proved the perfect setting to dig deep into the world of LCAs from a practical perspective. The conclusion? The construction business is clearly making great strides towards better environmental performance.



And in terms of the environment, there's plenty to report in the construction world. The circular economy is 'booming'. Environmental performance has never had such a high priority. The Dutch Ministry of Infrastructure and Water Management together with its partners is actively working to harmonise DuboCalc and the Dutch National Environmental Database, or NMD. The European Commission pilots relating to Product Environmental Footprint (PEF) have been completed and are moving into the transition phase. The Milieukostenindicator (Environmental Cost Indicator, or ECI) has become a staple within tendering processes.

And the first effects of the Environmental Performance of Buildings, or MPG, implemented on 1 January 2018, are also becoming visible, with the number of registrations for new construction products in the NMD increasing sharply.

OPTIMUM USE OF THE FLOW

Udo Waltman, chairman for the day and CEO of SGS Search, had a clear message in his opening speech: "We are in a state of flow. We are active on all fronts to ensure our environmental impact becomes more measurable. That's important. It shows what we

really stand for in the construction industry. I think we are part of a remarkable moment. That we'll look back on in thirty years to realise that this was the phase in which we laid a solid foundation for sustainable building practices and products."

SUCCESSFUL CIRCULAR BUSINESS CASE

Geanne van Arkel (Head of Sustainable Development at Interface EMEA) and Pablo van den Bosch (Director of the Madaster Foundation) provided an inspiring plenary session of the conference with their presentations. Geanne van Arkel gave us some insight into Interface's successful circular business case. She explained how LCAs have helped to make their carpet tiles – and the entire organisation – more sustainable over the years. This has decreased the CO₂ footprint of these tiles by more than 65%, with the tiles now being produced using 50% recycled material. Furthermore, Interface is also establishing a link with less obvious markets: fishermen in coastal communities on the Philippines and in Cameroon are collecting floating 'ghost nets' and selling them as a raw material. The company has also developed a prototype that stores CO₂ – yes, a carpet tile with a negative carbon footprint, known as 'Proof Positive'.

WHAT IF WE CONSIDER ALL MATERIALS AS LIMITED EDITIONS?

The presentation by Pablo van den Bosch appealed to the imagination, as many chain partners follow developments at the innovative Madaster Foundation closely. The demand for an online public data library of materials present in the built environment is substantial. The underlying philosophy of the start-up is as simple as it is brilliant. "Our earth is a closed system. What if we start



considering all materials as limited editions? If we give all materials an identity and assign value to them? And once they have an identity, we also have a market. The more we learn about materials and buildings, the greater the chance is that they will become circular."

THE SUCCESS OF DUBOCALC

Through the means of 'knowledge sharing' sessions, LCA was then discussed in relation to the circular economy, tendering process, building certificates and material savings. Marjolein van der Klauw (Sustainable Purchasing Advisor at The Dutch Ministry of Infrastructure and Water Management) provided insight into the DuboCalc tool and the role that LCAs play. She cited a number of the Dutch Ministry of Infrastructure and Water Management projects and sparred with the participants. The approach of this government agency is as solid as a rock: "We developed DuboCalc and have been applying our purchasing strategy for years now. And that is paying dividends. Our tendering process is now clear to everyone, and people understand why we award our contracts to certain parties. Our GWW projects are only getting more sustainable."

PEF UNDER DEVELOPMENT

Eric Mieras (Managing Director of Pré Sustainability) shared his experiences with the Product Environmental Footprint (PEF). This is the European Commission's pilot to ensure that footprints and environmental claims can be compared like for like. The pilot has now been formally concluded, but the way in which it is to be used in policy has yet to be hammered out. "The key conclusion for now is that the use of EPDs in our sector continues to increase. And that's a good thing. However, further upscaling creates tension between quality and easy results. We are now using the PEF to enhance harmonisation and guidance in order to safeguard quality."

GREATER FOCUS ON ENVIRONMENTAL IMPACT OF MATERIALS

Jeroen Kanselaar (Senior Consultant Sustainability at SGS Search) discussed the benefits of LCAs in building certifications. "Our focus is clear: we want to work towards healthy products and buildings. There are sufficient tools with which to do this. BREEAM, WELL and GPR, for instance. In terms of certifica-

tion, it's safe to draw the conclusion that by far the most attention goes to energy. There needs to be a greater focus on the environmental impact of materials. There's plenty of work to do in that regard."

INTRINSIC ENERGY – PUT IT IN THE SPOTLIGHT

A similar conclusion was drawn during the knowledge-sharing sessions 'Material Savings = Energy Savings' by Gert-Jan Vroege (Senior Consultant Sustainability at SGS Search). He argued that greater attention should be given to material use. "The focus on energy is a good thing. We want low-energy homes without CH boilers. At the same time we need to focus more on 'intrinsic energy', the amount of energy used to manufacture a product or building component. It's telling that only now, 23 years after energy labels were first introduced, we are seeing the MPG environmental calculation for materials being set up. The limit value of the MPG is 1, but the bar needs to be set higher. A focus on the environmental performance of construction materials and thus on intrinsic energy could make a major contribution to the Paris climate targets."



MANAGING CONSULTANT
MAARTEN SWINKELS:

“SOMETIMES WE MANAGE TO
REVITALISE BUILDINGS THAT HAD
ALREADY BEEN GIVEN UP ON”

MORE INFORMATION: MAARTEN SWINKELS
MAARTEN.SWINKELS@SGS.COM

IT'S REMARKABLE THAT YOU SEE THAT AS A CHALLENGE NOW,
SEEING AS YOU WANTED TO BE A DEMOLITION EXPERT IN THE PAST.

“When I started studying Civil Engineering, I loved the idea of working with explosives and demolishing concrete structures in a very controlled manner. To do so, you have to know exactly how strong the structure in question is and how it was put together. As I grew older, I discovered that damage and concrete maintenance are also very interesting, especially when they're caused by construction flaws. I'm also interested in the history of architecture and monuments. I enjoy finding out how I can save old concrete constructions without affecting the original character of the building.”

HAVE YOU ALWAYS BEEN INTERESTED IN CONSTRUCTION?

“When I was young, I often joined my dad when he went to a construction site. Like my grandfather, he was an architect. My other grandfather was a mining engineer and my great-grandfather was a contractor, so you might say that I come from a construction family. I've always been especially fascinated by the technologies used in construction.”

HOW DID YOU END UP AT SGS INTRON?

“During my studies I did an internship there. Jan Bijen, who was the director of INTRON at the time, was my thesis supervisor. For me, SGS INTRON has always been the key reference point for the market, but because I suspected that I wouldn't be given the more difficult jobs as a junior, I started my career elsewhere. I worked at Nebest for two years, before spending 12 years at ACN Constructeurs. At both companies, I worked on damage and maintenance, which is my specialty to this day. When INTRON suddenly moved to my hometown Geldermalsen, I thought it was too good to be true. I gave them a call straight away, asking them whether they might have room for me. We already knew each other, so the whole process was pretty quick and easy.”

THAT WAS BACK IN 2000. HAS INTRON CHANGED SINCE?

“Not really. Of course we've become part of SGS, but nothing has changed in how we work and think. We are a group of stubborn people with different backgrounds: passionate professionals who take things a step further and deeper than others. Everyone



SGS INTRONNER FEATURED

is always working on several projects at once and no matter what you do, you'll always find two people looking over your shoulder. As a result, we approach all problems from various angles and make fewer mistakes. I still love what I do and feel like a true SGS INTRONNER.”

WHY ARE DAMAGE AND MAINTENANCE
STILL INTERESTING AND CHALLENGING
FOR YOU?

Because the problems are becoming increasingly complicated, but also because I really enjoy solving the 'puzzle', the detective work you have to do to find out exactly what's going wrong. If the standard approach isn't an option, I'll look for new perspectives, creative solutions. The Ministry of Infrastructure and Water Management, my biggest customer, often asks for me specifically for that reason. Without a bit of creative thinking, for instance, we'd have never landed a project like the Afsluitdijk (Enclosure Dam).”

THE AFSLUITDIJK, THAT MUST HAVE
BEEN A VERY APPEALING PROJECT.

“Yes, I'm rather proud of it. In reality, it was a series of projects. Eight years ago, we were asked to produce a statement within 6 weeks about whether the Afsluitdijk would last for another 75 years. Many people deemed it an impossible task, but by conducting a smart

analysis based on studies we had carried out previously, we still managed to come up with meaningful results. This meant that when The Ministry of Infrastructure and Water Management wanted to find out what was necessary to ensure that the old concrete construction would have a lifespan of at least 35 more years, they asked us to investigate. In order to make a meaningful statement about this, we set up a large-scale study together with TNO, involving twenty employees, boats, divers, and sonar. Every single concrete component was inspected closely, and we even had some of the drainage sluice

channels drained so that we could walk on the sluice floor and inspect it from within. Impressive and very challenging!”

WHAT ELSE DO YOU DO AND WHAT
WOULD YOU LIKE TO DO MORE OFTEN?

“I think that I'll be working on maintenance and construction damage for the rest of my career, but I'd also like to focus a little more on restoration projects, which can also provide interesting challenges. How do you repair concrete damage while preserving the old structure as much as possible using original materi-

als? I have learnt quite a lot about that by now. Something I love doing and do often is teaching courses, ranging from comprehensive courses in Concrete Maintenance for the Concrete Association to SGS INTRON courses about specific topics such as 'leaks in underground parking garages' and 'residential tower block inspections'. These courses often reduce our workload, because we teach our customers what they can do themselves. When they do run into a problem that they can't solve, however, they always know: SGS INTRON has the expertise we need.”

1st EPBD AC CERTIFICATE AWARDED

MORE INFORMATION: JAN-WILLEM GROOT JAN-WILLEM.GROOT@SGS.COM

Technical Consultancy and Installation Company Warmtebouw Utrecht B.V. was the first company to be awarded the voluntary STEK EPBD AC certificate by the Refrigeration Technology Emission Prevention Foundation (STEK) and SGS INTRON Certification.

The Energy Performance of Buildings Directive (EPBD) AC certificate is awarded to companies that demonstrably comply with all requirements set for testing and advising AC installations of 12 kilowatts or more. Certified companies can provide specific advice about:

- Improving the energy performance of buildings;
- Saving energy costs;
- Comfort;
- Reducing carbon emissions.

EUROPEAN EPBD OBLIGATION

Building managers and owners must have their AC systems inspected every five years, as stipulated in the inspection obligation. This applies to building-wide systems with a total installed cooling capacity of 12kW or more. To meet the requirements set by the European EPBD, the manager or owner of a building must have the installation inspected by a certified expert.



CREDITS

SGS INTRON Bulletin is a publication of SGS INTRON BV
nl.intron@sgs.com
www.sgs.com/intron

SGS INTRON BV is part of SGS
© 2010 SGS Société Générale de Surveillance SA – All rights reserved

Dr. Nolenslaan 126, 6136 GV Sittard
POB 5187 6130 PD Sittard
The Netherlands
T 088 214 52 04 / F 088 214 46 09

Venusstraat 2, 4105 JH Culemborg
POB 267 4100 AG Culemborg
The Netherlands
T 088 214 51 00 / F 088 214 46 09

FINAL EDITING

Ulbert Hofstra and Gert van der Wegen

EDITORS

Piek tekst & PR, Paul Cartigny,
Suzanne Sideris, Vertaalbureau Perfect

DESIGN

Basement Graphics

WWW.SGS.COM

WHEN YOU NEED TO BE SURE

