

GRUNER GROUP

MAILING.

No. 29

2 GENERATIONS
OPINIONS

GRUNER SPEAKS
DIGITAL

CONSTRUCTION INDUSTRY
QUO VADIS



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EDITORIAL

“IT IS PEOPLE LIKE YOU AND ME WHO, THROUGH THEIR EVERYDAY COMMITMENT, ARE CRAFTING, FOSTERING AND MAKING PROGRESS. THAT IS WHY, ALONGSIDE THE VARIOUS DEVELOPMENTS IN DIGITIZATION, GRUNER'S FOCUS REMAINS ON PEOPLE.”

DEAR READER

“Gruner: personal and committed” – the motto embraced by the Gruner Group for 2018 – appears, at first sight, to be rather at odds with today's fast-moving, digital world. Digitization, without a doubt, is irreversibly shaping our work and unlocking new, intriguing potential. Like previous issues, this **Mailing**, quite rightly highlights various aspects of the digital transformation. The industry is in flux. It is evolving and we are moving with it. And it is precisely this “we” that I wish to underscore. Because it is people like you and me who, through their everyday commitment, are crafting, fostering and making progress. That is why, alongside the various developments in digitization, Gruner's focus remains on people. This magazine deliberately celebrates their abilities, know-how and opinions. And we also give external professionals the chance to voice their ideas. We are convinced that only by working together, by applying expertise and by putting words into action can we jointly capitalize on the possibilities offered by the digital world of tomorrow.

I look forward to talking to many of you in person and wish you an enjoyable read.

Kurt Rau

Civil Engineer (ETH)
Division Head, General Planning
Acting CEO of the Gruner Group



Kurt Rau
Acting CEO of the
Gruner Group

DIGITAL DEVELOPMENT:

GRUNER SPEAKS DIGITAL

BIM, VDC AND ICE HAVE LONG BEEN PART OF OUR DAILY ROUTINE. GRUNER IS AT THE FOREFRONT OF THE DIGITAL REVOLUTION IN THE CONSTRUCTION INDUSTRY.



BIG DATA ALSO PLAYS A ROLE IN DAM MONITORING



© Posiva Oy

THINKING AHEAD TO THE NEXT 1000 YEARS AND BEYOND



RISK ANALYSIS MAP



ON VDC, HOLOLENS AND ICE SESSIONS



USE OF BIM TO FIELD



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BIM FROM START TO FINISH



DIGITAL DEVELOPMENT IN THE SERVICE OF HUMAN SAFETY



BIM ON SITE



HISTORIC BUILDING CONVERSION

VENTURING OUT OF THE OFFICE

BIM HAS ARRIVED ON THE JOB SITE. AT GRUNER, WE CALL THIS "BIM TO FIELD". BUT WHAT IS IT ALL ABOUT AND WHERE IS IT LEADING US?

"BIM to field" denotes the direct use and processing by experts on site of the digital data and information created during the design process. This goes beyond consulting digital drawings to include on-the-spot deployment of digital aids to ensure proper performance of the works. BIM to field thus supports quality assurance and boosts process efficiency throughout the site team and across all construction phases. Today's job sites more and more information ever more quickly, and new data is amassed every day as the works proceed. BIM to field allows the structured capture of this data and it's prompt availability in high-quality form to all project parties. This is largely achieved through use of the Autodesk site supervision tool BIM 360™ Field.

PRACTICAL PROJECT APPLICATION

The use of Autodesk BIM 360™ Field is rapidly becoming widespread. Specific applications include the new University Children's Hospital in Zurich (General Planning), the UPlaNS (national highway maintenance planning) St. Gallen West-East project (Infrastructure), the water utilities project in Hausen am Albis, and the Ypsomed and SBG Schönburg projects in Berne (Building Services).

BIM TO FIELD – PRESENT AND FUTURE

BIM 360™ Field is a construction information management program for 2D and 3D environments. It combines mobile technologies for on-site use with cloud-based collaboration and reporting functions. It provides site personnel with key information for improving quality, safety and commissioning on all types of construction and capital projects. While some applications are fully fledged, others – e.g. working with models on site or the creation of user-defined reports – are still under development. In future, the data generated in BIM to field will be synchronized with other data platforms, such as the project management tool.

For further details of BIM 360™ Field, please visit www.autodesk.com



Mario Gähwiler
Civil Engineering Technician (TS/HF),
Gruner Wepf AG, St. Gallen



© Penzel Valier AG

USE OF BIM TO FIELD AT LONZA, VISP

LONZA AND SANOFI ARE BUILDING A JOINT-VENTURE BIOLOGICS PLANT AT LONZA'S IBEX™ SOLUTIONS BIOPARK IN VISP. AS OF 2020, IT WILL BE USED TO PRODUCE MAMMALIAN CELL CULTURES.

Gruner's mandate covers structural design and construction management as well as fire safety, building physics and acoustics. With its three-strong team of site supervisors, Gruner is responsible for overseeing the works. The wide range of digital tools used on the project include the BIM to field application for the work operations. It is used to maintain the daily site diary and checklists for on-site acceptances as well as for the central task, deliverables and defects management. To improve clarity, all relevant locations can be marked by pins on the existing floor plans. The initial feedback from Gruner's team leader Jörg Tegge is positive: "There's no doubt about it – this has simplified collaboration within the design team, and especially with the lead designer." He points out that, on complex fast-track projects such as the Lonza plant, where designs are liable to change, the team particularly appreciates having permanent on-site access to up-to-date drawings, e.g. via tablet for checks and acceptances.

Gruner is also a trailblazer in the field of structural design. For further details, please visit gruner.ch/en/references/use-bim-field



Jörg Tegge
Civil engineer (TU),
Gruner Ltd



Sven Brand
Civil engineer (UAS),
Gruner Ltd



NEWS AND SPORTS CENTER PROJECT BIM-DESIGNED FROM START TO FINISH

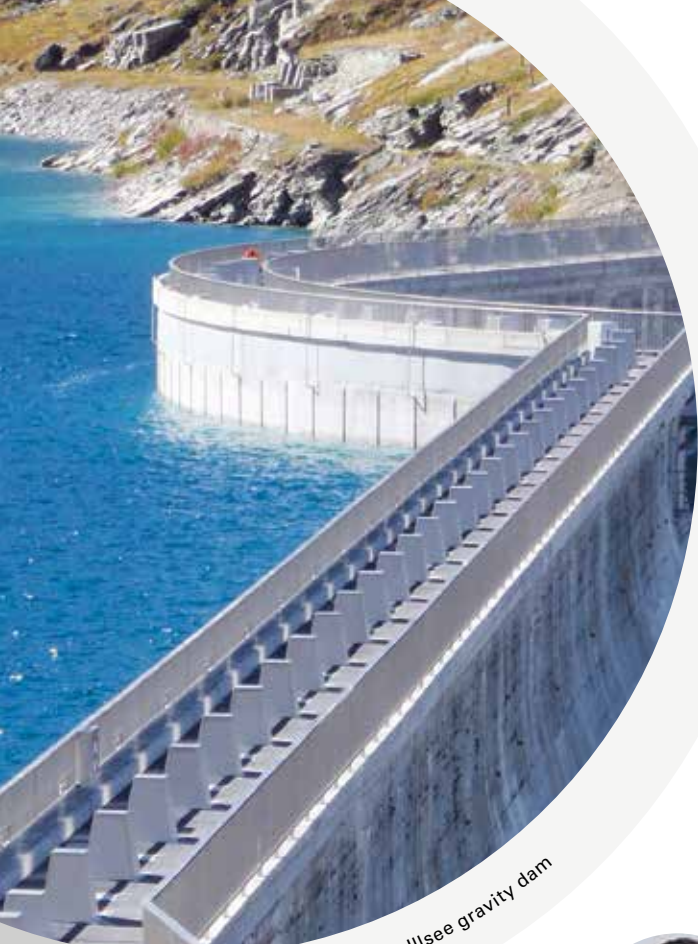
In designing the new SRF center, digital methods were adopted from the very outset, e.g. for the thermal/energy building simulations and spatial coordination of the building services trades. The use of BIM tools will allow the tough requirements in respect of cost frame and deadline to be met. The construction companies are contractually entitled to receive conventional 2D drawings and these have been used for the operations on site. The contractors are additionally provided with an up-to-date 3D Solibri model. Solibri is frequently used to visualize heavily serviced areas and complex geometries in order to rationalize construction processes.

According to Gruner manager Andreas Schmid, one key lesson to be learned relates to the potential deceptiveness of 3D models. As he sees it, the precision engineering quality of a 3D model encour-

ages professionals to design in the same spirit. It implies a level of precision, in the tenth-of-a-millimeter range, that is unachievable in construction practice. Schmid's verdict: "If we are working with dimensional tolerances in the centimeter range, then these must be built into the 3D model to avert any nasty surprises on site."



Andreas Schmid
Engineer (UAS), Member of the Executive Board, Gruner Gruneko AG



25 m tall Illsee gravity dam

DIGITAL DEVELOPMENT

GRAPHIC DATA ANALYSIS EXEMPLIFIED BY ILLSEE DAM

BIG DATA ALSO PLAYS A ROLE IN DAM MONITORING.

Large dams are equipped with numerous measurement systems for the periodic logging of deformations, temperatures, pressures and flows. Until now, these measurements have normally been presented in diagrammatic form using Excel software. Thanks to digital development, it is now possible to automate the processing of these vast data volumes and simplify their interpretation by the engineer.

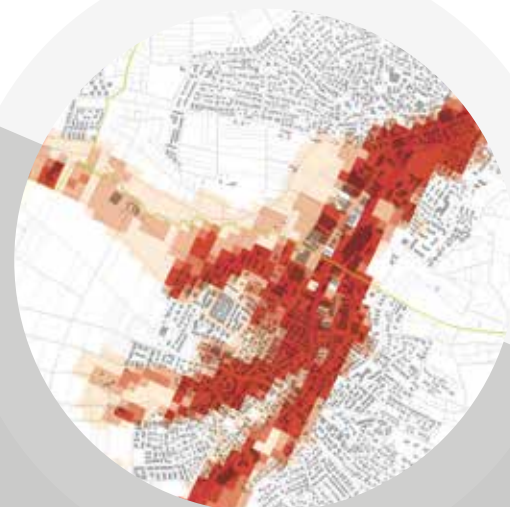
For the Illsee dam in the Canton of Valais, Gruner Group subsidiary Stucky partnered with the operator in developing a measurement data management system with such capabilities. Between 1994 and 2018, some 3.3 million readings were taken, equivalent to 132,000 processed data items per year. The Qlik Sense application can now be used to provide a direct visualization of deformations in the AutoCAD dam drawings.



Jérôme Filliez
Civil Engineer (EPFL),
Stucky Ltd



Dr. Hu Zhao
PhD (ETH), Gruner Ltd



Risk heat map



Raphael Brügger
Environmental Engineer (ETH),
Gruner Böhlinger AG



Michael Aggeler
Cultural Engineer (ETH), Member of the
Executive Board, Gruner Böhlinger AG

FROM RISK ANALYSIS TO ACTION PLANNING

The municipalities of Biel-Benken, Therwil and Oberwil in the Canton of Basel-Landschaft are crossed by several streams. These have burst their banks on various occasions in the past, causing major damage. To date, the municipalities have developed separate flood control projects for the individual watercourses. For various reasons, however, none of these has yet been implemented. An appraisal prepared by Gruner Böhlinger demonstrated the significant benefits offered to all parties by a regional approach to flood protection measures.

The Canton of Basel-Landschaft Public Works Department duly appointed Gruner Böhlinger to draw up flood control proposals for the Hinteres Leimental region, prescribing use of the Swiss Federal Office for the Environment (FOEN) "Risk analysis to action planning" methodology. This lays down the basic procedure, which is then adaptable to the specific context. The comprehensive digital geodata analyses performed by Gruner Böhlinger's specialists served as an important starting point for all steps in the process. The resulting action plan provides the optimum solution to all flood control requirements while being broadly based through the involvement of an advisory group in the development process. The measures are now ready for phased implementation over the next 15 years.

FACELIFTED: HISTORIC BUILDING CONVERSION

FOR THE CONVERSION OF BERNE'S HISTORIC SCHÖNBURG BUILDING INTO A RESIDENTIAL FACILITY WITH COMMERCIAL COMPONENT, GRUNER ROSCHI MODELED ALL THE BUILDING SERVICES SYSTEMS IN 3D.

With specific data assigned to each element, it is now possible to modify all sizes and quantities at the press of a button, thereby making the impact of any changes directly visible. Despite the seemingly endless list of tools used on the project, Urs Schürch, Department Head, Ventilation, Energy at Gruner Roschi AG in Köniz, insists that building information modeling (BIM) should not be regarded as a special software application, but as a method that exploits the available technological solutions. "The digitization of design and construction provides opportunities to improve communication and collaboration, and thus to enhance one's own working conditions," says Schürch. "Project management, however, remains key to the success of any project. Long years of project management experience in building construction, backed up by digital tools, offer a sound foundation for the provision of outstanding services."



Urs Schürch
Engineer (UAS/
HVAC), Gruner
Roschi AG



Visualization of residential building with commercial component and 3D model.

THESE METHODS AND TOOLS ARE BEING USED ON THE SCHÖNBURG CONVERSION PROJECT:

Building information modeling (BIM) as a methodology for optimizing the planning, design and interdisciplinary coordination of the construction process.

BIM execution plan (BEP) governs the BIM-based collaboration between design-and-build contractor, architect, building services engineer, structural designer and other project team members, and defines goals, processes and organization for BIM deployment.

Models (3D) Trimble Plancal nova 14.0
The digital model is hierarchically structured in element groups and elements. Elements are assigned both geometric and non-geometric information. The accuracy of the geometric information and the number of non-geometric data items are specified through the level of detail (LOD) function.

Model coordination Solibri Model Checker 9.8
To ensure trouble-free model coordination, quality controls such as clash detection and integrity checks are performed by the external BIM coordinator.

At ICE (integrated concurrent engineering) sessions, the results are summarized in meeting minutes and a quality assurance report, and a record made of the associated tasks to be performed.

Quantity measurement Desite MD PRO 2.0.18
The quantities for work specification are taken directly off the building services models.

File repository C24
Digital models are exchanged via the data room (C24).

Database dRofus
A web-based project database, created with the dRofus system, was used and maintained for the full duration of the project. It contains information that is otherwise kept in the room schedule.

BIM to field Autodesk BIM 360TM Field
BIM 360TM Field has been adopted for field management. The software provides all site personnel with key information for improving quality, safety and commissioning.

THE FUTURE HAS ARRIVED: ON VDC, HOLOLENS AND ICE SESSIONS

WHAT WAS SCIENCE FICTION ONLY A FEW YEARS AGO IS NOW REALITY. AT GRUNER'S BASEL AND KÖNIZ OFFICES, FOR INSTANCE.

For Gruner's Digital Development management team, one thing is certain: anyone who uses new tools and methods soon gets hooked. Johannes Kretzschmar explains the effect as follows: "The BIM rooms at Gruner Ltd and Gruner Gruneko AG in Basel or at Gruner Roschi AG in Köniz serve as a constant reminder to our employees that our industry is poised for a sea change and that model-based design has become a reality." The BIM rooms are not, of course, an end in themselves. They are actively used in our day-to-day work on our client's projects, some of which are featured in this issue.

As Mathias Faust, Gruner Group Head of IT, points out, equipping the BIM and VDC rooms posed a variety of challenges for Gruner's IT team. "Apart from powerful

PCs for model representation and processing, the requirements included AR and VR systems with adequate computing capacity. It is particularly difficult to accommodate the rapid pace of innovation with the existing software environment and to satisfy the diverse user demands."

With the BIM and VDC rooms, the Gruner Group has taken a further step in applying its digital development strategy to everyday working practice. "The state-of-the-art technical infrastructure in the rooms helps to optimize teamwork on the BIM project," says Kretzschmar. The rooms allow digital models to be viewed in virtual and augmented reality before work begins on site. Buildings and building parts are made tangible and can even be walked through. As the managers explain, these amenities offer

real benefits for conventional meetings in that they facilitate the digital presentation of documentation.

No one in the Gruner team knows if all the tools and applications will survive into the future given the highly dynamic nature of the software landscape. The essential thing is to address the key questions: What are the concrete benefits? What are the critical points in the application? What are the strengths and weaknesses of the software? In what areas is staff training useful? And, most importantly, how does the client profit?

In our industry, model-based design is now reality.



VDC ROOM: The "traditional" BIM room contains smartboards and projectors. VDC stands for "virtual design and construction". VDC rooms have additional equipment for AR (augmented reality) and VR (virtual reality).

AR/VR: Augmented/virtual reality. AR allows digital components to be added to and experienced in a real-world environment, e.g. through the use of a camera or smartphone. VR means completely entering the digital world, e.g. by walking through a virtual building as if it were real.

ICE SESSIONS: ICE stands for "integrated concurrent engineering". The sessions take the form of model-based, transdisciplinary design workshops.

HOLOLENS: A HoloLens is a combination of computer and headset that allows spatial interaction with holograms.



Johannes Kretzschmar
Engineer (TU/Architecture),
Gruner Ltd



Dr. Mathias Faust
Gruner Group Head of IT,
Gruner Ltd

Visualizations using wall and table touchscreens optimize collaboration on BIM projects.



DIGITAL DEVELOPMENT IN THE SERVICE OF HUMAN SAFET

PARTICULARLY AT EVENTS WITH HIGH VISITOR NUMBERS, ENSURING SAFE AND SMOOTH OPERATION IS A COMPLEX DESIGN TASK

"Operators and organizers regularly face the challenge of reliably modeling people flows during events (particularly during the entry and exit phases) or for evacuation scenarios," explains Gruner Group Senior Safety Expert, Stephan Gundel. As he sees it, computer-based people flow and evacuation simulations can be extremely helpful, particularly for events with high visitor volumes and venues with complex layouts or spatial constraints. Not only do they allow the scientifically based modeling of crowd behavior, but can also provide instructive visualizations in the form of video and image data – long before the venue has been built or the event has started.

Together with Matthias Siemon, who heads the Fire Safety, Engineering Methods team, Stephan Gundel draws positive conclusions from the many past projects: "Not least in the wake of the tragic events at the 2010 Love Parade in Duisburg, such methods

offer clients significant added value – also in terms of cost-effectiveness." But visitors also benefit. "Anyone can appreciate the positive impact of smooth visitor flows and an unconstricted radius of movement in the way an event is experienced."



Dr. Stephan Gundel
Gruner Group Senior
Safety Expert
Gruner Ltd



Dr. Matthias Siemon
Department Head, Fire Safety,
Engineering Methods
Gruner Ltd



Building evacuation simulation



Tunnel at the Olkiluoto peninsula repository

@ Posiva Oy

WITH STATE-OF-THE-ART SCIENTIFIC METHODS AND DIGITAL TOOLS, GRUNER IS PROMOTING RESEARCH INTO THE LONG-TERM SAFETY OF RADIOACTIVE WASTE.

Plans to build a repository for spent fuel elements in Finland have necessitated the performance of long-term safety assessments (for the period after repository closure). Gruner has been subcontracted by the Institute of Geological Sciences at the University of Bern to support the research program. The mandate involves the geochemical modeling of pore water in the bentonite barrier and tunnel backfill, and the determination of solubilities and migration parameters of radionuclides together with their sorptive behavior in the bentonite and tunnel backfill. As Mirjam Kiczka, Project Manager, Geochemistry, Environment, explains, the results will feed into the modeling and assessment of the

repository's long-term safety. "Our models can replicate processes that are not amenable to experimentation." Through its work, Gruner will also contribute to the assessment of the long-term safety of repositories outside of Finland.



Dr. Mirjam Kiczka
PhD (ETH), specialized
in soil chemistry/
isotope geochemistry,
Gruner Ltd

THE CHANGING ROLE OF EMPLOYERS:

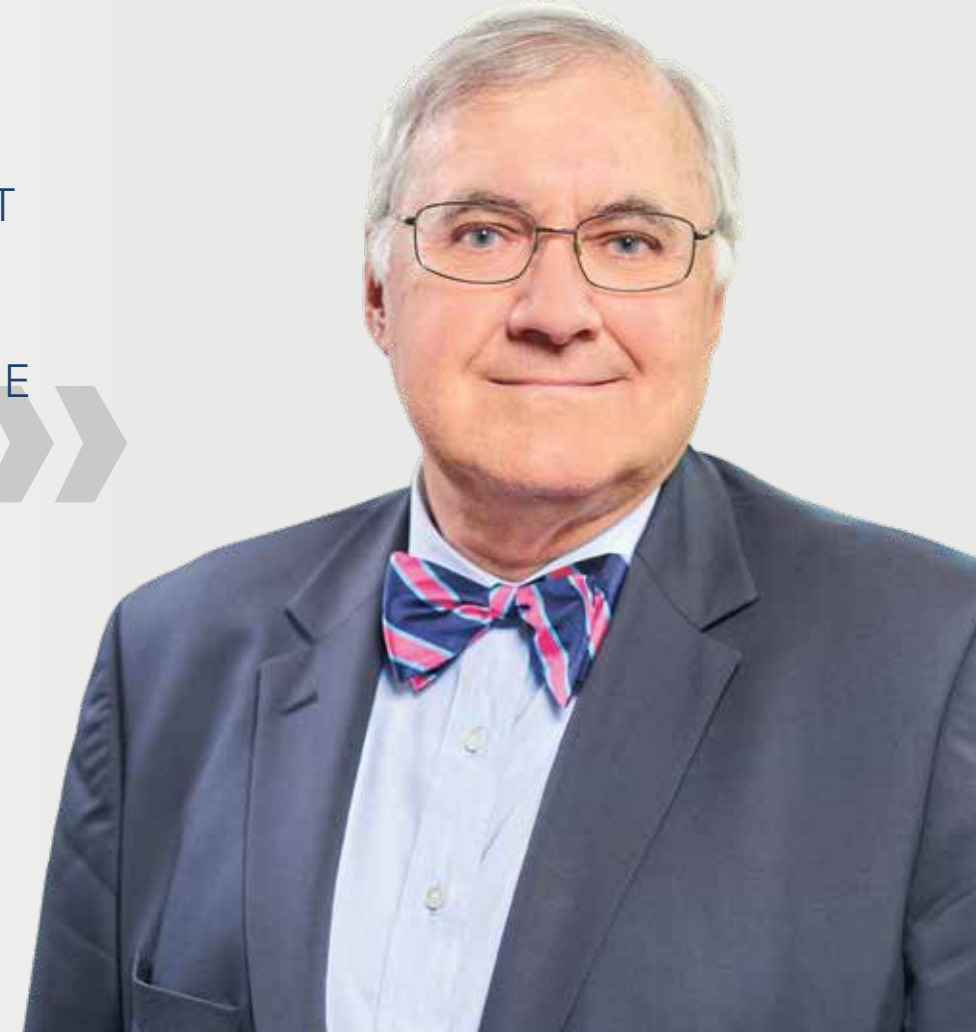
2 GENERATIONS OPINIONS

AS PART OF THE **"YOUR ENGINEERING OFFICE OF TOMORROW"** THEME, THE GRUNER GROUP GOT TOGETHER WITH ETH STUDENTS TO PRODUCE A CONTROVERSIAL PICTURE OF WHAT THEY HOPE FOR, DESIRE AND REQUIRE FROM THEIR FUTURE EMPLOYER. IT WAS STRIKING HOW IMPORTANT "SOFT" FACTORS SUCH AS TEAM SPIRIT AND FLEXIBLE WORKING HOURS ARE.

Philipp Grüniger
Senior Engineer, Gruner Wepf AG, St. Gallen
Years of professional experience: 5 years

« THE QUESTION ISN'T "WHAT MAKES ME FEEL GOOD?", BUT "WHAT GETS ME FURTHER?". »

Dr. Markus Ringger
Senior Engineer, Gruner Ltd
Years of professional experience: 31 years



QUALITY OR QUANTITY?

The younger generation aims on average to work the hours stated in their employment contract. It's very simple: If four people are constantly working 25% too much, then they are either one person short or have taken on too many orders. It doesn't mean I'm not prepared to work extra hours for a while, as long as this time can be taken back afterwards.

In my opinion, a civil engineer's salary is enough to be able to work an 80% week and still enjoy a nice lifestyle, including a family. The majority of the younger generation are no longer just interested in earning

money and saving. What really matters to them is their own happiness. We are people with a wide variety of interests, both in our careers and in many other places. As soon as we have enough money to live on, the next priority is to enjoy life. Two years ago I took two months' unpaid leave in order to travel the world, and I'd do this again.

Many advantages for the employee, but the employer is left empty-handed? I think you work more efficiently and make fewer mistakes if you keep to your planned working hours. Let it be said that I have met

my deadlines, produced high-quality work and worked efficiently at all times with my 100% working week. I realize again and again that once I reach the tenth working hour in a day, I'm nowhere near as efficient and focused as in the previous nine hours. As soon as I notice that my concentration is failing, I go home, even if there are still loads of files on my desk. With a good work-life balance I feel better physically, enjoy my work more, am more efficient and produce high-quality work. It's a win-win situation for me and for Gruner.

« WITH A GOOD WORK-LIFE BALANCE I FEEL BETTER PHYSICALLY, ENJOY MY WORK MORE, AM MORE EFFICIENT AND PRODUCE HIGH-QUALITY WORK. »

JOB OR VOCATION?

An architect once told me what the lecturer in their first class said: "Gentlemen, being an architect is not a job, it's a vocation!" I never heard a remark like that during my time as a physics student, but it was obvious to me. So I was shocked to see how the "Engineering office of tomorrow" visualizations were dominated by feel-good factors: sauna, being on an equal footing with your bosses, and so on. I don't view an employer as someone I work for and who pays me, but as someone who gives me an opportunity to develop in my vocation. We both benefit, and so that makes me an egoist according to Adam Smith. The question isn't "What makes me feel good?", but "What gets me further?".

It starts at university. Instead of looking for the easiest way to earn credits, didn't we focus on gaining a thorough understanding of our subjects? Didn't we find a quiet corner somewhere to immerse ourselves in a textbook, or rather two textbooks? I say two textbooks because comparing them both can bring out the essence of a particular topic more readily.

And so it continues at work. "What gets me further?" is a crucial guiding principle. For instance, having a line manager as role model – however demanding they might be – or being able to use a supercomputer as opposed to a sauna. More than anything, I would welcome a chance to take a professional sabbatical. That does pose a challenge for the employer: they can sell the supercomputer as a service, but a sabbatical is initially a loss-maker. However, this must be possible if you want to attract and develop

engineers who see their role as a vocation. Why not have an annual competition?

That would introduce a dialectic quality. Is it right that the people who see work as just a job are the most vocal champions of home working, while those who view their work as a vocation have long been home workers – at least in their free time? Show me the engineer who can't resist stopping to study and photograph interesting bridges or high-rises even on holiday? In short: if your profession is your vocation, work and leisure time are one and the same.

MY ENGINEERING OFFICE OF TOMORROW

Participants at a workshop with the 2018 ETH master's cohort suggested their ideas for their engineering office of tomorrow. The result was a real tangible image that illustrates what civil engineering, geomatics and environmental science students hope for, desire and require from their future employers. Visitors at the ETH liaison fair in April continued to work "live" on this future image, bringing it to completion. Further information on career prospects at Gruner, including for university graduates, can be found at gruner.ch/karriere

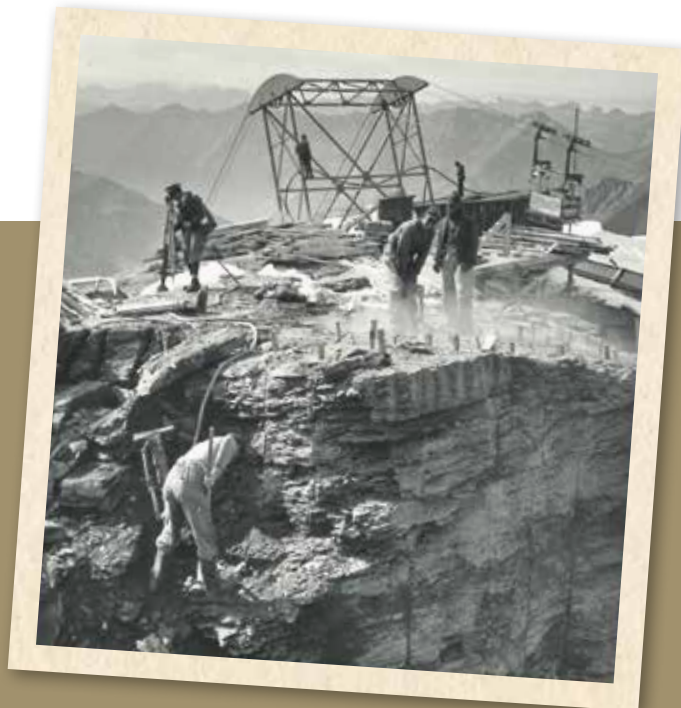
GRUNER ON HER MAJESTY'S SECRET SERVICE

THE SCHILTHORN: 2970 METERS ABOVE SEA LEVEL, BREATHTAKING VIEW OF THE BERNESE ALPS WITH THE "SWISS SKYLINE" THAT INCLUDES THE EIGER, MÖNCH AND JUNGFRAU, BACKDROP TO THE EPIC SKI CHASE WITH THE BAD GUYS IN PURSUIT OF JAMES BOND. IF YOU EVER GET A CHANCE TO SAVOUR THIS SPECTACLE FROM THE VIEWING PLATFORM (WHICH IN FACT ISN'T ONE), SPARE A THOUGHT FOR GRUNER. THE STORY THAT CONNECTS GRUNER WITH THE SCHILTHORN IS NO LESS SPECTACULAR. BUT LET'S START AT THE BEGINNING.

It was 1963 – the Swiss economy was thriving and widespread investments were being poured into improving the infrastructure – when building started on the Stechelberg–Gimmelwald–Mürren–Birg–Schilthorn mountain cableway project. With a horizontal length of 6967 meters and a difference in elevation of 2103 meters, the Mürren project involved the construction of what was then the world's longest section of aerial cableway. The planning and management of the Schilthorn cableway construction works was in the hands of the Gebrüder Gruner (Gruner Brothers) engineering company, which later grew to become the Gruner Group.



The Schilthorn summit station: On the right, the 007 helipad, which today serves as a viewing platform; in the background, the Mönch and Jungfrau



Explosive: Drilling the holes for the final blasting on the Schilthorn summit



Eternal ice: Permafrost lens on the Schilthorn summit

BATTLING PERMAFROST

The arduous conditions, especially the permafrost, encountered at high mountain elevations also posed a challenge for Gruner's engineers. Permafrost is problematic when ice lenses form in the cavities of the rock. The heat from the building could cause these ice lenses to melt, which would compromise the stability of the substratum. An air drain was left between the floor of the summit station building of the Schilthorn cableway and the ambient terrain to create a draft to ensure that the temperatures of the surrounding slate rock varied only insignificantly. Just a few of the support structures' bearing surfaces were in direct contact with the rock.

LIVING UNDER EXTREME CONDITIONS

Construction workers on the Schilthorn summit spent the night near the building site in a hut anchored with steel rope. A small diesel-driven power station prevented the drinking water from freezing and supplied the site with electricity. In order to be able to work with concrete at this altitude, the gravel and sand silos as well as the necessary water were kept permanently at a temperature of 15 degrees Celsius. At an altitude of some 3000 meters, the men faced the toughest of conditions. In the night of November 5 to 6, 1996, for instance, a raging storm hit with speeds of up to 150 km per hour. Only with the greatest effort were the workers able to prevent it from ripping the hut from its anchorings. One worker was said to have been so panic-stricken that he buried himself neck-deep in the sand silo and waited there for the storm to pass.

TERRIFYING CABLEWAY RIDES

"Buildings located at high mountain stations need an outer skin that can withstand the harsh weather conditions and be assembled from easily transportable prefabricated elements," wrote Georg Gruner in an article on the construction of the Schilthorn cableway published in 1970. Temporary construction cablecars were used to transport building materials and machinery. One such cablecar – a simple wooden crate – was used for the 28 500 or so personnel trips over the construction period. And one such passenger was Urs Müller, site supervisor with Gebrüder Gruner: "From Mürren you had to take the construction cableway up to Birg. The first time I arrived there, I remember thinking that wild horses wouldn't drag me into that crate. It was terrifying! All the same, I ended up braving that perilous ride quite a few times."

JAMES BOND OR HOW THE SCHILTHORN TURNED INTO PIZ GLORIA

The excessive amount of snow clearing, rising prices and other unforeseen expenses would have made it impossible to upgrade the summit restaurant after the completion of construction work in 1967 – had it not been for James Bond. On the lookout for a suitable location for the James Bond movie "On Her Majesty's Secret Service," the producers found the Schilthorn to be the perfect setting. Thus the Schilthorn became the fictitious Piz Gloria. And has remained so to this day.

A deal was quickly struck: The cableway company allowed the producers to film at the location and the latter paid for permanent improvements to the summit building and covered all transport, operating and personnel costs for the duration of filming.

In addition to the existing infrastructure, the production company required an "escape chute" and a helipad beside the summit station. The consortium comprising Frutiger Söhne AG and Gebrüder Gruner planned and built both. "Naturally, management insisted on following the progress of construction in person, catching an occasional glimpse of the actors – purely by chance, of course", remarks Urs Müller with a wink.



Manuela Britschgi
Specialist in internal communication
Gruner Group, Gruner Ltd



Terrifying: People too were transported to the summit by construction cableway in crates like these

CONSTRUCTION SECTOR

– THE CALM BEFORE THE STORM!

“ROARING TRADE IN CONCRETE CONTINUES” – THIS WAS THE TITLE OF RECENT REPORTS ISSUED BY THE SWISS CONTRACTORS’ ASSOCIATION AND CREDIT SUISSE ON THE STATE OF THE SWISS CONSTRUCTION INDUSTRY. BUT FOR HOW LONG? A LOOK AT THE UNSETTLED TIMES AHEAD.

How is business in the construction sector set to develop? Mailing put this question to three experts who view the industry from different perspectives. Silvan Müggler heads the Economics department of the Swiss Contractors’ Association (SBV), Daniel Heuer is Vice-Director of the Chamber of Commerce Germany-Switzerland and Joris van Wezemaël recently took over as Managing Director of the Swiss Society of Engineers and Architects (SIA). All three see major challenges facing a construction industry which, at least in some respects, is ill-equipped to master them.

STILL FLYING HIGH

For Daniel Heuer, who regularly publishes articles on the situation and trends in the construction sector, the overall picture is mixed: “While the construction boom is continuing in the major conurbations such as Zurich and the “Arc Lémanique” (Lake Geneva region), other regions and specific construction segments have been hit by current developments, such as the tourism crisis and the new restrictions on second home construction.” But even he speaks of a “very healthy situation”, even a “boom”. Silvan Müggler from the SBV and Joris van Wezemaël from the SIA agree, though Silvan Müggler draws attention to the “fierce” competition in the industry: “Despite healthy order books in both the buildings and civil engineering segments, with ‘stability at a high level’, margins are being squeezed and the earnings situation of contractors is anything but satisfactory!” Joris van Wezemaël speaks of a “historically exceptional situation”, largely brought

about by low interest rates and high immigration levels. “Many people know of crises only by hearsay, if at all.” The experts thus concur on the present situation. And, by and large, they also agree on the future prospects.

HARD OR SOFT LANDING?

There is one scenario which Silvan Müggler from the SBV considers particularly likely: a collapse in residential construction. Although supply already exceeds demand, development activity is unbroken in many places. “The longer this continues, the greater the fallout from a slowdown,” he adds. This is underscored by Joris van Wezemaël: “It could well be a hard landing.” He sees a slump of 30–50% as being within the realms of possibility. The Swiss Construction Index assesses the prospects for the second quarter as follows: “Strong order backlogs and a persistently high level of new building applications suggest (...) that no downward correction is imminent. Growth in the buildings sector is being increasingly fueled by the resurgent commercial development segment, which appears to be profiting strongly from overall economic upswing (...) Although these trends are benefiting the structural trades segment, they aggravate the existing imbalances in the real estate market. Their inevitable correction at some point in the future is likely to hit the construction industry hard.” Just how hard the sector will be hit depends not least on its ability to take measures, here and now, to cope with a crisis scenario. So far, however, there is little evidence of precautionary action.



“DESPITE HEALTHY ORDER BOOKS IN BOTH THE BUILDINGS AND CIVIL ENGINEERING SEGMENTS, WITH ‘STABILITY AT A HIGH LEVEL’, MARGINS ARE BEING SQUEEZED AND THE EARNINGS SITUATION OF CONTRACTORS IS ANYTHING BUT SATISFACTORY!”

Joris van Wezemaël

“ALTHOUGH SUPPLY ALREADY EXCEEDS DEMAND IN THE HOUSING SECTOR, DEVELOPMENT ACTIVITY IS UNBROKEN IN MANY PLACES. THE LONGER THIS CONTINUES, THE GREATER THE FALLOUT FROM A SLOWDOWN.”

Silvan Müggler

“COMPANIES MUST SINGLE OUT THOSE WORKS, SERVICES AND NICHEs WITH FUTURE MARGIN POTENTIAL.”

Daniel Heuer



LIKE A RABBIT CAUGHT IN THE HEADLIGHTS

“In the last 40 years, all key sectors in Switzerland have achieved massive productivity gains,” explains Joris van Wezemaël. “Except for the construction sector – which has recorded zero productivity growth.” This a “treacherous” situation: “In other sectors, disruption came mainly from industry outsiders: the old guard was ousted.” This is why van Wezemaël sees only one option. To safeguard their position in the long term, companies now need to invest in technological renewal. Daniel Heuer from Chamber of Commerce Germany-Switzerland shares this opinion. As he sees it, a crucial issue, alongside internationalization, is the need to “focus on the value chain”, i.e. to single out those works and services – or, possibly, niches – that have margin potential and thus a future. Silvan Müggler also speaks, in this connection, of the “necessary specialization” and “technology leadership” as key goals. Yet, all three regard the majority of companies as very passive and short-sighted in their thinking.

EXPERTS AND THEIR VIEWS



Silvan Müggler
Head of Economics department of
Swiss Contractors’ Association (SBV)



Joris van Wezemaël
Managing Director of Swiss Society of
Engineers and Architects (SIA)



Daniel Heuer
Vice-Director of Chamber of Commerce
Germany-Switzerland

OUR

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OUR SPECIALIST FOR
**STRUCTURAL FIRE
DESIGN**



Dr. Matthias Siemon
Civil Engineer (PhD)
Gruner Ltd

**FIRE
SAFETY**

OUR SPECIALIST FOR
**CATHODIC
PROTECTION**



Fabian Ille
Engineer (UAS/M.Eng.), Gruner Ltd

CP

OUR SPECIALIST FOR
**BUILDING ENVIRONMENTAL
CONTROL**



Manuel Frey
Building Environment Engineer
(B.Eng.), Gruner Roschi AG

BUILDING ENVIRON- MENTAL CONTROL

OUR SPECIALIST FOR
**SURVEY – ASSESSMENT –
MITIGATION OF ALKALI-
AGGREGATE REACTION
DAMAGE IN CONCRETE**



Dr. Patrice Droz
Civil engineer (EPFL), Stucky Ltd

AAR

OUR SPECIALIST FOR
CEMENT INDUSTRY FACILITIES



Martin Brotzer
Civil Engineer (ETH),
Gruner Ltd, International



Uli Jordan
Civil Engineer (UAS),
Gruner Ltd, International

**CEMENT
INDUSTRY FACILITIES**

OUR SPECIALISTS FOR
SOIL MANAGEMENT SITE SUPERVISION



Nadja Stammli
Geographer (MSc), Gruner Ltd



Dr. Matthias Hunziker
Geographer (MSc), Gruner Ltd

SOIL MANAGEMENT

GRUNER SPEZIALITÄTEN

CP CATHODIC PROTECTION

A SYSTEM WITH MANY PLUS POINTS



In an analysis of remediation options, CP systems represent the standard alternative to conventional concrete repair.

Cathodic protection (CP) is one of Gruner's specialty services in the field of structural design. The electrochemical method protects steel reinforcement and deactivates existing corrosion sources, even in chloride-exposed building fabric. In an analysis of remediation options, CP systems represent the standard alternative to conventional concrete repair. The benefits to be gained from using a CP system depend on the particular project. For example, a CP system offered the best solution for the Sihlcity car park building, whose reinforced-concrete slabs will be repaired by Gruner between 2018 and 2020.

a popular and heavily frequented facility like the Sihlcity car park building, the CP system thus offers major benefits. Not to mention the fact that CP systems have a service life of several decades.

To learn how exactly the CP system works and for further interesting details, please visit gruner.ch/en/cathodic-protection



Fabian Ille
Engineer (UAS/M. Eng.), Gruner Ltd

All eight parking levels of the building have suffered large-scale chloride migration into the concrete, with reinforcement corrosion as the result. Here, a CP system offered significant advantages over conventional concrete repair, particularly thanks to the far lower emission levels (noise disturbance, pollution) to which the neighboring facilities would be exposed. Moreover, a standard repair solution would have entailed at least temporary closure of one or two additional parking levels, e.g. for reasons of structural stability. For

The strip anodes are normally fixed to the concrete surface.

Rod anodes can be used to protect deeper-lying reinforcement.



YOUR SOIL IN SAFE HANDS

For us, as for you, soil protection is a heartfelt concern. Soil is a valuable and hardly renewable resource – which is why soil management assessments by a certified expert are frequently imposed as a condition by the approval authorities. Moreover, the timely planning of soil protection measures and their proper implementation in accordance with state-of-the-art practice also ensure the smooth progress and timely completion of the works. Such provision prevents or at least significantly reduces damage to the finite resource soil from overcompaction or chemical pollution during the construction phase, thereby eliminating the risk of consequential costs.

Working out of the Basel and Zurich offices, our two soil management site supervisors oversee projects across the whole region between north-western to eastern Switzerland. They provide the entire project team – from individual operatives to site managers and clients – with advice and support throughout all phases of construction.

SOIL MANAGEMENT SITE SUPERVISORS AT GRUNER LTD



Nadja Stammler
from Gruner Ltd in Zurich is a soil management site supervisor certified by the Swiss Soil Science Society (SSSS)



Dr. Matthias Hunziker
from Gruner Ltd in Basel gained his qualification as a soil management site supervisor at the start of 2018.

A proper assessment of soil conditions is key to the development of project-specific soil protection measures



SURVEY – ASSESSMENT – MITIGATION

OF ALKALI-AGGREGATE REACTION DAMAGE IN CONCRETE

ALKALI-AGGREGATE REACTION

Alkali-aggregate reaction (AAR) is a chemical reaction undergone by certain aggregate particles in an alkaline environment and triggered, for example, by high temperatures and moisture levels. The physical changes cause expansion of the concrete, with cracking, compressive action, stresses in the steel reinforcement etc. as the consequence.

Anchorage blocks for penstocks affected by AAR at Inga II dam

Alkali-aggregate reaction (AAR) has a similar effect in concrete as yeast in dough. As an operator of large hydropower plants, Alpiq is directly affected by the associated swelling processes. With Stucky's expertise, a special method was developed for recording, assessing and repairing the damage in concrete structures.

Even today, AAR-induced deformations are difficult to predict. The measures taken to counteract AAR attack in concrete fabric are typically aimed at damage limitation. Working as a team, Stucky, Alpiq, Holcim and IFSTTAR developed an efficient finite-element model for the prediction of deformations and changes in the structures. The method involves the full-scale chemical/mechanical modeling of a plant as a basis for assessing the current state of the reaction process and forecasting the future progress of any displacements in the concrete.

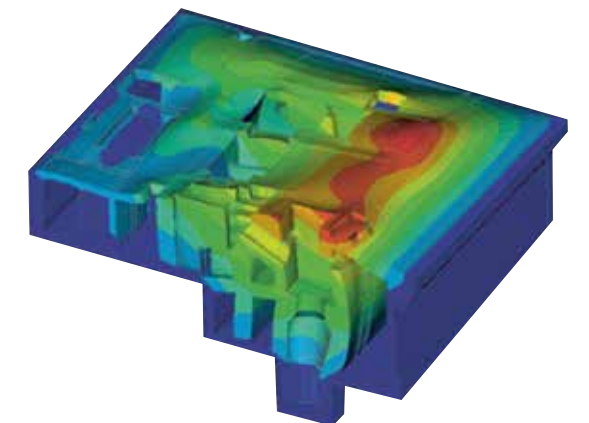
With help of this FE model and other highly specialized AAR-related services, we have successfully partnered with Alpiq in the development of engineering solutions for various affected facilities.



Dr. Patrice Droz
Civil engineer (EPFL),
Stucky Ltd



Relief cuts on dry side of Salanfe dam to reduce compressive stresses.



Example of the numerical modeling of alkali-aggregate reaction (AAR)-induced stresses in the affected concrete structure after 100 years

BUILDING ENVIRONMENT SIMULATIONS TO CONTROL CONTAMINANT EMISSIONS

IN SWITZERLAND, BUILDINGS ACCOUNT FOR OVER 40% OF ENERGY USE, E.G. FOR CONSTRUCTION, HEATING, COOLING AND HOT WATER PRODUCTION. THEIR OPERATION IS HIGHLY RESOURCE-INTENSIVE AND MAKES A SUBSTANTIAL CONTRIBUTION TO ENVIRONMENTAL AND ATMOSPHERIC POLLUTANT EMISSIONS.

Any building with sub-optimum energy performance will impose a decades-long burden on operators, users and the environment. Such a situation can only be remedied, if at all, at a high financial cost.

Quite apart from the demands for low resource consumption, low emissions and low operating costs, buildings are increasingly required to offer a high level of human comfort and user-friendliness. In cases where the specialist designers from the various disciplines work independently of each other, it is often unfeasible to properly address these demands.



Manuel Frey
Building Environment Engineer
(B.Eng.), Gruner Roschi AG

Building environmental control treats the building as an integral system and takes account of the interactions between facade, building structure and building services systems.

BUILDING ENVIRONMENTAL CONTROL AS HOLISTIC DESIGN APPROACH

As an interdisciplinary activity, building environmental control treats the building as an integral system and takes account of the complex interactions between facade, building structure and building services systems. As such, it adopts a holistic design approach that also integrates the BIM method and modern simulation tools. This approach enables us to provide support throughout the life-cycle of a building – from inception, through project development, design and commissioning, to facility management, operational optimization and adaptive use.

For further details, please visit
gruner.ch/en/building-environment-simulations

EXPERTISE IN CEMENT INDUSTRY FACILITIES EXEMPLIFIED BY CLINKER SILO PROJECT IN MOROCCO

On January 7th, 2018, the roof of a 46m tall, 31 m diameter clinker silo at a Moroccan cement plant collapsed without warning, taking the top section of the attached conveyor bridge with it. This led to the immediate shutdown of kiln line no. 2 for clinker and cement production.

The customer needed a fast solution: not only the cause of failure needed to be determined, the roof replacement had to be organized and designed.

The experts from Gruner Ltd, International visited the site on January 22nd, 2018 to investigate the structural failure from a man basket fitted to a mobile crane. An expert assessment of the possible cause of the collapse, complete with photographic documentation and structural calculations, was then submitted to the client and insurers.

It was not possible to visit the site earlier due to the difficulty of organizing a 300 t mobile crane with approval for the man basket.

While undertaking the clarifications with the insurers, Gruner was already starting with the design for the roof and conveyor bridge replacements. The steelwork design, including workshop drawings, were prepared in 3D using the Advanced Steel software application. The detail design for the reinforced-concrete works included the installation of new bearings in the existing silo wall and repair of the destroyed concrete parts. This was also done in 3D, using Revit.



Martin Brotzer
Civil Engineer (ETH),
Gruner Ltd,
International



Uli Jordan
Civil Engineer (UAS),
Gruner Ltd,
International



31 m diameter roof construction collapsed into silo together with filter and conveyor bridge.

Operative Temperatur, °C



INNOVATIVE FIRE SAFETY DESIGN WITH METHOD

Structural fire design forms an integral part of our innovative fire safety design services. It paves the way for the intelligent, needs-based structural detailing of steel and composite structures for new and existing buildings and even for protected landmarks. The results of the verifications may completely or largely eliminate the need for any special retrofitting or upgrading measures and thereby bring about significant time and cost savings, especially for existing buildings.

For further details, please visit
gruner.ch/en/structural-fire-design



Dr. Matthias Siemon
Department Head,
Fire Safety, Engineering Methods
Gruner Ltd

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