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SPECIAL ISSUE 08 || January 2012

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AGATE revolutionizes nuclear research

Unique research project

Jetting between time zones

Erik Herzog: the cosmopolitan project manager

HIV point-of-care tester

Developing the electronics for innovative medical systems

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Join the team: Brunel's management on the parallels between team sports and the world of work.

See page 12 of this issue for more details.

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Dear Reader,

Straightforward résumés are hard to come by these days. The introduction of flexible working models and other changes in the world of work are increasingly accommodating people's desire to do things their way. Good people want varying assignments and exciting projects. They relish the prospect of mastering all kinds of challenges.

Brunel's specialists make good use of project work to get to know lots of different customers in a short time and gather wide ranging experience in a broad spread of industries. The projects they complete vary tremendously, plunging them into the world of development or planning, production or commissioning at everything from SMEs to international corporate groups. For those just launching their career and experienced engineers alike, Brunel's extensive portfolio opens up attractive opportunities across virtually all sectors of industry and at every link in the value chain.

Our specialists regularly give this magazine a fascinating insight into the challenges and peculiarities of their particular projects. In this issue, for example, we meet Salun Hamzic, whose team is conducting a feasibility study exploring ways to ease the problems associated with the permanent storage of radioactive waste. We also encounter Ralf Wierse, one of Brunel's embedded systems specialists, who is currently helping a manufacturer of medical products to develop a compact HIV tester. These are just two out of many hundreds of projects that our specialists complete every year for our customers.

Would you like to contribute your knowledge and experience to one of our teams of specialists? Then send us your application now!

Before you do so, however, sit back and enjoy your read!

Gerjan Mazenier
General Manager

Featured specialist

COPY › Lisa Schwarzien

Brunel specialist Salun Hamzic: a designer through and through

Salun Hamzic (41) sees himself as a "designer through and through". After studying mechanical engineering in the Serbian city of Novi Sad, Salun moved to Germany in 1995. He and his family – the only thing more important to him than his work – today live in Cologne, where Salun also trained as a 3D CAD expert. In 2010, cross-industry experience as a design engineer led him via Brunel to the Corporate Technology department (ZAT) at the Jülich Research Center. Here, it is the team spirit that has most impressed the native of Montenegro. He and his colleagues are currently designing a system that could be used in future to reduce radioactive nuclear waste. Read more about this unique project on page 06.

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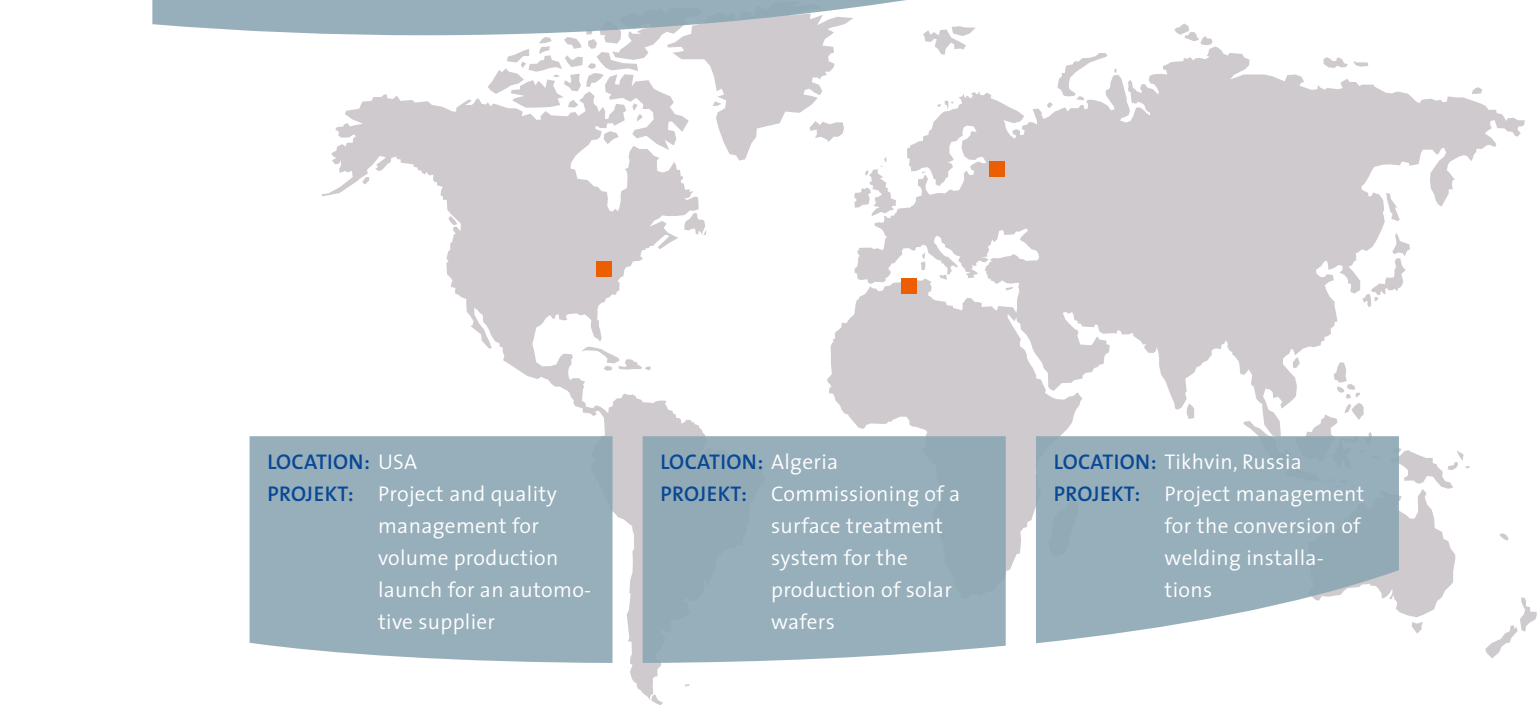


LOCATION: USA
PROJEKT: Project and quality management for volume production launch for an automotive supplier

LOCATION: Algeria
PROJEKT: Commissioning of a surface treatment system for the production of solar wafers

LOCATION: Tikhvin, Russia
PROJEKT: Project management for the conversion of welding installations

"Being able to bring my design experience to bear in different industries is a tremendous incentive to me. Working together with others on a project such as AGATE, which is one of a kind in the world, is the pinnacle of my career to date."

Salun Hamzic, design specialist for 3D CAD systems

Portrait:
Salun Hamzic, a native of Montenegro, joined Brunel in 2010. A design engineer with a wealth of experience, Hamzic is currently working with peers at the Jülich Research Center to develop a system to reduce highly radioactive nuclear waste.

AGATE revolutionizes nuclear research

>> Excerpt

Whether governments abandon nuclear power or not, they still need a solution for all the highly radioactive waste products. The AGATE concept study indicates that transforming long-lived radionuclides into stable isotopes could significantly ease the problem of permanently storing nuclear waste.

COPY > Dr. Ralf Schrank

Splitting uranium atoms releases radionuclides that can give off radioactivity for several million years. Long-lived transuranic elements such as plutonium-242 have a half-life of 375,000 years, however – not to mention neptunium-237 (2.1 million years) and the iodine-129 isotope (15.7 million years). Clearly, storing these substances for the very long term is a very risky business indeed.

Transmutation – the deliberate transformation of long-lived radionuclides into stable isotopes – would go a long way toward easing the problem of permanent storage, however. This, at least, is the finding of a feasibility study recently conducted under the aegis of the Advanced Gas-cooled Accelerator-driven Transmutation Experiment (AGATE). Commissioned by the German state of North Rhine-Westphalia, the study was conducted by the Institute for Nuclear Fuel Cycles at RWTH Aachen University in collaboration with the Jülich Research Center, Siemens AG and the Frankfurt Institute for Advanced Studies.

TRANSMUTATION: NUCLEAR FISSION WITHOUT THE SELF-PROPAGATING CHAIN REACTION

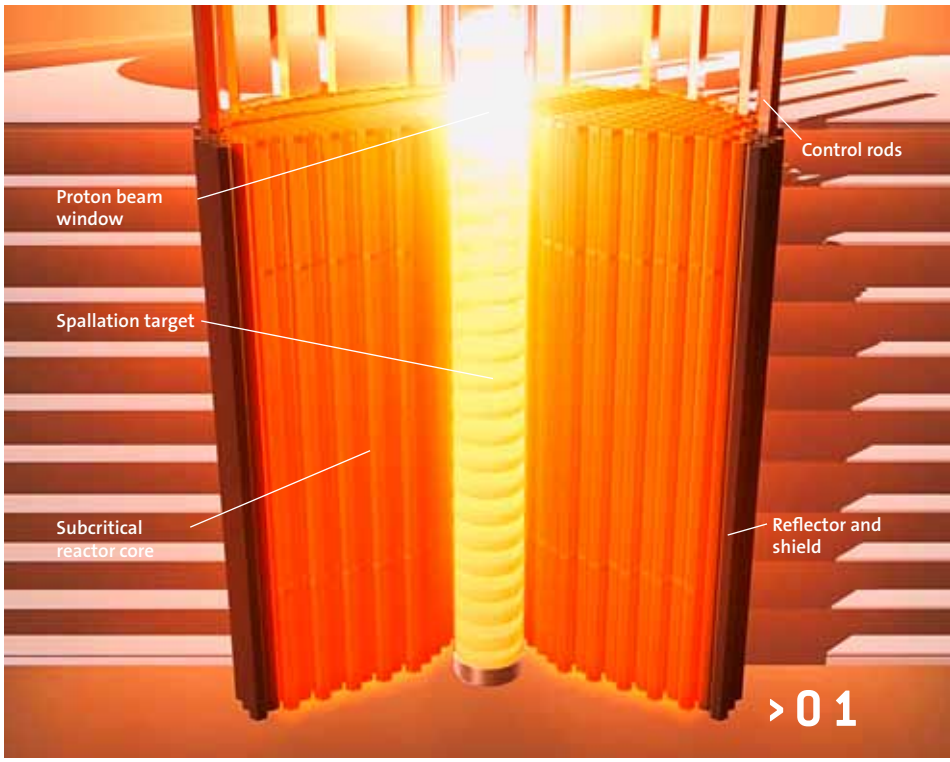
The transmutation process involves bombarding atomic nuclei with accelerated neutrons. As a result of this process, the extremely long-lived and highly radiotoxic

substance iodine-129, for example, absorbs a neutron and is transmutated into the stable, non-radioactive substance xenon-130. Transmutable radionuclides are partitioned before this process begins.

The core of what is known as a partitioning and transmutation (P&T) system is a complex that combines a particle accelerator and a reactor. When they hit their "spallation target", the protons created by rapid acceleration release energy-rich neutrons. These neutrons slam into the coolant-surrounded fuel that is to be transmuted and, in doing so, trigger the intended fission process, similar to the one that takes place in a nuclear reactor. The crucial difference is that transmutation does not unleash a self-propagating chain reaction.

Besides technical implementation of a helium cooling cycle – the crux of the whole concept – the AGATE researchers focused on developing the proton beam window and the spallation target.

Brunel employee Salun Hamzic, who was part of the Jülich-based Corporate Technology department (ZAT) team that developed the design concepts for both window and target, involvement in the AGATE project was a special kind of challenge. "AGATE is the only project of its kind in the world. The whole system is extremely complex," the engineering graduate notes. CAD-designing the segmented, roughly one-meter-long target plate made of layered tungsten disks and designing the proton beam window, which is exposed to huge thermal stresses, was an impressive feat of engineering. "Getting the window right to optimize stability and cooling involved extensive numeric simulations at the ZAT center," the Brunel expert adds.



Ultimately, however, AGATE came up with a coherent concept for a P&T system. The next step is to optimize the physical and technical parameters for a demonstration system. The organizations involved in the project reckon this will require all relevant German research institutes to be brought together – as well as taking a decade or two of research work. The researchers expect to have a model system up and running by 2030 at the earliest.

> 01
The proton beam strikes the tungsten disk in the spallation target from above, releasing the energy-rich neutrons that are needed for subsequent fission processes.

Jetting between time zones

NAME: Erik Herzog
PROFESSION: Mechanical engineer

COPY > Lisa Schwarzien

Erik Herzog is a true cosmopolitan. Born and bred in Saarland, Germany's smallest state (by surface area), he now lives in Bavaria but feels at home the world over. And no wonder, after 16 years' international project management activity. Erik's most recent business trips took him to Russia, where the Brunel employee works for Augsburg-based Kuka Systems GmbH. One of his assignments is to serve as project manager for the conversion of welding installations. The company is a leading international provider of automated production systems. In Tikhvin, about three hours' drive east of St. Petersburg, one of Kuka's customers produces freight cars. "The plant is fitted with Kuka welding machines and technologies," Erik explains. "Our job is to increase their capacity because the payload for one of the car types is to be enlarged." The Brunel employee therefore stops by at least once a month to coordinate the commissioning of machines with his staff of 30 people and then to handle acceptance with the factory foreman.

TWELVE COUNTRIES IN 16 YEARS – TRAVELING HAS LONG SINCE BECOME BUSINESS AS USUAL FOR PROJECT MANAGER ERIK HERZOG

"I may be an external project manager, but I am fully integrated in the team," says the 49 year-old engineer, who oversees the project together with four colleagues. "The right knowledge, a healthy portion of self-confidence and professional experience are what matter." Erik Herzog is definitely not lacking in any of those departments. Having studied mechanical engineering at the Helmut Schmidt University in Hamburg (formerly the University of the Armed Forces), he served as a regular soldier in the German army, including positions as head of department at a logistical facility and as an operations management and logistics teacher. "After my time in the army, I initially went free-lance, working on a project to select a help desk solution at a CD production plant, for example. That's where I caught the project management bug," Erik recalls.

Five years' experience as a management consultant in the automotive sector then preceded the beginning of his worldwide activities as a project manager across a broad cross-section of industries. Italy, Sweden, China, the USA, Saudi Arabia, Hungary? He's been

Milestones in Erik Herzog's career

1	Augsburg, Germany	7	Saudi Arabia
2	Tikhvin, Russia	8	Hungary
3	Italy	9	Japan
4	Sweden	10	Austria
5	China	11	UK
6	USA	12	France

there. Product development, factory and logistical planning, process reengineering and restructuring? He's done that. What the mechanical engineer understandably likes about his job is above all the variety and the stream of new challenges. For a project manager, it is particularly important to get experts from a wide spread of disciplines together around one table. "People talk to each other, but they often don't understand each other," he notes, referring not only to linguistic barriers. The project manager, who is business fluent in three foreign languages and has a basic command of four others, sees his primary job as networking the kaleidoscope of knowledge possessed by his colleagues and getting all kinds of different angles on projects. "That is what international projects in particular have taught me. Whenever you move into a new language and cultural space, you have no choice but to reach out to others and try to understand them."

On his countless travels, Erik Herzog has also learned to cheat jetlag and avoid running too low on sleep. Though he has been criss-crossing the world's time zones for 16 years, he still gets by happily without wearing a watch. Time is critically important not only in resource and personnel planning, but also in the context of project management. "Projects with a long-term time frame must be broken down into manageable packages," says Erik, who enjoys playing handball in his free time. Even during longer stays abroad, he always seeks to maintain a healthy balance by engaging in sports. He still has difficulty deciding which is favorite country, however: "A summer's evening in St. Petersburg can be just as beautiful as a salsa course in Tokyo."

"You need a broad spectrum of expertise to work with cutting-edge technologies. Thanks to the projects I have done with Brunel Communications, I can channel experience gained in the automotive, rail and aerospace industries into the electronic aspects of hardware design."

Ralf Wierse, specialist for embedded systems

Portrait:
At Brunel Communications from the word go: Ralf Wierse (41) completed his engineering studies at the University of Hanover in 1997. In 2006, he became deputy head of the Hardware Design department and has since participated in customers' electronic development projects in a variety of industries.

HIV point-of-care tester – Developing the electronics for innovative medical systems

>> Excerpt

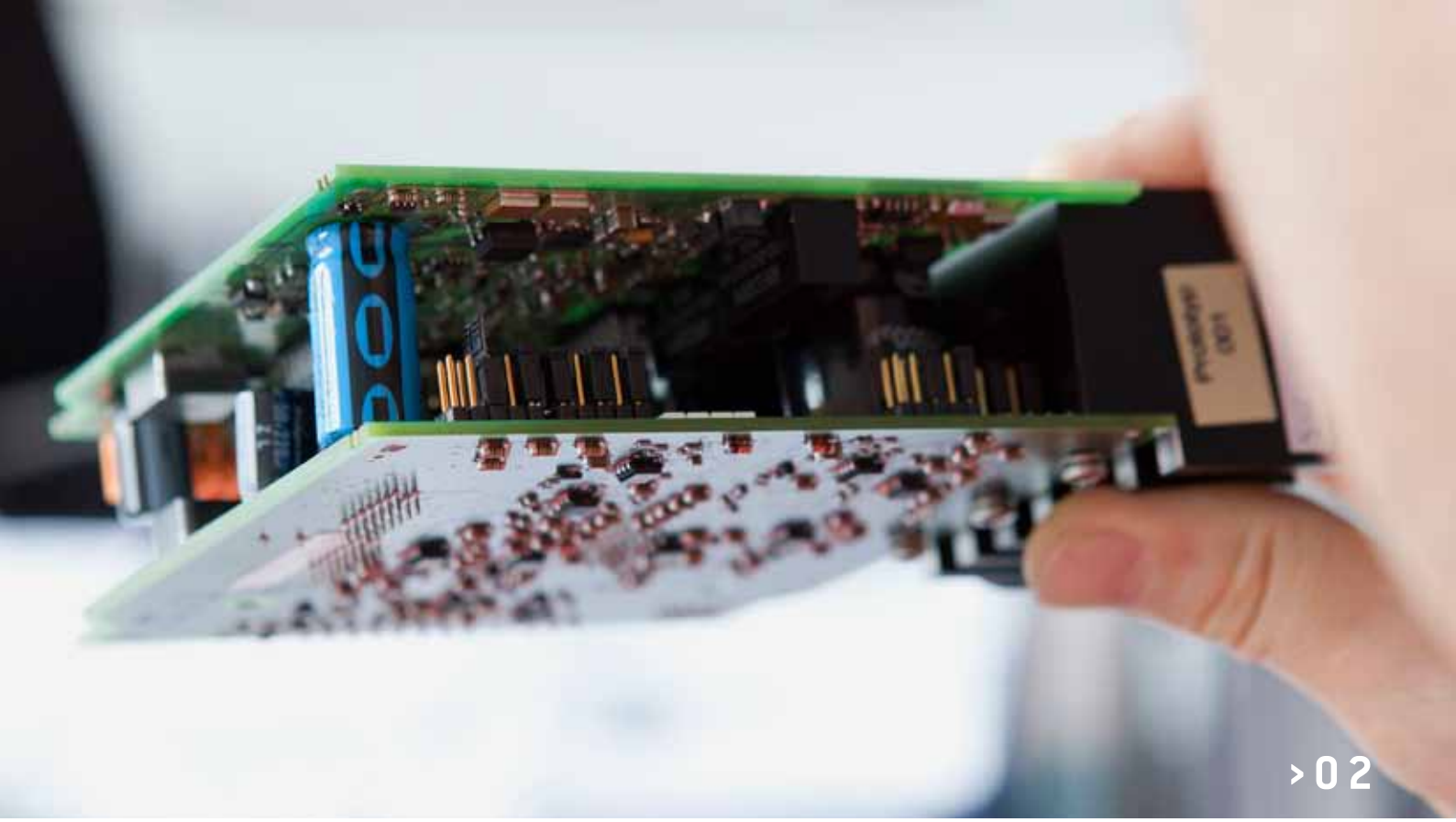
Developing a device that reliably measures the HIV viral load in a blood sample presents a challenge to medical and electrical engineers. Brunel specialists for embedded systems helped one manufacturer of medical products to engineer just such a point-of-care tester.

COPY > Dr. Ralf Schrank

Recent estimates from UNAIDS, the Joint United Nations Programme on HIV/AIDS, put the number of people infected with the human immunodeficiency virus HIV at over 34 million. Though no cure has yet been found for the virus, various treatment methods can at least significantly alleviate the symptoms. The key to successful therapy is the precise dosage of viral inhibitors, which is possible only if the current viral load can be accurately identified. Up to now, however, only central laboratories had the capacity to cope with the necessary time-consuming analyses.

SAFETY AND RELIABLE READINGS COMMAND TOP PRIORITY

To optimize the process, a leading producer of biomedicines – supported by embedded systems specialists from Brunel – has developed an innovative HIV tester that analyzes the viral load quickly and automatically. The first version of the tester is a pocket-sized biochemical laboratory. A drop of blood is fed via a capillary into the tester cartridge. In a series of interlinked chambers, actuators such as stepper motors, photoelectric sensors, valves and special-purpose components control the complex stages of biochemical reaction. Integrated sensors measure the blood's temperature, flow rate and pressure.



To design the controller board and embedded software for the HIV point-of-care tester, the Brunel specialists drew on the wealth of applied expertise they have amassed in software and hardware design. "When we designed the controller board, top priority was given to safety and reliability," explains Ralf Wierse, head of hardware development at Brunel Communications. The components also had to be miniaturized to match the size of the cartridge. "Another imperative", Wierse adds, "was to ensure compliance with the strict safety standards required by the authorities that license medical diagnostic equipment."

The tester detects process errors autonomously and switches itself off automatically if there is the danger of a leak. Plausibility checks prevent incorrect immune status analyses from being read out. Within about 60 minutes, the device delivers reliable diagnostic data – and that at a very reasonable cost. Brunel hardware expert Wierse is confident: "If we can further optimize the biochemical side, we might be able to get the analysis down as low as 30 minutes in the future." Thanks to the new tester, patients infected with HIV can immediately align the doses of medicines they take with their current immune status. Especially in structurally weak regions such as Africa, the tester will provide a very valuable service and can be deployed in local GPs' surgeries, for example.

›02
Quality control for electronic components: The hardware components had to be miniaturized and aligned with the cartridge size to keep the tester small and handy.

The best eleven individuals aren't necessarily the best eleven team players

Brunel management duo Gerjan Mazenier and Dr. Ralf Napiwotzki draw parallels between soccer and the world of work.

Gerjan Mazenier: Shared goals, teamwork and the fun of the game: Soccer and the world of work have a lot in common.

Dr. Ralf Napiwotzki: That's right. Our commitment to both is wholehearted, even if we only watch soccer from the stands. But there are many similarities. The whole team is crucial if you want to win on the soccer pitch. We also repeatedly see that the best eleven individuals are not necessarily the best eleven team players. Especially in our industry, solid teamwork in which everyone contributes their strengths for the good of all is the most critical factor of success.

Mazenier: Healthy minds, of course, are found in healthy bodies. Fit and healthy people rise to challenges, find unconventional solutions and become genuine playmakers. On the pitch and in the office.

Dr. Napiwotzki: We also offer our people excellent chances of promotion. More than 70 percent of our managers have risen through the ranks. When it comes to developing young talent, we can teach soccer clubs a thing or two.

Mazenier: You won't succeed if you don't focus on the goal, though. Strikers want to score goals and sales staff want to get good deals signed and sealed. Here, it is we who can learn from the sporting world. In business, we sometimes have a tendency to still talk about the shape of the ball and the properties of the pitch instead of getting on with the game. In soccer, you know all that before you start. Out on the turf, the only thing that matters is scoring goals.

Dr. Napiwotzki: One goal we always pursue is to continue internationalizing Brunel. Changes in the world's economy are driving the emergence of a global labor market. To stay successful in the long term, the Brunel team must do what a soccer team does: enjoy the game, stay fit, take its chances and hit the goal.

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(Jamila.Heinrici-Ibrahim@brunel.de).

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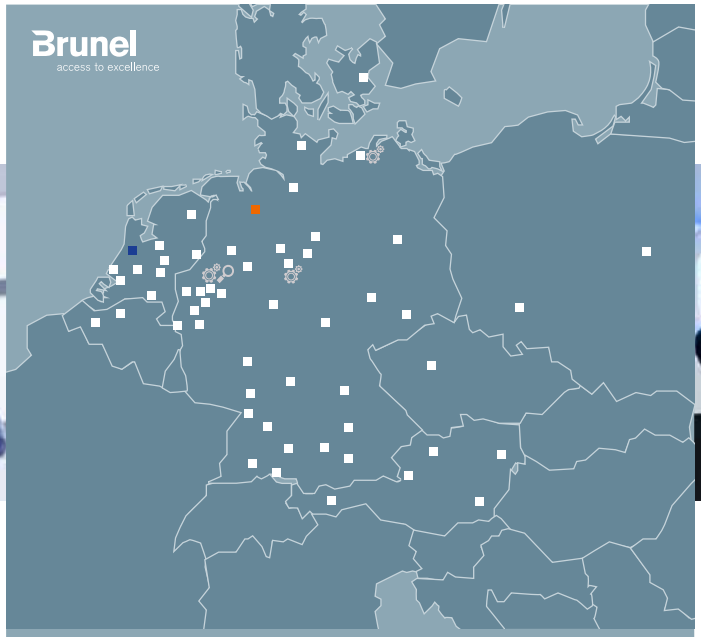

Our contacts:

■ **Brunel Netherlands** Astrid Hagedoorn	John M. Keynesplein 33 1066 EP Amsterdam info@brunel.net
■ **Brunel Austria** Helena Grabner	Mozartstraße 2, 85622 Feldkirchen t. +49 89 358 823-0 helena.grabner@brunel.de
■ **Brunel Denmark** Soren Kristensen	Havnegade 39, 1058 Copenhagen t. +45 334 363 24 soren.kristensen@brunel.dk
■ **Brunel Germany** Yvonne Höft	Airport City Hermann-Köhl-Str. 1, 28199 Bremen t. +49 421 169 41-0 yvonne.hoeft@brunel.de
■ **Brunel Poland Warsaw** Karolina Kosmala	Lumen Zlote Tarasy, ul Zlota 59 00-120 Warsaw t. +48 22 222 46 80 k.kosmala@brunel.net
■ **Brunel Poland Wroclaw** Franek Szewcyk	Silver Forum Strzegomska 2-4, 53-611 Wroclaw t. +48 71 776 07 45 f.szewczyk@brunel.net

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EDITORIAL OFFICE

Brunel GmbH | "The Specialist" editorial office
Airport City | Hermann-Köhl-Str. 1 | 28199 Bremen
redaktion@der-spezialist.de
Phone +49 421 169 41-14

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EDITOR-IN-CHIEF

Dr. Johann Arie van Barneveld, lawyer, CEO, Brunel International N.V., Brunel GmbH

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Brunel GmbH
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Phone +49 421 169 41-14
brunel.de
redaktion@der-spezialist.de

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