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Data Centers: Greater Efficiency and Reliability for the Future

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Innovations for the Fiber Optic Future



Our customers have known for many years that R&M is an excellent fiber company as well as a strong supplier of copper technology. In this issue of CONNECTIONS we can prove our trailblazing fiber optic expertise to you once and for all. After a successful transformation process in Research and Development, R&M is launching innovations and lines of products on the market that will bring measurable benefits to all areas of application.

For instance, turn to page 8 and learn about the LC connector we developed. Not only does it have a Grade A* rating with the best conceivable attenuation values, we believe it also represents a milestone in fiber optic connection technology. Go to page 38 and you can find out how we raised the bar for multimode products and are outperforming the standards. We also present our R&Mfoxs program in this issue for the first time. Turn to page 14 to read about this reliable and complete solution for Fiber to the Home (FTTH). And when you read the interview with Professor Hartwig Tauber, Director General of the FTTH Council Europe, on page 30, you will see just how important FTTH has become.

Data centers will also depend more heavily on fiber optic technology to handle the growing quantities of data. The use of parallel optical connection technology will be vitally important for

carrying out the migration from 10 to 40/100 Gigabit Ethernet. R&M has solutions for the use of MPO/MTP® systems that make a migration virtually child's play. Find out more about our data center program in the Focus article starting on page 4.

Incidentally, the MPO fiber optic connectors are assembled at R&M. They really stand out in transmission quality because we have developed unbeatable methods for quality control and for the finishing of the fiber tips. We haven't forgotten about copper technology in this issue, either. Check out page 22 for further insights into the diversity of innovations incorporated in our Cat. 6_A connection module.

We have identified further potential areas for new advances and are implementing them successively in a continuous improvement process. We have created the necessary organizational structures, skills and processes for that. As our esteemed customers, you will naturally reap the fruits of these investments.

A handwritten signature in black ink that reads 'Gianfranco Di Natale'. The signature is fluid and cursive, written in a professional style.

Gianfranco Di Natale | CTO
gianfranco.dinatale@rdm.com

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Cover picture:

Data centers are playing an increasingly
important role for modern companies

Publication Details

CONNECTIONS 41 | September 2011

Publisher: Reichle & De-Massari AG,
Binzstrasse 31, CHE-8620 Wetzikon,
Switzerland, www.rdm.com,
E-CONNECTIONS: www.connections.rdm.com

Editorial team: René Eichenberger,
Editor-in-Chief, Erica Monti, Anita Kiser,
Reinhard Burkert, Bernward Damm

Layout: Syncolor Digital AG, Zollikon,
Anna Göhner

Printing: Druckzentrum Stallikon

Print run: 20000 copies

CONNECTIONS is published twice a year
and can be ordered from the publisher.
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Data Centers: Greater Efficiency and Reliability for the Future

Petabytes, exabytes, zettabytes...

The quantity of digital data produced worldwide is growing at the speed of light. Operators of data centers have to respond ever faster and constantly adapt the capabilities of their infrastructure. Everything depends on a system's efficiency and ability to continue handling future requirements.

The megatrend to digitalization is as strong as ever. Some of the forecasts cited in CONNECTIONS Issue No. 38 in this column are already outdated. In its most recent study IT producer Cisco noted: "We are entering the zettabyte era."

The Cisco Visual Networking Index (VNI) issued in June 2011 predicts that in 2015 a data volume of 80.5 exabytes will be flowing through IP data networks around the globe every month. That corresponds to nearly 1 zettabyte a year or 11 gigabytes per capita for the world's population. VNI says that global IP traffic is growing at an annual rate of 32 percent. And here is another impressive figure: In 2015 the number of computers, mobile devices, etc. connected to IP networks will be double the human population worldwide.

That has consequences for network infrastructures. The greater the number of devices that are active, the more data is produced and exchanged. All

that data has to be reliably stored somewhere. The storage capacities available on the market are currently increasing by nearly 60 percent a year according to the market researchers from IDC.

As numerous as the forecasts and scenarios are, the reasons for the megatrend are clear: There are more and more users engaged in Video over Internet, cloud computing, virtualization, global ERP systems, social networks, online storage, file sharing and online gaming. IDC predicts the cloud market alone will have grown into a 45 billion dollar industry by 2014, nearly tripling its business within five years.

Growth means greater responsibility

Data centers are taking on an ever more central significance. Nothing will work anymore without reliable and secure data communication and storage. Responsibility increases in any case. In addition, there is a huge need for security and connectivity as well as for server and storage capacities. Experts from

FTM Consulting say the sale of structured cabling for data centers alone will grow by 19 percent a year up to 2015.

Central management tasks becoming more complex

The typical planning period for data center projects has already decreased from months to weeks. Otherwise, companies could not handle the growth and the short-term requirements. A further observation: Expansions, migrations and consolidations are already eating up two thirds of investment budgets. What conclusions can we draw from all this? Data center operators have to handle their centers more flexibly, more efficiently and with greater discipline to remain profitable and competitive.

As a leading supplier of structured cabling solutions for copper and fiber optic applications, R&M recognized these trends early on and came up with answers to the growing needs at data centers. With its product range optimized for use in data centers, R&M offers five decisive benefits for planning, installation, operation and maintenance:

- increased efficiency
- maximum availability
- full flexibility
- genuine investment protection
- and the R&M Green Initiative

Increased efficiency: quick and easy

The world is complicated enough as it is. Cabling in the data center should not be, as the trend to consolidations already implies. The simpler and more structured the cabling systems are, the more efficient and faster installations



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and changes are able to be planned and carried out. Cost constraints are forcing all of us to strive for maximum efficiency. So when selecting a cabling system, you should check to be sure it makes your data center more efficient.

One example of efficiency is when cabling units come already terminated, cut to length and factory tested. That sig-

nificantly reduces the cost for installing, maintaining and expanding your physical infrastructure. It also eliminates potential sources of error and maximizes availability. All these aspects save costs and increase the profitability of a data center.

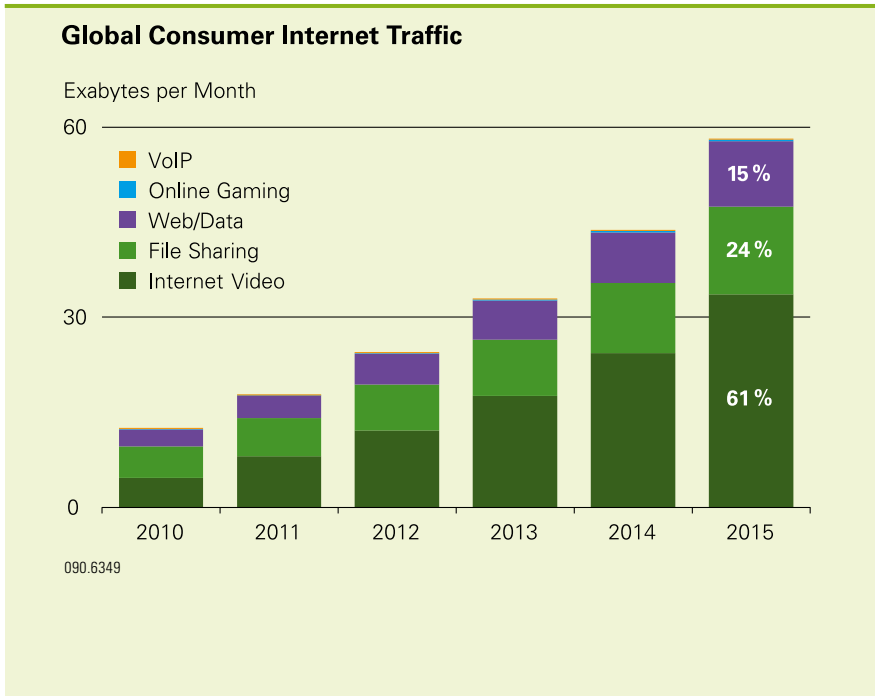
Maximum efficiency is something customers can also expect from the inno-

vative Cat. 6_A advanced module from R&M. Termination work on the advanced module is child's play. This product also provides the maximum level of performance for copper cabling in the universal RJ45 format and is ideal for achieving maximum density in the rack. With the HD panel, operators can accommodate 48 Cat. 6_A connections on a single height unit.

Short links also help boost efficiency. Thanks to the epic advances in shielding and connection technology that R&M has achieved, the Class E_A/Cat. 6_A solution continues to deliver superb performance even over ultra-short links. The critical parameters NEXT and RL have

The Internet data traffic generated by end users will see annual average growth of 34 percent up to 2015, increasing to a volume of just under 60 exabytes a month. Business data traffic comes on top of that. The total volume of data traffic in 2015 will exceed 80 exabytes a month. Half of that will be Internet traffic from video transmissions.

Source: Cisco, Visual Networking Index (VNI), June 2011



unique reserves. That has certain advantages for users. They can plan for much shorter permanent links between the racks than previously customary. That saves installation time and cable material and prevents long cable loops in the sub-floor, which only get in the way of ventilation.

Zero errors for maximum availability

Many applications such as cloud services, ERP, video, gaming and even the financial markets put maximum requirements on data centers in terms of availability. Service level agreements force companies to maintain maximum levels of security and reliability. Availability of up to 99.995 percent can be required depending on the tier classification. There is no room anymore for errors.

Maximum availability starts at Layer 1, with the passive infrastructure and with the tiniest details such as the contacting in the connection modules and plug connections. These aspects are what decide whether a cabling system will



be able to provide the desired performance and signal quality in the long term. Planners and users should therefore carefully examine the quality of the material and craftsmanship to be able to ensure maximum availability.

In copper cabling, R&M assumes advanced insulation displacement contacting (IDC). IDC permanently eliminates contact losses in wires. In the production of fiber optic components, R&M has stricter criteria than any standard. Its tuning and testing methods are found nowhere else in the market. Individual device testing is standard procedure at R&M. That means the goods that arrive at the data center are completely error-free. R&M also conducts individual tests on cabling solutions where cables come cut to length and already terminated. In these tests, it applies all relevant parameters to ensure consistent performance throughout the service life of the system and to make sure failures or installation errors can never occur in the first place. These are just a few examples of the extensive action R&M takes to contribute to a high level of availability.

The need for connectivity continues to grow by leaps and bounds. Data centers have to be able to carry out installation flexibly and to make investments that will retain their value in the future.

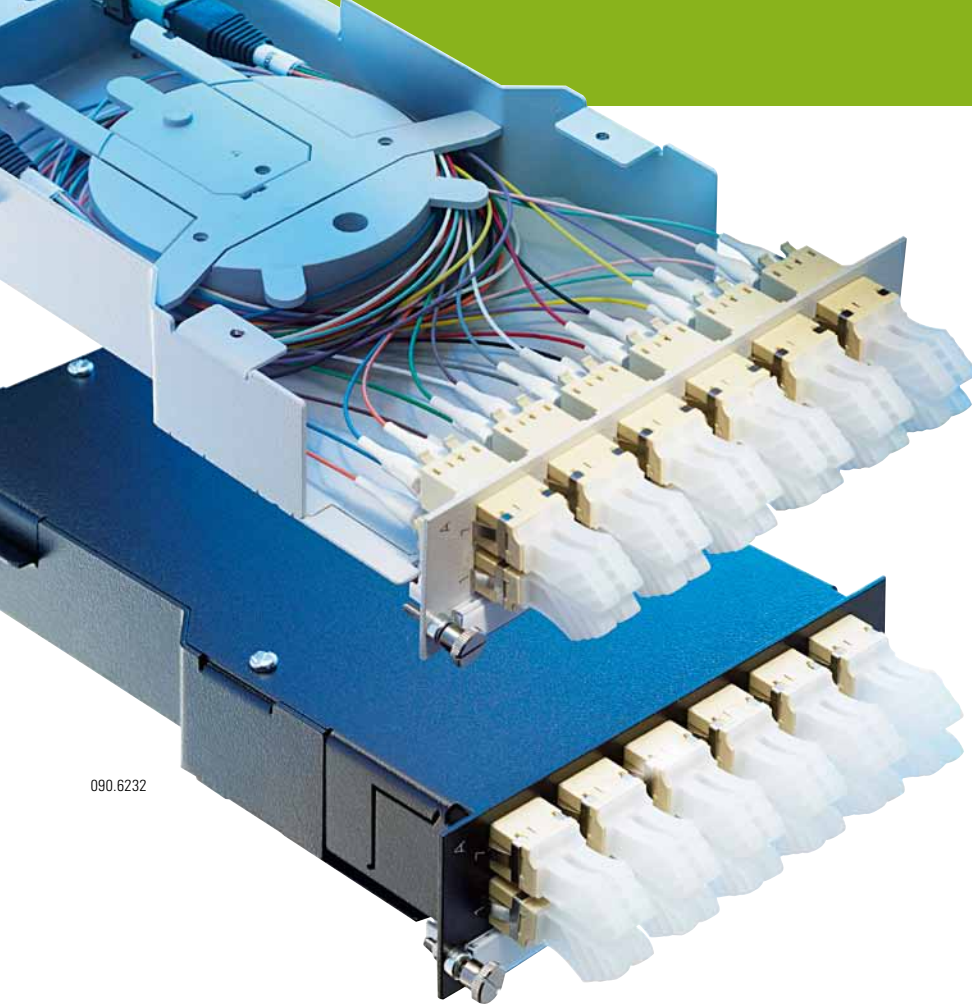
Full flexibility: MAC with a flick of the wrist

Operators of data centers want to concentrate on productivity and value creation. Ongoing operations must run absolutely smoothly and the infrastructure must be able to be handled effectively, especially during conversion and scaling or when maintenance is being done. The modular principle applied in the R&M data center systems ensures this flexibility. Modularity simplifies the network design, making it transparent, fast and easy to reproduce. It allows flexible possible combinations and seamless scalability for structured cabling.

Users have a solution for every situation at their fingertips thanks to this reduction to a lean, versatile and modular range. New applications can be integrated spontaneously without interrupting operations.

With the forward-looking MPO/MTP® portfolio, trouble-free migration from 10 Gbit/s to 40/100 Gbit/s is ensured. The plug-and-play systems are dimensioned and terminated at the factory to provide maximum flexibility. Users have their choice of 12-fiber or 24-fiber MTP connectors (for 100 Gbit/s) with OM3 or OM4 fibers. To increase network capacity four-fold or ten-fold, operators need only replace trays with panels and supplement the system by adding further trunk cables. They can continue using any existing trunk cables.





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The MPO/MTP® portfolio from R&M (the MPO module is shown here) allows fast and simple migration from 10 Gbit/s to 40/100 Gbit/s.

Genuine protection for your investment: thinking about the future today

Despite all the dynamism and short-term planning, the basic infrastructure of a data center has to be designed for a service life of at least ten years. Today that means the following for the main and equipment distribution area, for example: Cabling must fully support 10 GbE and already contain all the potential for the 40/100 GbE generation.

Investments allowing for easy migration are the only ones that make sense and are worthwhile and that will retain their

value in the future. Other approaches will turn out to be unprofitable in the long term.

One further aspect of secure investments and equipment that retains its value in the future involves the possibility of making multiple re-use of components once they have been installed. For example the patch panel platforms from R&M are designed to support copper and fiber optic cabling installed side-by-side or alternately.

The structured data center solution from R&M that complies with the pertinent standard is the picture of long-term sustainability. R&M guarantees the quality, stability and longevity of all components and systems. These traits permanently reduce operating, maintenance and repair costs. Investments are protected by a comprehensive warranty program. Under its Qualified Partner Program (QPP), R&M grants 25-year system warranties and life-long application warranties, thus ensuring that valuable infrastructures will indeed retain their value.

R&M Green Initiative: environmentally sound conduct

Environmental awareness is part of basic corporate rules at R&M. We do our part to protect resources and keep humankind and the environment healthy so you can use cabling systems from R&M with a good conscience.

In this context, cabling should at the very least contribute noticeably to cutting energy consumption and protecting the environment. Cabling has a certain effect on air circulation in data centers and thus on the energy consumption of overall systems. Lots of thick cables block the flow of air. A logical solution here is to use short links and AWG26 cables with smaller cross sections. These approaches open up potential optimization and contribute lastingly to the energy efficiency of data centers. ■

New website:

www.datacenter.rdm.com

We recently launched a special website to provide information about our data center solution. We urge you to visit www.datacenter.rdm.com to find out more about our comprehensive range of products and systems.



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Thomas Glättli
Head Market Segment Data Center
thomas.glaettli@rdm.com

The LCs from R&M: More Stable, More Reliable, Better

The new LC connectors from R&M are categorized as grade A* and have the best attenuation values imaginable. They can be adjusted in increments of 30 degrees and they have an ultra-precise and sturdy construction.

The LC connector family has taken all areas of optical data transmission by storm in recent years. Compact design and easy handling are two features that make the LC so popular. LC connectors can accommodate fiber face ends polished either regularly or at an angle. They are suitable for multimode and singlemode fibers. Typical attenuation values range from 0.1 to 0.3 dB. As duplex connectors, the LCs take up only as much room as SC connectors. They support the mounting of high-density distributor systems in data centers just as effectively as in the central office of carrier networks. Active component manufacturers also encourage the use of LCs.

However, the LC models available on the market thus far have had several shortcomings. They can be used only up to a quality level of Grade C as defined by IEC 61753. That means users always have to accept certain attenuation losses. In addition, the LCs were originally developed for use in local data networks. Those contexts allow certain tolerances. But if the LCs are to be used as singlemode connectors for high-performance applications, they must be designed much more precisely. Most importantly, the connectors as well as their fibers and ferrules must all be much more precisely adjustable than in the past.

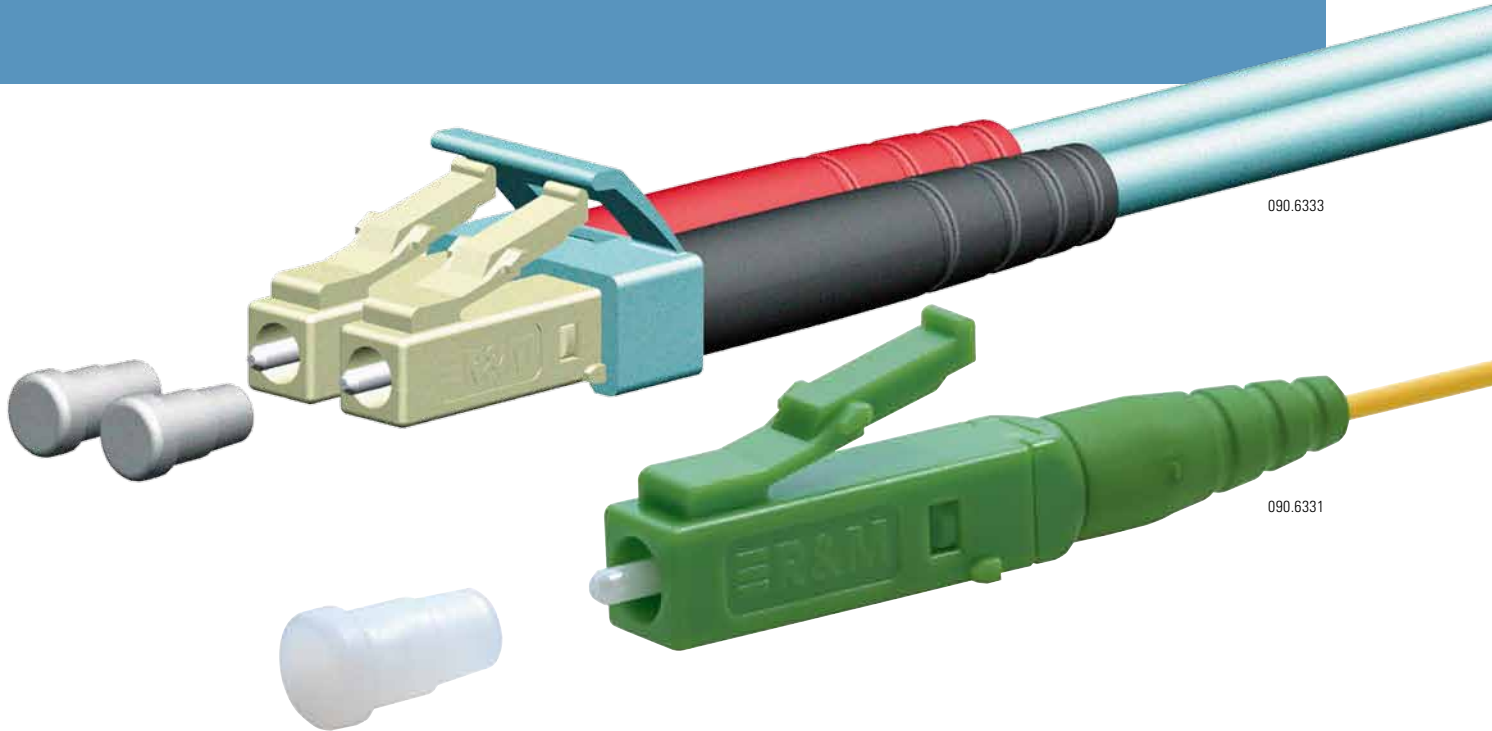
**As a driving force
for innovation in fiber optics,
R&M has done
its utmost to improve
the popular LC connector.**

Mechanical stability is another weakness of the LCs. "Collateral damage" can easily occur during patching (e.g. axis shifts) if the installer accidentally touches a neighboring connector because of the high packing density. Simulations in wiggle and nutation tests confirm this problem. Connectors must have greater stability for present and

future applications to prevent unwanted signal losses under all circumstances. Fiber to the Home (FTTH) is one example. The three crucial factors in this application are the long-term reliability as well as minimal possible loss and low latency in transmissions.

As a driving force for innovation in fiber optics, R&M has done its utmost to improve the popular LC connector. The latest outcome of our development work with the R&M laboratory in Wetzikon is the LC model from R&M. It marks a milestone in fiber optic connection technology.

These new LC connectors comply with Grade A* as defined in IEC 61753 and offer the best attenuation values attainable in this category. They transmit the light signal virtually free of loss, thus achieving the highest performance levels desired. These connectors can be adjusted in increments of 30 degrees and help to ensure perfect transmission quality. Precision plastic technology and a new housing design deliver the best mechanical stability ever achieved in a connector body. That is why the LCs from R&M are suitable for assembly with cables up to three millimeters in diameter and for applications involving high mechanical stress.



Compact design and easy handling are two features that make the LC so popular.

In keeping with our philosophy of added value, we have managed to pack a number of further ideas and advances into the LC project. They result mainly in logistical advantages for the customers. The connectors are well suited for simplex and duplex installations. The duplex connectors simplify the assembly process. The assembly of LCs from R&M requires neither shrink tubing nor new tools. Assembling firms, installers and users can use the assembly tools they already have. The new LC, LSH and SC connectors can all be terminated using the same crimp set.

Finally, we incorporated many safety features in the new LCs. They can be color-coded and mechanically coded. Pigtails and cable boots are available in twelve different colors. A mechanical stop on the ferrules prevents the connectors from being rotated unintentionally. In addition, we fitted the ferrules with non-contact dust covers.

As part of the warranty program and quality control, we use a laser beam to write the batch number on the ferrule

holders or the measurement log on the connector housings in the case of patch cords and pigtails. That way the original parameters remain traceable for the entire service life of the components. Incidentally, quality testing at R&M means we test insertion loss (IL) and return loss (RL) values at wavelengths of 1310 and 1550 nm for each and every connector before it is packed. Unlike other suppliers, R&M has adopted the quality grades defined in IEC 61753 for its entire fiber optic range and has also used in-factory quality testing based on worst case scenarios for years. This specification of attenuation values is closer to real operating conditions than measurements in a best-case setting. ■

From construction to the finished product: here illustrated by a 3D drawing of the LC-Duplex connector with color coding for OM3 and a picture of a grade B/1 pigtail for sample testing.



090.6334
Daniel Eigenmann | Product Manager
 daniel.eigenmann@rdm.com



High-Density Patching

R&M is expanding its data center range by adding a new cable management system for 19" network cabinets. This system increases the density of the cabling while simplifying patching and protecting individual cables more effectively.

It is called HD Cable Management.

Operators can continue to follow the high-density trend in network cabinets too – for example, with our new cable guidance and cable management system. In many cases, this system renders superfluous the bulky types of patching brackets commonly used. HD Cable Management (HD stands for high density) consists of compact plastic trays inserted laterally and horizontally into the distributor cabinets.

Compared with conventional methods, it is now far quicker to insert patch cords into or remove them from these innovative wire guides and to feed them via recesses to the connections. There is no longer any need to thread them into patching brackets. Velcro tape provides strain relief.

Covers with hinged catches protect the cables. The covers can be opened without tools and easily removed in their entirety if need be. This provides ready

A new cable management system for network cabinets from R&M makes vertical and horizontal cable management more compact.

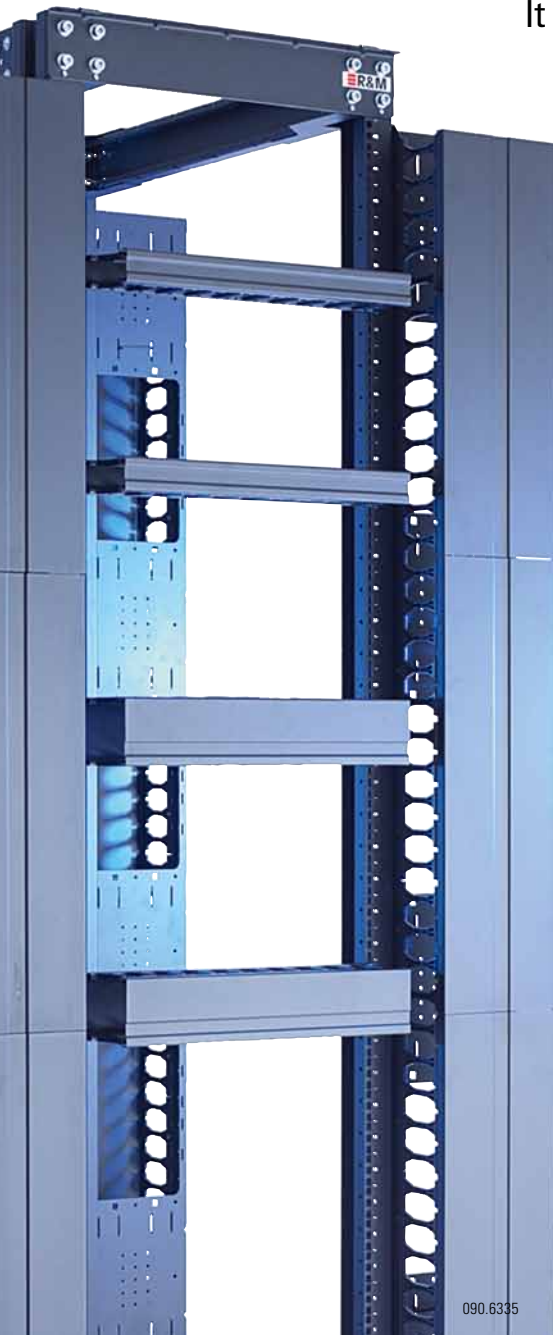
access to the cable bundles. The tripartite layout of the lateral and vertical covers is another feature that simplifies patching work. The design ensures minimum bending radii for stress-free cable management throughout the cabinet.

HD Cable Management is part of the modular 19" network cabinet range from R&M. It offers variations on the widest range of applications, cabling strategies and air-management and cooling concepts. There are 600 and 800 mm wide racks, light-weight constructions and sturdy versions for heavy loads, as well as doors made of glass, steel plate or perforated plate. The range also features a myriad of possible combinations with the cabling periphery. The system therefore covers typical needs ranging from passive distribution panel to server and storage segment.

The cabinet system is suitable for the basic equipment of computer rooms as well as for high-performance networks with high-density copper or fiber optic cabling. It can also be used in telecommunication centers, control stands, offices, clinics or in structured building cabling. ■



Rolf Zollinger | Product Manager
rolf.zollinger@rdm.com





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Exterior of 1 Bligh Street Office Tower in Sydney

Clayton Utz – Moving Toward a Greener Future

Known for its legal innovation and excellence, Clayton Utz is a multi-award-winning, top-tier law firm in Australia. It has an established clientele base of over half of the top 100 Australian companies, as well as over 250 Federal and State Government Departments, agencies and companies. For its new office space, Clayton Utz chose an R&M network solution.

Clayton Utz was looking for the perfect place that would offer staff and clients an innovative, healthy and welcoming work environment. They found premises in the new 1 Bligh Street Sydney Office Tower. The skyscraper is one of Sydney's first to achieve a "Green Star" rating of six and a five-star energy rating. That ticks all the boxes for an environmentally conscious Clayton Utz!

Thanks to a strong network and foundation built up over years in Australia, the R&M winning formula was also credited to a proven track record and reliable solution. In the case of the STP Real10 products, the unique termination process and extra bandwidth capacity built within the installation cables have given it an edge in terms of convenience and costing. With fast and simple termination, R&M products have been of great assistance to its certified installer, Heyday, in ensuring smooth and effortless installation.

Every project comes with a set of challenges and it is never plain sailing for all,

with problems arising at different project phases. However, this was all well-managed by R&M and its partners. One of the issues faced was the need for local product adjustments to cope with the customer's choice of office furniture and specific floor boxes. Decisions were often made at the eleventh hour, requiring fast response and immediate attention. With great support and assistance from Madison, product adjustments were made possible to integrate the R&M solution. Multiple site visits were also conducted to ensure that things were moving on schedule and issues surfaced were addressed immediately.

"The chemistry and relationship built up over time has given us this advantage, which in turn benefits the customers."

Kevin Chambers, Madison Technologies

National Sales Manager of Madison Technologies, Kevin Chambers, said, "We've

THE R&M SOLUTION

Real10 Cat. 6A system including:

- RJ45 outlets fitting inside standard Clipsal wall plates
- Cat. 7 S/FTP Low Smoke Zero Halogen cables
- Shielded patch leads of various lengths fitted with unique R&M color clip boot coding system
- Shielded 24-port patch panels empty and loaded
- Fiber Optic Unirack Sliding FOBOT fitted with LC-Duplex OM3 adapters
- Fiber Optic 12-core OM3 Indoor Low Smoke Zero Halogen riser cable

WHY R&M?

- Strong network and a proven track record
- Quick turnaround and on-time delivery
- Easy product termination
- Service-oriented

been working hand in hand with R&M for years. This special bond and understanding have made it easier for things to be accomplished. It's important to work with the right partner who understands the way you work, your needs, and is able to give you immediate support when required. The chemistry and relationship built up over time has given us this advantage, which in turn benefits the customers." ■



090.6344

Emmanuel Beydon | R&M Australia
emmanuel.beydon@rdm.com



Cat. 6_A at the Service of Leading-Edge Research

“Noise-free” – absolutely free from all interference. That’s a very important requirement at the Binning and Rohrer Nanotechnology Center near Zurich (Switzerland). The laboratory areas are shielded on all sides from external influences. The cabling from R&M also works absolutely free from interference.

In this technology company’s 100-year history, the IBM Research Center in Rüschlikon on the west banks of Lake Zurich has earned a prominent position. Work at the lab, which opened in 1962, has led to a number of Nobel Prizes and pioneering discoveries – among them being the scanning tunneling microscope and trellis modulation, which provides for efficient data transmissions in modems.

In May 2011 on this very same campus, IBM, together with the ETH Swiss Federal Institute of Technology Zurich, opened the Binning and Rohrer Nanotechnology Center. It is named after nanotechnology pioneers, IBM researchers and Nobel Prize winners Gerd Binnig and Heinrich Rohrer, whom we can thank for the scanning tunneling microscope just mentioned.

There’s something very special about this new project: It houses six “noise-free labs” – cleanrooms for very sensitive measurements and experiments. They are shielded from all external disturbances such as dust, vibration, acous-

tic noise, UV radiation, electromagnetic fields and temperature fluctuations. Decoupled from the outside building, these cleanrooms, each 23 square meters in size, sit on special foundations and vibration dampers.

Research at the nanometer scale requires device fabrication and characterization with a corresponding level of accuracy. The combination of measures taken in the “noise-free labs” in this way is something never seen before and opens up a new level of quality for measurements. The newly constructed

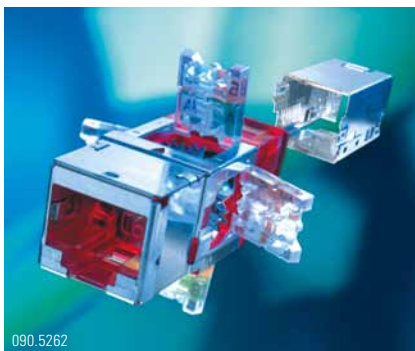
facility represents an investment of CHF 90 million, of which CHF 30 million was allotted to technical infrastructure.

Highest performance

An important contribution to the interference-free research environment is provided by shielded Cat. 6_A building cabling from R&M, and that’s because – as already reported – it exhibits unique performance characteristics. Among them is a very good signal/noise ratio, a figure of merit for low-noise, faultless signal transmission.

Besides this performance, the shielding and grounding of the modules and cable play a decisive role in avoiding electromagnetic fields in the “noise-free labs.” Here, the highest grade of shielding was required. That’s why the innovative Cat. 6_A solution from R&M had to put all of its strong points to the test.

The overall contractor for the construction project, Steiner AG, and the electrical contractor, Burkhalter AG, made a very detailed examination of the R&M solution. For those involved, it was es-



Shielded Cat. 6_A connection module from R&M



have a complete solution from one source were convincing factors. In addition, the quality and ease of handling of the Cat. 6_A modules from R&M were key in making the decision to install the R&M system. The modules, moreover, could be integrated directly in the special network connections in the laboratory equipment.

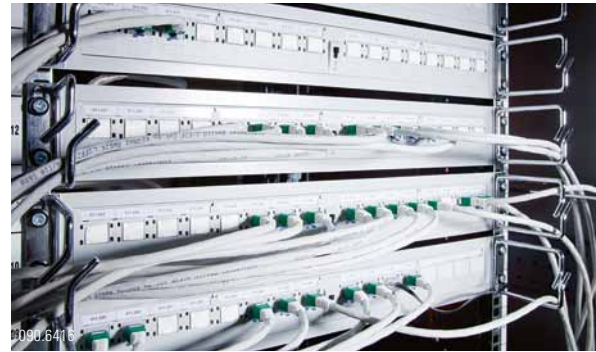
R&M made project-specific modifications of panels at no additional cost and within the timeline that had been scheduled far in advance. Here, the flexibility of the R&M cabling system proved its value because it enabled fast modifications. In total, the research facility was equipped with 1500 links based on Cat. 6_A connection modules and type Cat. 7 / 1200 MHz / AWG 22 installation cable.

R&M assisted all those involved during the installation phase with on-site instructions, reference measurements and further support services. While working on the project, the electricians from R&M's certified QPP Partner Burkhalter AG were trained on-site practically in real time and were made familiar with the challenging parameters of the new E_A/Cat. 6_A cable. In this way, the

pecially important to determine whether this new generation of copper cabling – Class E_A/Cat. 6_A – could fill the high expectations that have been set since the adoption of the corresponding ISO 11801 standard.

A solution from one source

In the final analysis, these measurements along with renowned references from Switzerland and the opportunity to



continual presence of the R&M experts contributed to making sure the project could be completed on schedule, safely and successfully.

Twenty-five years of the R&Mfreenet system guarantee

Even so, the expectations of IBM and ETH – both R&M customers for many years – far exceeded matters relating strictly to installation and commissioning. Long-term joint responsibility on the part of R&M was an obligatory part of the contract. With a system guarantee provided by R&M over 25 years, the new IBM lab can research the future of nanotechnology securely and confidentially and spawn further groundbreaking discoveries for information technology and many other fields of technology. ■

The Binning and Rohrer Nanotechnology Center Zurich-Rüschlikon

Scientists and engineers from the ETH Swiss Federal Institute of Technology Zurich and IBM are pursuing joint and independent projects at the Nanotechnology Center. The spectrum of research activities spans from basic research to the understanding of physical properties and processes at the atomic level through the development of new nanoelectronic components and component architectures as well as their fabrication.

The development of novel switching elements for future CPU chips and memories is a central focus of research for IBM. In order to create even more computationally powerful computer systems that also consume significantly less energy, IBM scientists are researching, among other things, what are known as nanowires made of semiconductor material. Based on these extremely thin structures (3 to 100 nanometers), they are developing new transistor architectures that have the potential to consume up to ten times less energy.

Nanotechnology concentrates on structures with dimensions less than 100 nanometers – approximately 800 times thinner than a human hair. Below this order of magnitude, surface properties of materials play an increasingly larger role than their volumetric properties, and quantum physics effects appear.



090.6414
Reto Rudolf | R&M Switzerland
reto.rudolf@rdm.com

R&Mfoxs: the Secure Total Solution for FTTH

Network operators face a number of challenges. There's no stopping the future of Fiber to the Home (FTTH) for broadband access.

The question is how the roll-out can take place in a secure, fast and flexible way.

The answer is R&Mfoxs. This is the new recipe for success for FTTH projects. The market launch will take place at ECOC (European Conference on Optical Communications) 2011 in Geneva. Network operators can use this technology immediately and without taking any risks because R&Mfoxs always delivers a clear-cut and secure result – a custom-tailored, convenient and highly available FTTH solution with clear competitive advantages.

R&Mfoxs is a fiber optic cross connections system from Reichle & De-Masari. This system unifies all the factors that network operators must take into account for a successful FTTH future. R&Mfoxs is the professional total solution for ultra broadband infrastructures and next generation networks.

Convincing arguments

The first argument is the modular product line. R&Mfoxs offers the seamless combination of all the variables at each level of the fiber optic network, from the central office through to residential connections. The proven Single Circuit Management (SCM) family from R&M is the basis for smooth, high-density fiber and subscriber management on all platforms, whether optical distribution frames, splitters, dome closures or building entry points. Concentrating on a few, easy-to-handle core components that

can be scaled to any desired level simplifies planning, assembly, maintenance and modification, and thus reduces the total cost of ownership.

The second argument concerns the uncompromisingly high standard of quality. Connectors fabricated with Swiss precision and tested 100 percent contribute decisively to long-term transmission reliability and absolute network availability. The safety aspects developed by R&M enhance this effect. For instance, a 40-millimeter bending radius, which prevents damage to optical fibers, is guaranteed at every network level – a decisive performance criterion for future high-power and xWDM applications.

Clear labeling on the SCM modules ensures identification of subscribers without any possible confusion. If you add components from the three-stage R&M safety system, network operators are also protected comprehensively from mistakes with patches and modifications.

As a further argument, we have increased convenience during installation. The R&Mfoxs system stands out due to its simple operation and quick assembly, largely without any tools. Pre-fabricated and factory tested units must only be clicked into the housing. Many distribution systems and residential connections can be set up as much as

The system

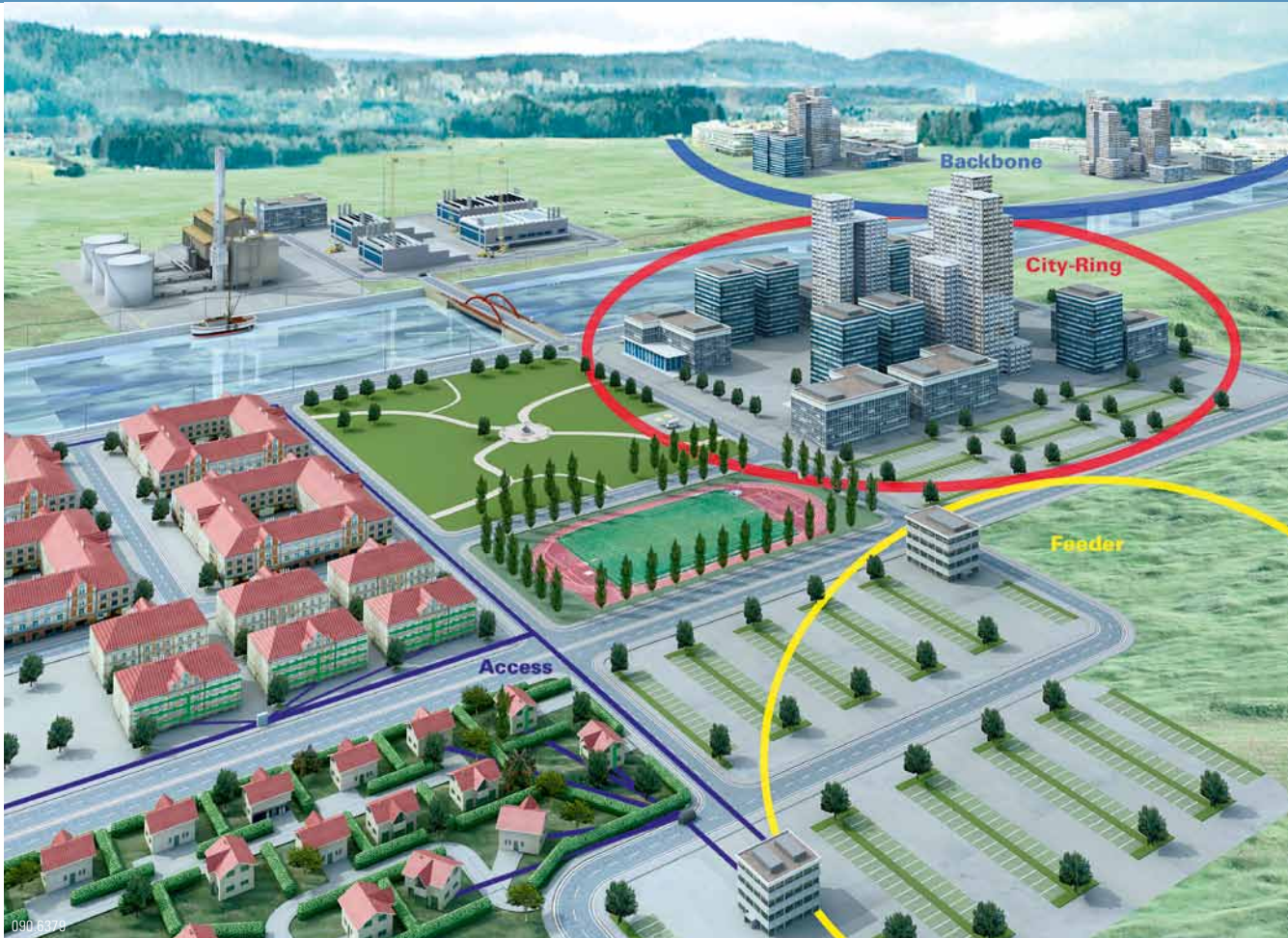
R&Mfoxs, the complete cabling system for Fiber to the Home, offers modular solutions based on Single Circuit Management for the following areas:

Central office: Optical Distribution Frame (ODF) | raceway system

Outside plant: Dome closures | splitters | outdoor Venus distribution boxes

Customer premises: Building entry points | Venus Box and Ecoline | communication distributors, outlets

In addition, on-site fabrication of LC and SC connectors are part of the R&Mfoxs program. Every type of cable commonly found on the market can be combined with the platforms and the SCM system: loose tube, blow-in, micro- and mini-cable.



30% faster compared to conventional cabling systems. In this way, the added value of R&Mfoxs for FTTH projects is increased many times over.

Advantage in customizing

Now let's add customizing. When it comes to the FTTH market, R&M considers aspects like fulfilling individual requirements, quick adaptations and local support as being fundamental. That's because we know that each public network presents its own unique set of challenges. Environmental factors, competitive situations and legal regulations vary from site to site. Network operators follow different strategies when it comes to topology and architecture. Sometimes point-to-point solutions might be the right answer, sometimes point-to-multipoint solutions or even a combination of both.


Sometimes existing infrastructure must be integrated into feeder, drop and access areas, or hybrid cabling must be used in a transitional phase before FTTH

has finally become firmly established. The flexible possibilities for combining copper and fiber optic cable on existing platforms is an exceptional strength of the R&M product line.

After all, building entry points and residential connections often require customer-specific modifications and aesthetic solutions. Meeting these demands increases customer acceptance and connection rates. We have taken this aspect into consideration because R&M is not only the specialist for Fiber to the Home but is also a leader in structured cabling in commercial buildings and homes.

The result: Anyone who counts on R&Mfoxs will always get a secure and optimal custom-tailored total FTTH solution. ■

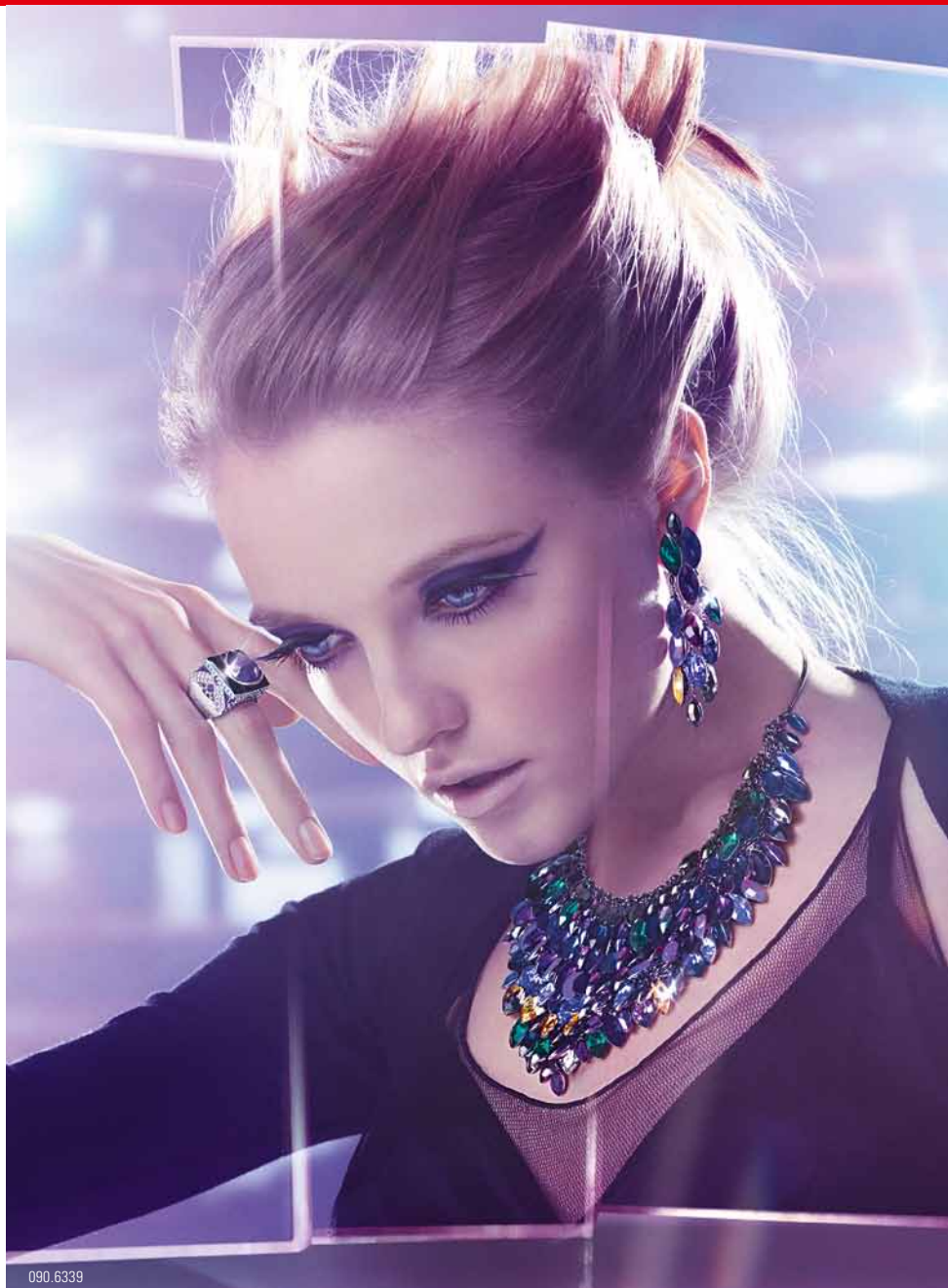
**New website:
www.ftth.rdm.com**



090.6338
Tobias Münzer | System Manager
tobias.muenzer@rdm.com



090.6089
Martin Kellenberger
Program Manager FTTH
martin.kellenberger@rdm.com



“The cabling is from R&M. We were crystal clear on that decision,” said Stefan Ruckstuhl, IT coordinator at the new Swarovski facility in Switzerland. The company has had good, long-term experiences with R&M. “I have to be able to rely on my suppliers. My whole success as IT coordinator depends on them,” Stefan Ruckstuhl explained. He went on to say that R&M also offers a complete product portfolio for structured building cabling.

The Swarovski Group recently took up residence in an architectural jewel in Männedorf along the famed Gold Coast of Lake Zurich. The U-shaped glass office

Crystal Clear Solution

Crystal designer Swarovski expected a crystal clear solution for its new Swiss headquarters. Its wish was fulfilled in an exemplary manner. In 2010 an architectural jewel arose along the shores of Lake Zurich. It is compelling in its design and transparency, to say nothing of its exquisite location, ecological features... and its network.



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building nestles into the surrounding landscape, elegantly curved like a swan, the Swarovski trademark. The open-plan offices on three floors look out onto the lake and the Swiss Alps. Against this magnificent backdrop, employees come up with creative ideas for the global brand image of Swarovski and other matters.

Mobile working requires top-quality service

The building has work spaces for 450. Nearly all of them are designed to be reversible so the layout encourages flexible team building and mobile working. "About 80 percent of our employees are on the go 80 percent of their working hours – in the building and throughout our markets worldwide. That is why they work mostly with laptops," Stefan Ruckstuhl explained. In the office floors, the mobile computers are constantly connected to the network via a wireless LAN.

The dynamic work organization requires service of extraordinary quality from the IT. Stefan Ruckstuhl described typical challenges he faces as IT coordinator as follows: "When employees are here, everything has to work smoothly. IT problems have to be solved immediately."

That is exactly why he wants to be able to rely fully on the passive network infrastructure operating in the background. It gives him the support he needs. Swarovski has achieved this goal with structured building cabling from R&M. The system warranty from R&M assures the company full operational reliability for the next 20 years.

The network was installed by R&M partner Alpiq InTec Ost AG from Zurich and is based on the cabling system R&M-

freenet. Preterminated R&M VARIOline units make up the fiber optic backbone. The infrastructure on the three floors consists solely of shielded Cat. 6 copper cabling. About 2000 links were set up to the connection points, antennas and VoIP phones. The IT is operated as a peripheral unit of the Swarovski headquarters located 200 kilometers away. The headquarters in Wattens, Austria, make available the software and service desk services.

"I have to be able to rely fully on the passive network infrastructure operating in the background."

Stefan Ruckstuhl, IT Coordinator

Innovative energy design

The energy design for the new building is as brilliant and striking as the architecture. Swarovski made a crystal clear decision in this regard, too. An ecological mode of construction and innovative building installations complying with the Swiss Minergie standard to reduce CO₂ were as important as the visual design.

The planners came up with the unusual idea of using water from nearby Lake Zurich as a regenerative energy source. A thermal pump heats the Swarovski building with lake water and provides cooling when necessary. A combination of ventilation and shading equipment across the 4800 square meter facade supports the air conditioning system for the office floors. The structured building cabling ensures smooth communication among the many sensors and controls.

Swarovski: The Poetry of Precision

People's fascination with crystals has made the company famous the world over. Swarovski was founded in Wattens, Austria, in 1895 and is represented today by agencies, boutiques and franchise partners in most countries. Wattens continues to serve as headquarters. The second main facility in Männedorf near Zurich is responsible for matters such as finance, marketing and sales. The family-owned company has about 24 800 employees around the globe, who generate sales of EUR 2.25 billion. The leading global brand is synonymous with creativity and technical expertise, perfection and elegance. Its slogan expresses just that: "The Poetry of Precision".



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Beat Stucki | R&M Switzerland
beat.stucki@rdm.com



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The FTTH Council's Mission

The FTTH Council Europe is a non-profit, non-commercial association with the principal objective of developing and promoting the common interests of all entities seeking to accelerate fiber deployment to premises in Europe. The FTTH Council Europe is based on the principles of free enterprise, competition and fair trade in Europe and throughout the world, and promotes fair and equal conditions for companies worldwide.

Any ICT stakeholder, such as a business entity, public entity, academia or an individual, can be a member of the FTTH Council. Currently the European Council has more than 150 members.

Organization

Worldwide the council is represented by four organizations: the FTTH Council Asia Pacific, FTTH North America, the FTTH Council Middle East and North Africa, and the FTTH Council Europe.



Martin Kellenberger, Program Manager FTTH R&M, as Key Speaker at the FTTH Council Milano

The council's members elect a board that receives full powers to achieve the objectives; it drafts and proposes policies for General Assembly in order to promote the objectives of the FTTH Council Europe, decides on the number of committees and their objectives, and appoints their chairs.

The board, headed by a President, has the task of representing the FTTH Council Europe in a neutral and objective way in all external dealings, appoints the Director General and is responsible for setting up the right number of committees necessary to implement the strategy of the FTTH Council Europe.

The committees are:

- Business Committee
- Deployment & Operations Committee
- Content & Applications Committee
- Market Intelligence Committee

Tasks such as monitoring the regulatory and policy framework in Europe as well as fostering relations with the European Commission are taken care of by the Council's Policy and Regulation Expert Group.

R&M and the FTTH Council Europe

R&M has been a member of the FTTH Council Europe since 2006. Currently R&M chairs the D&O Committee. In 2011 R&M was a Gold Sponsor of the FTTH Council Conference in Milan and will also be supporting the 2012 conference in Munich as a Gold Sponsor.

At R&M we are doing everything we can to move Europe toward fiber implementation with sufficient speed to meet the deadlines of the Digital Agenda. At the FTTH Council Conference in Milan, Neelie Kroes, the European Commission

Vice-President responsible for Europe's Digital Agenda, said: "We must now implement the Digital Agenda and build a better future for Europe together. The heart of the Digital Agenda aims to ensure that Europeans can get all the advantages and benefits that come from access to superfast broadband. Succeeding in this ambition is key to our economic future, and the role of fiber is central here." As fiber is key to Europe's economic future, it is also key to R&M's presence on the European market and at the heart of all R&M innovations and development efforts to its role as a global player. We therefore follow the market drivers and are totally committed to the movement as an active member of the council, understanding that our contribution supports the future of the industry. ■



Cristina Deac | R&M Romania
R&M Delegate to the FTTH Council Europe
cristina.deac@rdm.com

R&M *freenet* – New Possibilities for a “New City”

Structured cabling for office space has always represented a serious challenge for investors and developers. It is extremely important to choose a cabling system that not only fulfills the minimum criteria for performance, but also allows non-problematic adaptation to the individual needs and requirements of the subtenants. Designers working on the “New City”, a modern office building located in the prestigious business center of Warsaw, solved the task perfectly.



The R&M solution provides highest flexibility.



The cooperation with an authorized R&M partner leads to added value for the customer.

THE R&M SOLUTION

- Cat. 6 U/UTP cables, 300000 m
- Real10 Cat. 6 S/FTP cables, 94000 m
- Cat. 6/u modules, 1250 pcs
- Real10 Cat. 6/s modules, 4000 pcs
- Global 2U patch panels, 100 pcs
- Cat. 6 patch cables, 2000 pcs

The building meets the highest standards of office infrastructure (Class A+) and was designed as a complex of two buildings connected by a spacious central hall with an elegant restaurant. This hall also serves as a sophisticated business meeting lobby. Each floor offers flexible office space arrangements ranging from 200 m² to 4000 m². To be able to satisfy the most demanding customers, investors had to find the most flexible structured cabling system. A Reichle & De-Massari solution was chosen because of the performance and functional advantages it offered while maintaining absolute top quality. During construction, the cabling system was limited to just backbone cabling infrastructure based on multimode optical fibers OM2. The investors assumed the horizontal cabling segment to be cabling Cat. 6 U/UTP but the final choice of performance class was left to the individual subtenants. For this reason, a large part of the cabling system has been modified and as a result the Real10 Cat. 6 S/FTP solution was installed. This approach, however, required the cabling system to be extremely flexible. This flexibility was delivered by R&M thanks to modular design and the advanced functionality of the system. Fiber optic links have been terminated on Global 3U and 1U patch panels and equipped with FiberModule universal trays. This resulted in ultra-flexible arrangement and easy management of the optical links. In the case of copper links, the modular Global 2U patch panels were used, allowing 48 links to be handled over 2U of a 19" rack. Their high density, enormous functionality and modularity made it possible to cater to the needs of the individual subtenants – something



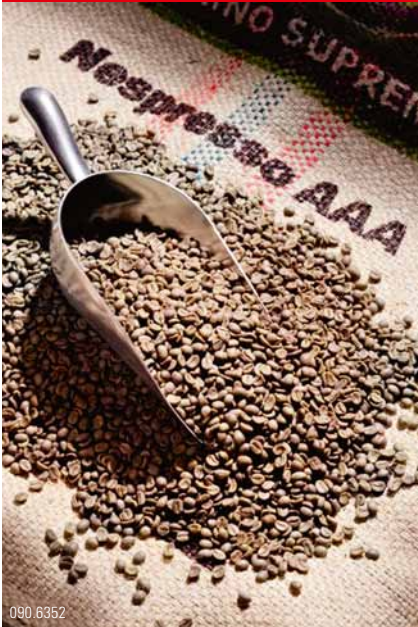
Modern office complex in the heart of Warsaw business center

that was a top priority in the initial phase of the project. An additional benefit is the facility to make changes to network configuration to suit changing conditions of office usage.

Once again it has been demonstrated that the key factors determining investors' choice of structured cabling are: quality at a reasonable price, as well as flexibility and functionality. R&M has always been aware of this and continues to do everything within its power to improve its production in terms of these qualities, making it the undisputed leader in the field of structured cabling. ■



Mariusz Solski | R&M Poland
mariusz.solski@rdm.com



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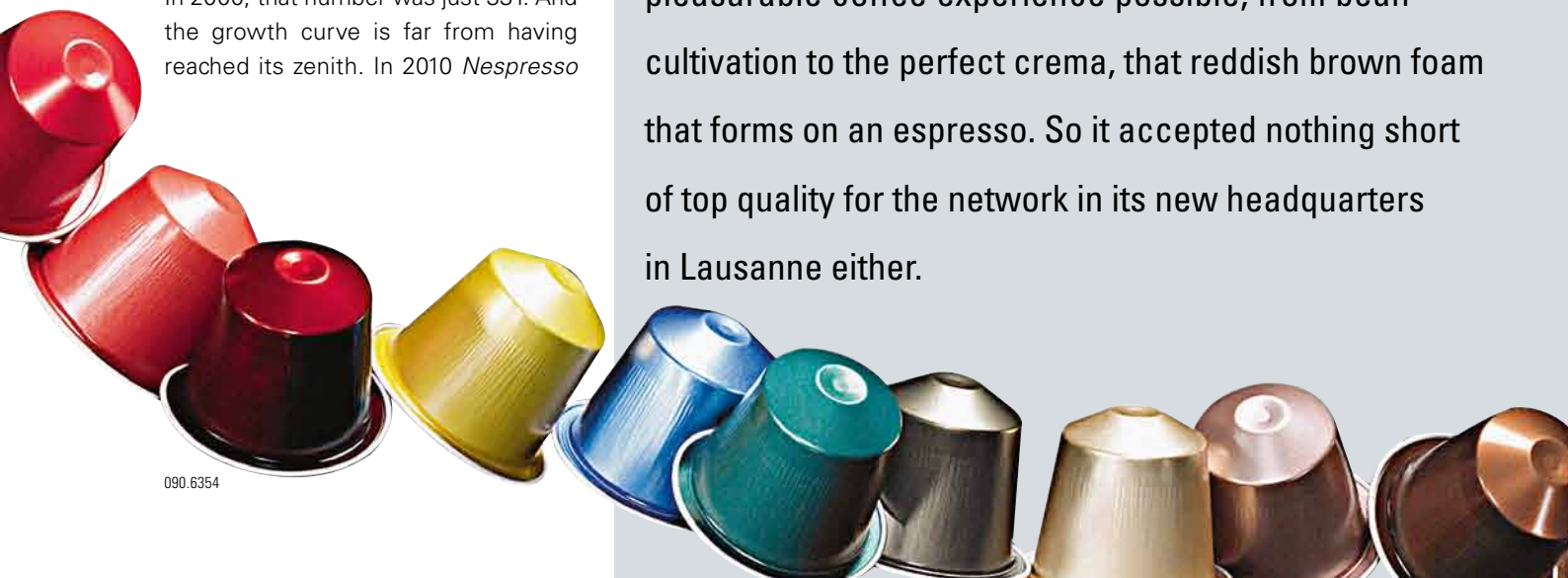
Nespresso is an independent, globally run business unit of the Nestlé Group and is present in more than 50 countries around the world. The Swiss company is one of those success stories that do not occur on a daily basis in today's economy. The best proof of the astounding worldwide ascent of this coffee brand is that its name has already become a generic designation for an entire industry – and done so across all cultures, from New York to Shanghai and from Munich to Moscow. The numbers also energize you, like enjoying a ristretto, a short shot of espresso, next to the Trevi Fountain in Rome: In 2010, 12 300 cups of *Nespresso* coffee were consumed per minute, up from about 10 000 a minute the year before. That gave *Nespresso* an overall global sales of more than CHF 3 billion and growth of over 20 percent. The rate of staff increase is also impressive: In 2010 more than 5500 people worked for *Nespresso*. In 2000, that number was just 331. And the growth curve is far from having reached its zenith. In 2010 *Nespresso*



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Fast Data for Maximum Coffee Pleasure

Nespresso aspires to giving its customers the most pleasurable coffee experience possible, from bean cultivation to the perfect crema, that reddish brown foam that forms on an espresso. So it accepted nothing short of top quality for the network in its new headquarters in Lausanne either.



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THE R&M SOLUTION HEADQUARTERS IN LAUSANNE

- Cat. 7 cable, light
- Cat. 6 modules
- 24-port panels
- 2060 copper links
- 384 fiber optic links



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THE R&M SOLUTION PRODUCTION SITE IN AVENCHES

- Cat. 7 cable, 1200 MHz
- Cat. 6 modules
- 24-port panels IP54 protection class
- 1626 copper links
- 384 fiber optic links
- Measurements in accordance with ISO 11801 Class E_A



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You can find videos and pictures on this topic in the electronic version of **CONNECTIONS** on our website

www.connections.rdm.com

opened 36 new boutiques. The total number of these exclusive shops is now 215 and is due to increase to 250 by the end of this year. The concept works magnificently. *Nespresso* generates 35 percent of its sales in its high-class boutiques. *Nespresso* has already acquired a respectable brand image on a global basis. The *Nespresso* Club has over 10 million members. The company registers more than 130 000 Internet visitors a day. Online sales account for 51 percent of the total so the Internet is also the company's most important sales channel.

In spite of all this success, *Nespresso* has not forgotten its ecological and social responsibilities. The company has subjected itself to a corporate social responsibility program and committed to achieving ambitious sustainability goals by 2013. By then, it will purchase 80 percent of its coffee through its AAA Sustainable Quality™ Program, including Rain Forest Alliance Certification. At the end of 2010, this figure had already climbed to more than 60 percent. By 2013, it aims to increase the capacity worldwide to recycle used capsules to 75 percent and reduce overall CO₂ emissions by 20 percent.

Nespresso is a technology leader and a continuous innovator. It also applies the highest possible quality standards as the basis for its corporate culture in all

business segments. R&M exhibits these same three traits on a daily basis. R&M was therefore the logical choice in connection with the new *Nespresso* Group headquarters in Lausanne. Connectivity from Wetzikon has been helping the *Nespresso* site in Avenches to increase the speed, reliability and security of its data traffic since 2009. The production facility there produces about five billion coffee capsules a year. Fiber to the machine could be implemented with no difficulty if need be because of the installed R&M solution but RJ45 is still in use right now due to current requirements. It is vital that the system be reliable under difficult conditions. The network connections must be fully impervious to coffee dust. That is why R&M products with known resistance are used here, in this case protection class IP54.

Network requirements were tough at *Nespresso* headquarters in Lausanne, too. This facility houses the central IT for 20 countries, including for two data centers in Switzerland and France and for several call centers. The reliability and speed of data traffic are correspondingly important there. The company needs a high-performance, failure-free network not least for its online sales, which make up a proportionately high share of total sales. The integrated R&M solution includes fiber optic and copper equipment for the entire campus and office cabling

in four buildings. The requirements called for peak flexibility and future reliability plus trouble-free integration of building equipment such as a security access system for employees.

All in all, R&M implemented the entire network infrastructure at four *Nespresso* sites: Paudex, Lutry, Avenches and, most recently, Lausanne. After intensive planning, the projects were carried out precisely according to the specific needs of the customer and to its full satisfaction. Today 500 *Nespresso* employees in production and 400 at headquarters benefit daily from the performance capabilities of the R&M solution.



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Walter Kurzen | R&M Switzerland
walter.kurzen@rdm.com

Technology from Nature – also with Cat. 6_A Module

Such a lot of effort going into such small parts?

The insulation displacement contacting (IDC) in the Cat. 6_A module from R&M is full of fascinating technology. Read on to find out about the research effort and expense

R&M put into developing the best copper connection technology of all times.

If you hold the Cat. 6_A module in your hands, you are struck first by its handsome, compact design. A glance inside reveals a number of further unique features, however. The product starts becoming really intriguing when you catch sight of the tiny but extremely sturdy insulation displacement contacts and connecting blades.

They are instrumental for the uniform impedance and stable performance of the Cat. 6_A module. The insulation displacement contacts (also known as IDCs) ensure the reliable and lasting contacting of wires. The connecting blades cut the wires precisely when the wiring cover is pushed shut.

Ambitious goals set

R&D put more than two years of development work into these miniature components alone. Two of the most challenging tasks were to miniaturize the module and to cover the big range of connectable cables.

Another objective was to make the module be all-purpose in use and able to contact strand just as reliably as solid wire. That requires the IDCs to be extremely flexible. AWG26/7 gauge strand has a cross section of 7 by 0.16 mm whereas AWG22 gauge solid wire has a diameter of 0.65 mm.

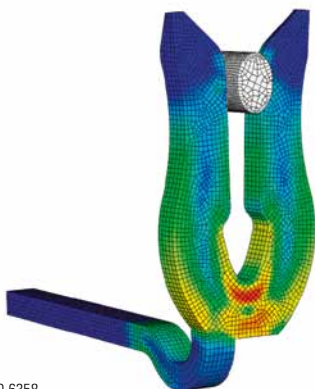
Another requirement was that the module be able to be rewired twenty times and be compatible two steps in reverse.

In other words, a thinner wire should still be able to be connectable even after a larger wire was previously used. That requires the IDCs to be extremely stable.

Pear-shaped solution

R&M engineers designed dozens of different models. The team examined the widest variety of materials, including exotic materials such as metallic glass. Applying the finite element method (FEM), they simulated and calculated the models on a computer. Most models turned out to be too rigid or too weak, too large or too expensive and were eliminated.

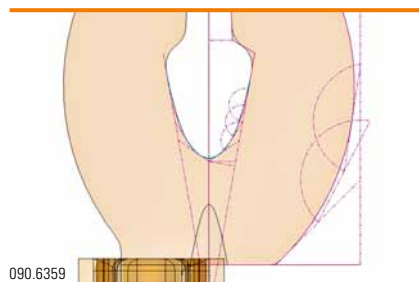
A solution emerged when R&M began consistently applying the tensile triangle method. It belongs to bionics, a science



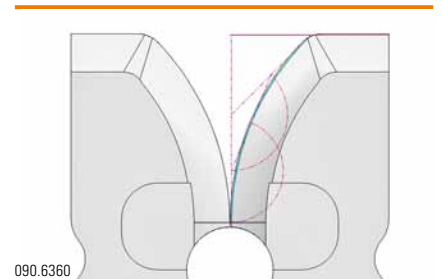
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Left: FEM calculation of the distribution of tension in the IDC when an AWG22 gauge wire is being pierced

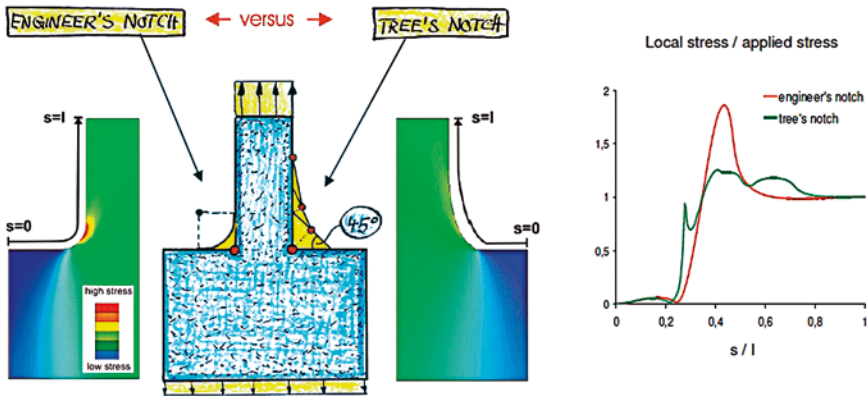
Below: forming by means of tensile triangles



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Designs from engineers and Mother Nature vary so much. Shown here using the example of a T section (middle). Engineers would typically reinforce the sharp corner using a radius (left side). Mother Nature uses shapes that are more ingenious and considerably more stable. These shapes can be replicated using tensile triangles (right side). Trees show this design feature in the transitional areas between trunk and branches or trunk and roots. The FEM charts next to the model demonstrate where to find the critical spots threatened by stress and fracture (see small red area on the left).

Figure included with the friendly consent of Professor Dr. Claus Mattheck. You can read more on this subject in his book "Thinking tools after nature," www.mattheck.de

that makes use of findings on the biological structures of plants and animals. If you apply natural structures correctly, you can design highly stable, long-lasting and torsion-resistant products.

Bionics helped R&M come up with the pear-shaped IDC so characteristic of our Cat. 6_A module. New high-performance materials with improved spring characteristics appeared on the market at the same time. It was the optimized form plus the use of these materials that helped R&M meet the desired requirements.

Hard and resilient blade

R&M entered less familiar territory when it came to developing the blade. Many factors played a role, for instance the

ratio between the cutting angle, wedge angle and cutting gap, and the different states of matter of materials.

R&M also applied the tensile triangle method to the blade. That allowed minimal cutting forces to be calculated. The finishing touch on the blade was a barely visible but highly effective fuller groove.

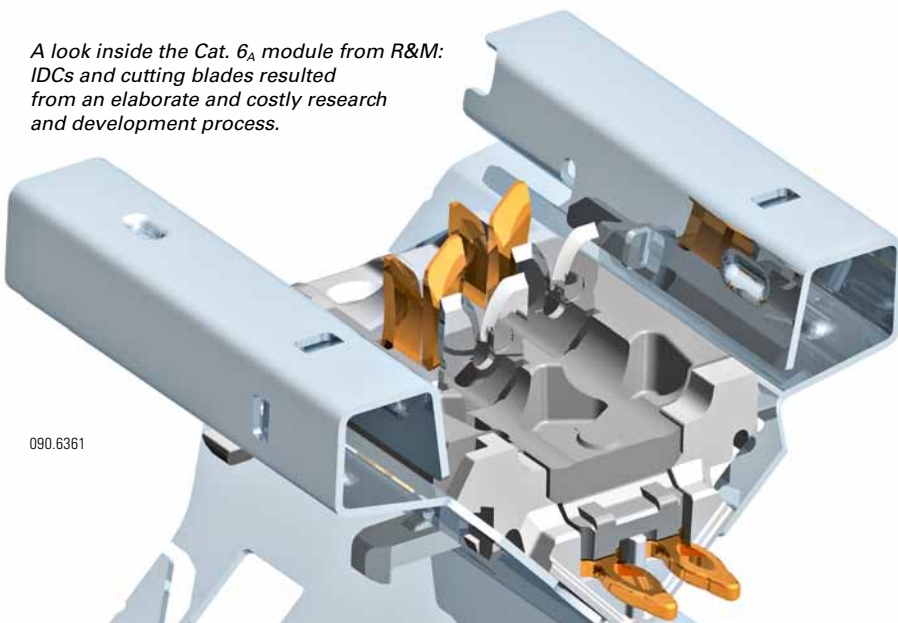
The knife edge is manufactured in a punching and pressing process. The blade becomes even more resilient and the surface even harder as a result of this processing. The base material is stainless steel with tensile strength values otherwise required only in engine parts for race cars or for industrial products that have to withstand high levels of stress and strain.

...and the benefits

As inconspicuous as these two components may seem, the benefits they bring are crucial to the use of the Cat. 6_A module. Users can employ a single module type to cover the entire range of cables occurring in a data center.

The bottom line is this: Even in wiring technology, the development team from R&M spared no expense or effort to find the best possible solution for giving its customers added value. ■

A look inside the Cat. 6_A module from R&M: IDCs and cutting blades resulted from an elaborate and costly research and development process.



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Fabio Trio | Team Leader
Development of Copper Core Products
fabio.trio@rdm.com



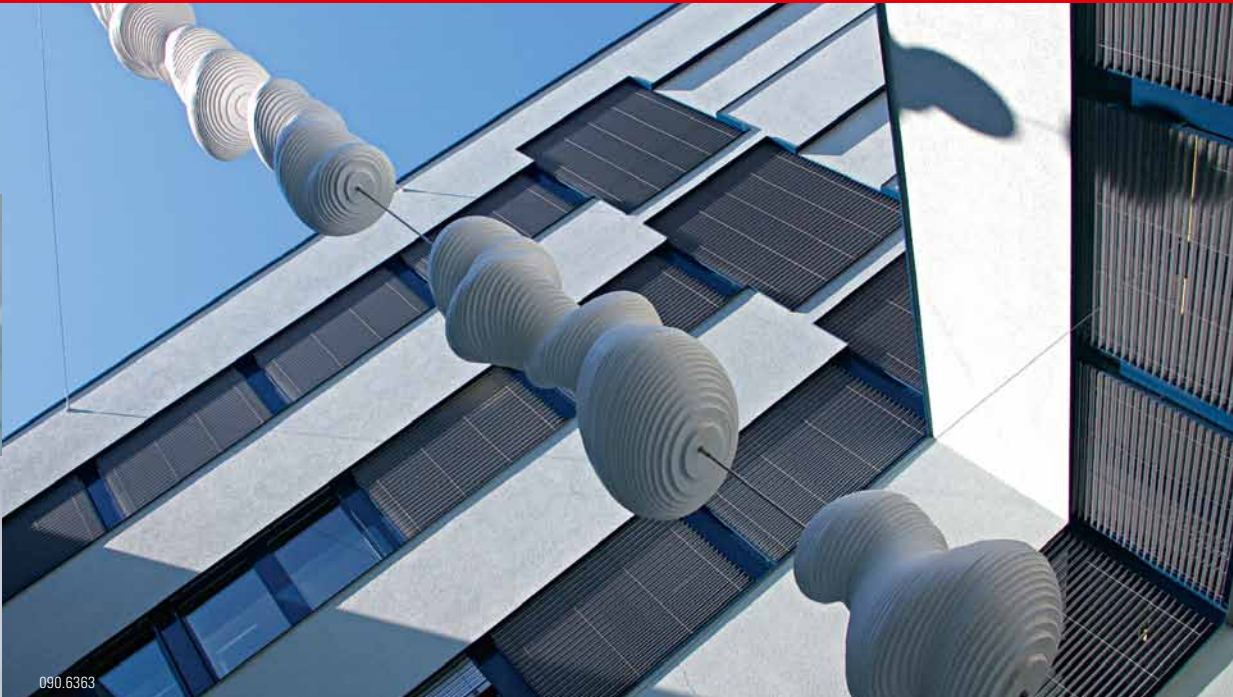
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The Highest Level of Flexibility for Laboratories at Solvias

The ideal conditions for customer-oriented services. The life sciences company Solvias attained this goal with its new central office/laboratory building in Kaiseraugst near Basel. Despite a high density of ports, they have at their disposal an especially flexible cabling solution.

A conversation between Yves Suter from Pro Engineering AG, Dr. Peter Dätwyler from Solvias and Christian Reck from R&M

IT plays an increasingly larger role in high-tech research companies, and this fact is meanwhile also having implications on the design of corporate buildings. This is exactly the point where Solvias AG in Kaiseraugst faced a major challenge when constructing a new building. Some 2800 network connections had to be placed in 57 laboratories on five floors – almost ten ports for each of the 300 workplaces. At the same time, even while assuring full network functionality, the interior aesthetics had to be preserved. For example,

hallways were to remain open and not cluttered with the enormous amount of cable that was necessary.

The time needed to process orders and projects varies quite a bit. Although the instruments and methodologies used in the laboratory can remain stable over months or even years, they must be able to be quickly converted to accommodate a new order. For this reason, all 57 labs must be identically equipped and technically standardized. One specification was that they have to be able

to be converted from the minimum to maximum configuration in the shortest possible time and with the least possible expense.

Solvias' project leader Dr. Peter Dätwyler faced a true technical and planning challenge, explaining, "Absolute high tech was called for!" Reading a technical journal, Dr. Dätwyler ran across a solution approach from one of the Max Planck Institutes. From this it was clear that conventional solutions with fixed installations for power, commu-

nications and data did not come into question because they were insufficient to meet the demands for high flexibility.

Cascading cabling

Dr. Dätwyler, Solvias, and Yves Suter from the planning company Pro Engineering AG in Basel chose the newly developed "cascading cabling" concept, an intelligent chaining of distribution equipment. In this concept, what are known as consolidation points (CPs) are installed unobtrusively in false ceilings and cavities within the labs but are clearly visible at an ideal location on the ceiling. They serve as the sub-distribution panels for all required types of connections. Suter speaks of this with great respect: "The customer knew exactly what the solution should look like in the end."

A field trial helped IT management and corporate management gain confidence in this cabling solution. Even though the building's interior was only roughed in, Dr. Dätwyler created a complete sample laboratory with cascading cabling. Tests provided valuable experience from which the final concept and clear standards emerged. Now the construction of the five floors could conform completely to the CP infrastructure.

For the cabling concept, the project leaders sought a reliable partner who could offer both technologies – copper and fiber optics – including a system warranty. That's how R&M came into the picture. Dr. Dätwyler and Suter were also pleased that R&M does its development and to a large extent manufacturing in Switzerland and that the products could be adapted to project-specific requirements in short order.

Using prefabricated VARIOline fiber optic systems, the building could be developed in a simple way. The 10 Giga-bit Ethernet backbone was designed to

Office connection outlets



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The innovative R&M solution offers significantly more potential than conventional cabling.

be scalable. All CPs are already connected to the fiber optic network. The lab and office connections were tied in with copper cabling. In order to meet the absolute highest broadband requirements, each workplace can be flexibly converted to Fiber to the Desk technology without any great effort. Suter: "If something is needed up front, we can put a strong push on something that might be needed later on. The CP infrastructure allows us to use the labs and offices in a considerably more flexible manner. Further, we are considerably lowering later conversion costs compared to conventional installations."

Dr. Dätwyler and Suter agree that the solution can clearly be characterized as innovative. It offers significantly more potential than conventional cabling. As Suter explains, "We're moving toward an ideal solution."

It was possible to hand over the new 14 000 m² laboratory/office building, planned by the architectural firm Zwimperf Partner in Basel, after a construction period of slightly less than two years. Kaiseraugst is the new location

Consolidation point (CP) cabinet installed on the ceiling



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where Solvias provides customer-oriented services at the highest scientific level. The spectrum of this internationally oriented company includes the analysis of small and large molecules, the development of chemicals and process analytical technology using fiber optic probes. ■

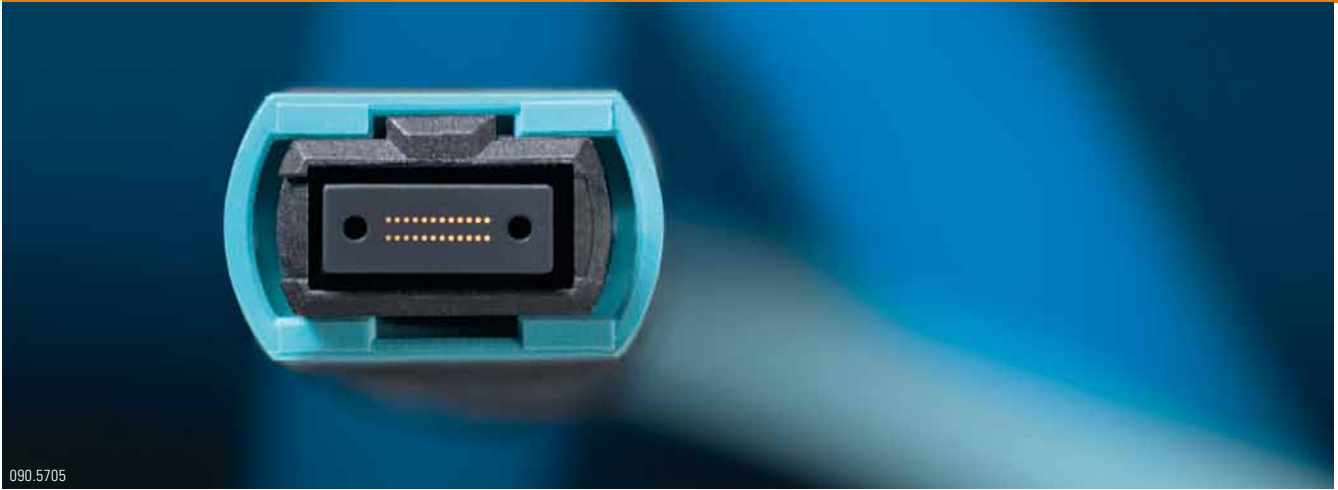
The advantages of consolidation points

- Security and flexibility during planning
 - Comprehensive solution for basic installations
 - Collection points for data
 - Flexible application as a MUTO (multi-user telecommunications outlet) or CP (consolidation point)
 - Immediate access, easy conversions
 - Cost-effective thanks to standard patch cables
 - Efficient for facility managers and users
 - Modularity, scalable to any degree
-



090.6369

Christian Reck | R&M Switzerland
christian.reck@rdm.com



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Parallel Optical Connectivity Technology

Data center networks will soon be reaching the limits of their capabilities. Even 10 Gigabit Ethernet (GbE) connections over a single fiber pair are no longer a guarantee for being able to deal with the rapidly increasing flood of data. However, using parallel optical connectivity technology, 40 and 100 GbE links can be quickly implemented to meet any needs.

The demand for increased bandwidth has been with us as long as modern data communications. Meanwhile, though, innovation cycles for both systems and networks have become shorter than ever before. That's why advanced infrastructure solutions such as parallel optical connectivity technologies, which support data rates above those which are currently needed, are by no means design overkill.

Innovation cycles for both systems and networks are shorter than ever before.

Quite the contrary – with them, planners can avoid bottleneck effects and expensive rework such as in backbones or in other areas with high data aggregation. In following the principle of protecting investments, the backbone (permanent link) for today's 10 GbE systems

should also meet the requirements of future parallel optical links. R&M supports its customers with a corresponding migration concept.

New standard

In June 2010, following IEEE 802.3ae for 10 GbE, there came a new standard for 40/100 Gigabit Ethernet, specifically IEEE 802.3ba. A primary motivation for the development of a new standard was the increase in requirements on high-speed data transfer in data centers. As part of IEEE 802.3ba, a number of versions were defined for 40/100 GbE connections.

Because the vast majority of link distances in data centers are shorter than 150 m, 40GBASE-SR4 and 100GBASE-SR10 (short range over multimode optical fiber) are the versions most frequently put to use. Both concern parallel optical transmission over four or ten fibers, in other words 4 x 10 Gbit/s

or 10 x 10 Gbit/s. For 40GBASE-SR4, eight optical fibers of category OM3 or OM4 are required per link, and for 100GBASE-SR10, 20 such fibers are required per link.

New connector

The great expansion in the number of optical fibers in parallel optical transmissions also has an impact on connector technology. Compared to 10 GbE, four or even ten times as many connectors must be integrated into ports. Conventional connectors would take up too much space, and the demand for higher densities in the infrastructure while at the same time achieving the highest levels of reliability also stands in the way.

For this reason, the MPO multi-fiber connector was adopted in the 802.3ba standard for 40GBASE-SR4 and 100GBASE-SR10. The acronym MPO stands for "multi-fiber push on" and also "multi-path push on." In the smallest amount

Left: MPO/MPT® connector interface (here with 24 fiber positions)

of space – equivalent to the size of an RJ45 connector – MPO connectors can theoretically connect as many as 72 fibers. In practice, connectors with 12 or 24 fibers are common. For 40GBASE-SR4, a type of MPO connector with 12 fiber positions is generally used, and for 100GBASE-SR10, a type with 24 fiber positions is used (in each case, four positions remain free because only eight or 20 fibers are required for the transmission).

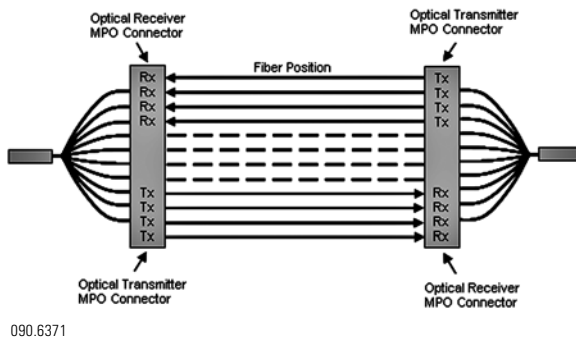
New requirements

Parallel optical connections place increased demands on the optical and mechanical properties of connectors. MPO technology and in particular the optimized MTP® (mechanical transfer push on) connectors from the manufacturer US Conec have proven to be an excellent solution.

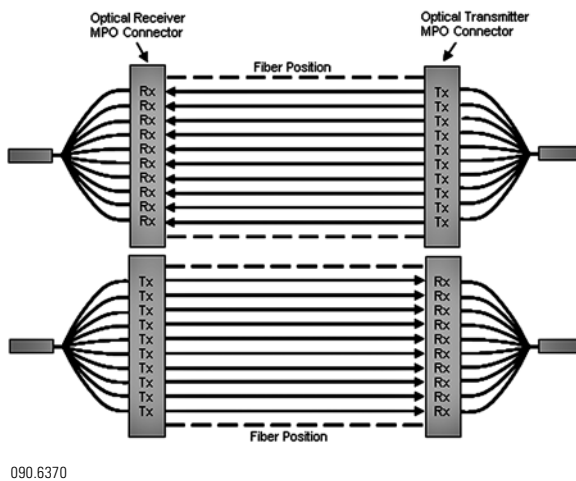
For parallel optical connectivity technology, R&M relies on MTP® connectors with high-quality MT Elite® ferrules, and the company has further improved these components' already good optical performance with a finishing process it has developed on its own. In this way, ferrule tolerances as specified according to IEC have not only been tightened, but beyond that new parameters have been defined.

MPO/MTP® connectors are offered in combination with correspondingly high-quality optical cables (OM3 or OM4) as

factory preassembled and tested patch and trunk cables. The result is a first-class multi-fiber connectivity solution that makes the assembly and operation of parallel optical 40/100 Gigabit links as easy and risk free as single-fiber connections. ■



Parallel optic transmission for 40 GbE with eight optical fibers



Parallel optic transmission for 100 GbE with 20 optical fibers

Why parallel?

Due to the intrinsic optical dynamics of the directly modulated VCSEL (vertical-cavity surface-emitting laser), optical fiber systems reach the limit of their capabilities at serial transmission rates exceeding 16 Gbit/s. For higher transmission rates, parallel optical connectivity technology is thus the most practical and cost-effective solution. Current and future protocols will, among other things, be carried over parallel optical 40 and 100 GbE or InfiniBand systems.



Future-Proof Network Infrastructure Solution for the Maasstad Hospital



Van den Berg Infrastructuur has installed a Class E_A R&M communication network for the Maasstad Hospital in Rotterdam. From spring 2011 the so-called Healthcare Boulevard on Maasstadweg, as the road will be known, will be the place to go for a wide range of healthcare services. The Healthcare Boulevard covers an area of 132 000 m², with 84 000 m² set aside for the Maasstad Hospital which is being created out of the merger of the Zuider Hospital and the St. Clara Hospital.

Supplier selection based on quality

After three years of construction the Maasstad Hospital – the site on which the St. Clara Hospital and the Zuider Hospital are joining forces – is one of the most modern hospitals in the Netherlands. As well as providing a full range of healthcare services and pleasant hospital accommodation for the inhabitants of Rotterdam and the surrounding area, the Maasstad Hospital, as one of the top clinical hospitals, will also play an important role as a training hospital. The buildings of the new hospital complex cover an area of 84 000 m² (the size of four soccer fields) and have four floors. The hospital has several unique features: The ground floor is what is referred to as a “hot floor”

where the intensive care unit, the heart monitoring unit, the burns unit and the operating theaters are situated. Green roofs and patios make time spent at the hospital more pleasant for patients and visitors. The new hospital is also equipped with a modern infrastructure that is able to accommodate the increasing number of communication and information applications. “The building specifications for the construction of the hospital were drawn up five years ago,” says Danjan Mudde, a technical specialist who is a member of the IT Department’s Technical Management Team. “The long preparation and construction period made it very important to build future-proof solutions, especially for the technical infrastructure. And quality and

reliability are important selection criteria for every hospital. We discussed all requirements with our building consultant at Royal Haskoning and specialist network distributor Forehand Netwerken

THE R&M SOLUTION

- 12 000 drop Class E_A channel with U/FTP cable, 24 port panels, DIN 50 x 50 outlets
- 27 km fiber optic 12 x OM3 & LC-Duplex connectors

WHY R&M?

- Higher performance than originally specified
- Color coding system for easy administration



Buildings of the Maasstad Hospital in Rotterdam

and decided to use a Class E_A R&M network solution for the communication network.”

Simple to install and easy to manage

The communication network at the Maasstad Hospital consists of more than 10 000 connections, almost 600 kilometers of U/FTP copper cabling and 27 kilometers of fiber optic connections. The network was installed and certified for Class E_A compliance by Van den Berg Infrastructuur, an R&M CI partner appointed by the principal installation contractor, ULC Groep. “About two years ago Forehand ran a training course to introduce us to the various cabling solutions and concepts, standard development methodologies, practical installation and management,” continues Danjan Mudde. “On the basis of the new knowledge we gained and an extensive study of the market, we decided to install a Class E_A compliant R&M network. Of course there are other Class E_A solutions, but the Swiss quality of the R&M solutions is evident from the fact that they exceed the standard values by a substantial margin. As the end user this gives us greater assurance that the network connections will operate as

required. Several practical advantages also tipped the scales in favor of R&M, such as the fact that the connection cables are patched on their side and the fact that it is possible to secure critical connections against unauthorized disconnection by using the R&M Security System. As far as we are concerned this is the best total solution: It looks neat and tidy when installed and is also relatively easy to manage.” “Our own engineers are equally enthusiastic about R&M,” adds Peter van Dijk of Van den Berg Infrastructuur, the project leader responsible for the installation of all of the communication cables at the Maasstad Hospital. “The LSZH cable we used is easy to install and because the standard values are exceeded by a substantial margin all the connections show excellent test results.”

Pre-patching to increase flexibility

The network connections at the Maasstad Hospital lead back via a dozen SERs (Satellite Equipment Rooms) to two computer rooms, where all of the cables are connected in accordance with a pre-patch concept. “We no longer call our redundant computer rooms MERs (Main Equipment Rooms), because the central hub function is housed outside

the building at the Rotterdam Internet eXchange,” explains Mudde. The Maasstad Hospital decided on pre-patching because it is almost impossible for patch cables to be incorrectly connected. It also ensures that the racks are still neat and tidy and well organized years later. “Pre-patching increases the flexibility and quality of our network infrastructure and makes everyday management tasks far easier,” continues Mudde. “As a network administrator, you have to keep connecting new staff and equipment and responding to all kinds of internal changes – so-called Moves-Adds-Changes (MAC) – throughout the life span of the network. We can now easily implement and administer these kinds of changes from a distance.” Although there are no plans to outsource, pre-patching also makes a network more suitable for outsourcing. The Maasstad Hospital has both a cabled network and a wireless network (WLAN) based on Cisco technology. Because the collaboration with Van den Berg Infrastructuur was so successful, the certified R&M installer will continue to take care of maintenance on completion of the project. ■



090.6373

Gert-Jan Roozeboom
R&M Western Europe
gert-jan.roozeboom@rdm.com

FTTH: Involves More Than Just Bandwidth

The fiber optic age can open up entirely new dimensions for all of us. Fiber to the Home (FTTH) means much more than just ultra-fast Internet access. Nonetheless, there are still too few fiber optic networks, especially in Europe. The FTTH Council Europe is leading the way to improve this situation. We spoke about this issue with Professor Hartwig Tauber, the Director General of the Council.

R&M: Mr. Tauber, could you explain to our readers for what the FTTH Council Europe stands and what interests it pursues?

Hartwig Tauber: The FTTH Council Europe was founded in 2004 and has a mission to push the spread of Fiber to the Home in Europe – for the good and benefit of all citizens. The FTTH Council Europe is one of the largest industrial organizations on the continent today.

How does Europe stand when it comes to Fiber to the Home?

Europe as a whole is trailing far behind compared to the 40 million plus households in Asia with fiber optic connections and the more than nine million households in the US. With fewer than four million connected households, Europe is still a small market in which growth really needs to be pushed. The Nordic countries are leading the way in Europe. Lithuania tops the list, however, something that may come as a surprise.

With fewer than four million connected households, Europe is still a small market in which growth really needs to be pushed.

Why are markets developing so differently?

The broadband and fiber optic market in Europe is not a unified market. The Nordic countries have always been first in using innovations in telecommunications. Now they have started building fiber optic networks sooner than others have.



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Policy decisions have often determined the situation in Lithuania and Eastern Europe. These areas wanted broadband networks to obtain advantages quickly over other countries. In addition, these countries had to build new infrastructures anyway. It was only logical to start with fiber optics.

Governments in other countries such as Portugal and Slovenia simply created an awareness and a positive climate for the subject of broadband. That made it easier for suppliers to gain a foothold in these markets. Certain incumbents in Western Europe such as France Telecom or Deutsche Telekom are setting up huge Fiber to the Home networks in Eastern Europe.

What is the crucial difference between FTTH and previous broadband networks?

It is important to remind ourselves exactly what fiber optic networks mean, namely, high-speed connections in both directions, high speed without the restrictions we see with other technologies. With fiber optic networks, there are no restrictions for the uplink and no obstacles for symmetric connections. With fiber optics you really have high speed for downloading and high speed for uploading.

How does it benefit users?

It opens the way to a large number of new apps and new services. Everything

starts with little things. For instance, you can start with an online backup service. If you have a 40 gigabyte video and photo collection and try to back it up using online backup today, it will hardly work. These restrictions on uploading disappear with Fiber to the Home.

**With fiber optics
you really do have high speed –
for both
downloading and uploading.**

We have been talking about teleworking and e-health for 15 years, for example. Suddenly we are creating dimensions in which both can actually work. To sit at home and work at the same speed as in the office, now that is genuine teleworking. E-health in the home will not be a reality until we can monitor elderly or sick people online with truly high-quality results.

It is not just a matter of a few more megabits. It is the services opening up the possibilities behind these extra megabits that make fiber optics such an important infrastructure.

How could we accelerate the FTTH trend?

One aspect of our work on the FTTH Council involves instructing consumers and letting them know what types of new services are already available. We

also show them how fiber optic networks are what let these services become beneficial or improve in the first place. Right now we are planning a roadshow, with which we want to intensify this work. It will start at the next annual conference of the FTTH Council Europe. This event is taking place in Munich in February 2012.

Incidentally, our FTTH conference has become the largest of its kind in the world. We look forward to seeing you in Munich.

Mr. Tauber, thank you for this interview. ■

The entire interview is available as a complete text version and as a video cast at: www.connections.rdm.com



090.6173

René Eichenberger
Head of Corporate Communications
rene.eichenberger@rdm.com



Data Center Solution for Synthes

The new Swiss base of operations for the Synthes Group

is starting off with a customized data center.

The cabling solution from R&M helps to achieve a high-density IT infrastructure and boosts performance substantially.

Switzerland is a key location for Synthes, Inc., a leading medical technology firm. One reason is that part of the corporate group originated there. But that is not the only reason. Switzerland is also a high-tech location with optimum basic conditions for the new international base of operations that was recently built in western Switzerland and that is in charge of all activities outside North America.

Besides administration and development, Synthes moved one of its main data centers there after consolidating these centers and reducing their number from five to two. The center covers an area of 144 square meters and thanks to its redundant data center infrastructure provides three times the capacity and greater security than the existing data centers operated at different sites.

It is a tier-III data center that meets tougher requirements in terms of availability as well as reliable supplies and operations. Those responsible for IT at Synthes explained the company's choice

of sites as follows: "Switzerland gives us stable infrastructure for this kind of data center plus a reliable power and water supply, a moderate and stable climate, and political neutrality."

The cabling solution from R&M also supports the increased capacity and operational reliability of the new IT infrastructure. Synthes was looking for a flexible data center system solution of high quality able to combine fiber optic and copper cabling. A high packing density and a scalable MPO fiber



optic solution were two other items on the list of requirements. Synthes also wanted R&M to fulfill individual design requests at short notice.

Individually pre-terminated

In the summer of 2010 during the evaluation process, the infrastructure managers at Synthes, Simon Kissling and Philippe Wegmüller, became convinced that R&M was offering even more than the delivery of the best solution. That marked the start of a new partnership. René Rieder and Roger Müller from the installation company Alpiq InTec Ost AG from Spreitenbach, Switzerland, helped to get things off to a good start, too, as did Urs Zeier from Sytek AG (electrical planner). As a certified QPP partner, Alpiq is intimately acquainted with the cabling systems from R&M. But the Synthes project posed several extra challenges that everyone involved came to view as "rather athletic in nature."

First of all, everyone had to get acquainted with the new generation of copper cabling, Class E_A/Cat. 6_A, and install it

THE R&M SOLUTION

- Cat. 6_A advanced connection modules, shielded
- 48-port 1-U HD panel
- 6-fold trunk installation cable Cat. 7/900 MHz, AWG23
- 126 MPO modules with 12 LC-Duplex apiece
- MPO fiber optic trunk cables, already cut to length
- Approx. 4000 fiber optic and copper patch cables, colored, labeled, different lengths



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From left to right: Claudio Palmieri (Alpiq), Daniel Gyger (R&M), Roger Müller (Alpiq), Philippe Wegmüller (Synthes)

“What convinced us during the evaluation process is that the R&M offer involved more than just delivering the optimum solution.”

Philippe Wegmüller,
System Engineer Information Technology,
Synthes GmbH

with expertise. Assembly started just-in-time thanks to on-site instructions and personal assistance with construction work from R&M experts as well as other support services.

That was in fact necessary because the tight time schedule was a critical challenge in this project. The first components had to be delivered within four weeks, fabricated and pre-terminated to customer specification. In the end, there were about 4000 colored, labeled copper and fiber optic patch cables, 126 MPO modules completely fitted with LC-Duplex plus the required MPO trunk cables for the fiber optic infrastructure as well as Cat. 6_A modules and 48-port 1-U HD panels for 1000 copper links.

Among other things, the team connected blade enclosures with more than 100

physical and 125 virtual servers, storage systems and backup libraries. The entire infrastructure of the data center is designed to be completely redundant and to serve as the basis for the twin data center strategy of Synthes IT, which is fully implemented right now.

The bottom line from the standpoint of R&M: The collaboration went smoothly and positively thanks to the customer's clear and tight objectives plus the exact planning, the operational readiness of the installation company and the flexibility of R&M. Within an extremely short time we all succeeded in satisfying tough and specific requirements very constructively. The modular data center range from R&M based on the cabling system R&M *freenet* has proved the possibilities of its professional applicability once again.

Important site

With its new data center, the Synthes Group can optimally supply IT services to its business sites outside North America from its facility in Zuchwil, Switzerland. And it still has reserves for further growth. The previously used data centers had reached the limits of

their capacities as regards space, power and cooling needs.

With its 2800 employees, Switzerland is an extremely important location for the Synthes Group. The Group has more than 11 000 employees worldwide. Switzerland is where Synthes has its product development centers for traumatology, vertebral column and craniomaxillofacial structures, the main headquarters for Europe, the Middle East and Africa, as well as eight of a total of 14 production facilities. ■

SYNTHES®
ALPIQ
SYTEK AG

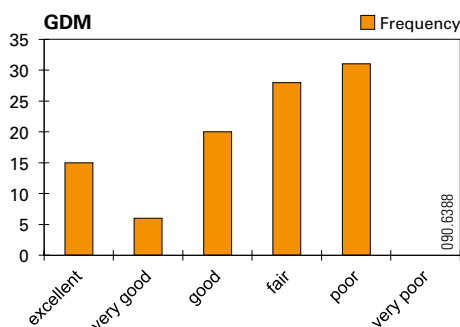
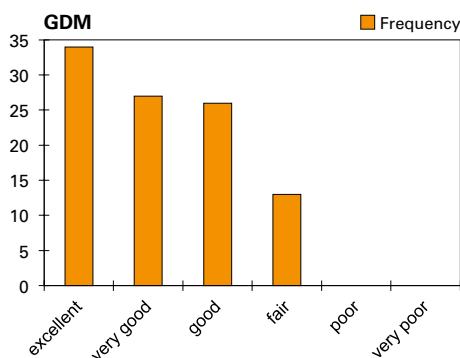


090.5783

Daniel Gyger | R&M Switzerland
daniel.gyger@rdm.com

Field Measuring Devices – How Precise Are They Really?

While there is nothing as subjective as an opinion, measurements are objective. But just how accurate are the results? R&M tested several field measuring devices and compared the results. R&M believes that while high-quality measurements may cost more initially, ultimately they cost a great deal less than a wrong decision.



Global Difference Measure, i.e. the measure of the total deviation, determined using the Feature Selective Validation (FSV) method set out in IEEE Std. 1597.1/2, here for field tester 1 (top) compared with the network analyzer. The bars indicate the frequency with which the agreement achieved by the measurement points was classified as "excellent," "very good," "good," etc. The bottom diagram shows the same measurement for field tester 2. The difference is telling.

The purpose of field testers for LAN cabling parameters is to make certification and acceptance measurements quick and simple. Providing, of course, they are accurate enough for the job. That's why measurement uncertainties are specified in standards; after all, different testers by different manufacturers should still provide the same result.

The true value

IEC 61935-1 Edition 3 (2009-07) defines different accuracy classes depending on the application, for example Level III E, which is suitable for testing Class E_A cabling parameters. The field test uncertainties specified describe the maximum amount by which measured values are allowed to deviate from the true value. But in actual fact, no one really knows what that true value is. However, what you can do is carry out high-precision reference measurement procedures using a network analyzer. The results it provides will be very close to the true value and provide a reference for the results of the field testers.

Measurement uncertainties

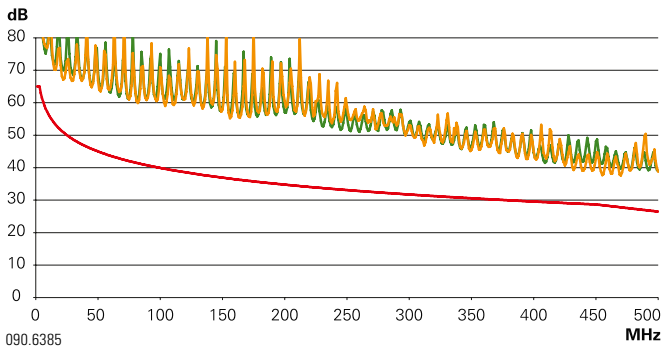
For channel measurements, Level III E testers must comply with the following accuracy requirements: 4.1 dB at 500 MHz for RL (return loss); 5.2 dB at 500 MHz for NEXT (near-end crosstalk).

This means that a field tester may well indicate "+4.0 dB, pass" while in truth the system does not meet the required specifications. Likewise the display might indicate "-4.0 dB, fail" even though the system fulfills the specifications. With RL, a miscalculation is particularly critical: As a recent study* shows, exceeding the RL limit by 0.8 dB can disrupt the transmission of 10 gigabits per second to such an extent that the system spools down to 1 gigabit per second. This is because greater interferences are allowed for RL than for NEXT.

All field testers are of course (ETL)-verified independently of the manufacturer. The problem lies in the generous limits of error allowed by the standards, with IEC 61935-1 allowing measuring equipment manufacturers to specify reduced error limits for information purposes. As R&M's measurements have shown, error limits can be narrowed down much more accurately with a good field tester.

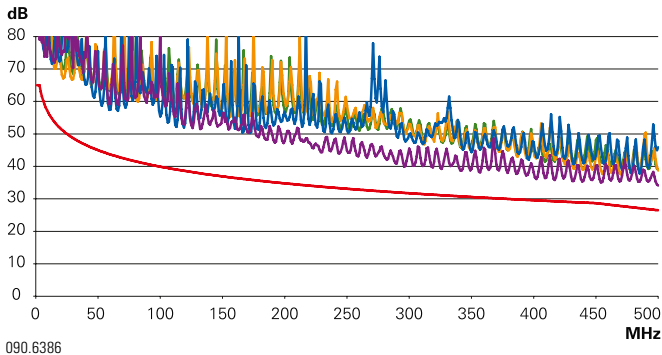
Empirical methods

An expert with a trained eye has no difficulty evaluating measurement curves. For an objective comparison however, the Feature Selective Validation method set out by IEEE Std. 1597.1/2 is recommended. It is based on empirical re-

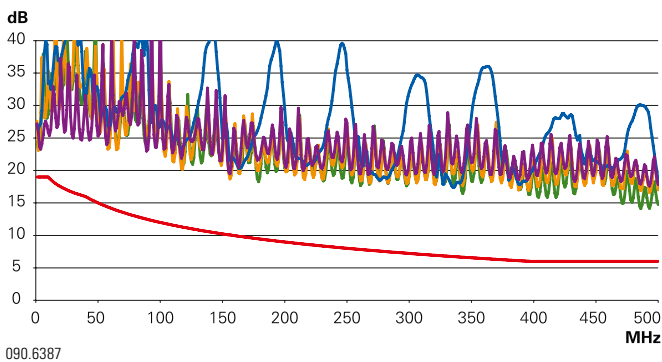


- Limit
- Network analyzer
- Field tester 1
- Field tester 2
- Field tester 3

NEXT measurement on a channel between the critical wire pairs 36 and 45. The limit curve corresponds to ISO/IEC 11801 Appendix 2. The agreement between the results for field tester 1 and those for the network analyzer is good.



NEXT measurement on a channel between the critical wire pairs 36 and 45. The limit curve corresponds to ISO/IEC 11801 Appendix 2. The curve characteristics for field testers 2 and 3 deviate significantly from those of the network analyzer.



RL measurement on the same channel. Here only the results for field tester 1 agree well with those of the network analyzer; by comparison field testers 2 and 3 have values that are too high and too low respectively in the upper and lower frequency ranges. If the channel's reserves are low, this could result in a classification as "good", even though the channel is "poor" – or vice versa.

search and was originally developed to quantify the degree of agreement between computer simulations and measurement results in electromagnetic compatibility (EMC) studies.

It can, however, also be applied to any data such as curve characteristics to verify their agreement or deviation, much in the same way as a human expert would do. With this method each measurement point is assigned a descriptive criterion from "excellent" to "very poor" based on the quality of the agreement. A conclusion can then be drawn on the degree of agreement based on the frequency diagram.

If we apply this method to the measured values for field testers 1 and 2 compared with those for the network

analyzer, we see here again that field tester 1 is clearly the preferred option.

This is why R&M distinguishes between measuring devices for channel/permanent link certification (PASS/FAIL in accordance with the standard) and reference measuring devices. The reference measuring devices must clearly exceed the Level III accuracy requirements, e.g. field tester 1. Only the reference measuring devices allow quantitative reserve statements and comparison measurements of Class E_A systems. ■

** IEEE 10GBASE-T over TSB-155 or Cat.6_A compliant links. A practical experience & consequences for field testing. By Christian Schillab. Available at <https://www.bicsi.org>*



090.6389
Dominik Schweizer | Innovation Engineer, Corporate Innovation
 dominik.schweizer@rdm.com



“Our Small Town” Swears by FTTH

In Dietikon near Zurich, a futuristic housing development is being equipped with Fiber to the Home. Here R&M is making its mark with innovative cabling systems.

With its 11 courtyards resembling neighborhoods, Limmatfeld constitutes a small town with many green areas and places for people to gather.



The generously laid-out apartments with interesting floor plans have FTTH access. Illustrations: raumgleiter gmbh

For Ede I. Andràskay, things were clear from the very beginning. “The future belongs to fiber optics. That’s why we’re equipping all the residential units of the ‘Limmatfeld’ A/B building site with Fiber to the Home. The corresponding decision was already made back in 2008.” The CEO of the Swiss company Halter Entwicklungen knows exactly what he’s doing and knows that fiber optic cabling all the way through to the customer supports data rates exceeding 100 Mbit/s. This allows smooth, reliable access to growing volumes of data traffic and the use of new value-added services as well as multimedia Internet services. These services have a strong appeal for today’s communications-loving urban dwellers because the longer these services are around, the stronger the impact they have on everyday life. They even improve the quality of life.

includes a courtyard and block perimeter development as well as an imposing high-rise building that will some day dominate the skyline.

Futuristic district

Work is progressing busily at various construction sites in order to transform this former industrial complex step by step into an attractive, high-quality and futuristic district. As the primary owner of the complex, Rapid Holding AG had already commissioned Halter in 2001 to ensure the long-term conversion to new uses by means of suitable planning measures and targeted regional marketing.

The result is the emergence of “our small town,” a catchy and very applicable slogan. And just as it should be for a small town, an extensive project is being created at Limmatfeld with offices, hotels, apartments, stores and other uses. The designers are placing special emphasis not only on an innovative, representative and economic total project but likewise on one that presents a striking solution in terms of urban planning and architecture. One goal in particular was to avoid creating a megastructure in order to give the town of Dietikon a

THE R&M SOLUTION

- Main FO distribution frames (ODF)
- Vertical FO distribution frames going up risers (BEP)
- Home wiring kits with Cat. 5 cabling in living areas

We’re standing with Andràskay in the exhibition pavilion of the new “Limmatfeld” residential neighborhood, which is taking shape in Dietikon near Zurich. It’s an impressive creation because “Limmatfeld” has a total area of no less than 85 000 square meters and is divided into a total of 11 building sites (A through L) being developed in stages. It



Ede I. Andraskay, CEO of Halter Entwicklungen, uses an architectural model to explain the project.



“An innovative partner who always kept our project goals in mind was a key factor leading to the success of this concept. Developments in the area of FTTH are enormous and even today still need daily optimization. Products from R&M have impressed me in every respect. I’m very excited by their further development and how they can flexibly adapt to every situation. I very much like this joint way of taking on something so new and having an open exchange of ideas so we can all profit from each other over the long term.”

Alexander Huber, CEO, Click to move, www.clicktomove.ch

new, positive accent. At the same time, consideration had to be placed on a suitable form to blend in with the appearance of neighboring buildings.

No one less than the renowned Berlin architect Prof. Hans Kollhoff supplied the overall concept for the urban planning. This resulted from the winning project submitted to a study competition in 2002 and serves as the basis for adapting the basic organization. At some future time – that means in 2015 – “Limmatfeld” will have between 2000 and 3000 occupants, and 1500 to 2000 people will work there.

Solution-oriented total concept from R&M

Even though the future tenants and owners of the “Limmatfeld” apartments might be very different in many re-

spects, they’ll all have something in common – they’re urban people open to modern times. They’ll be just as impressed with the attractive, affordable location at Zurich’s doorstep and near the Dietikon train station as with the modern interior construction of their homes. This includes equipping every apartment with Fiber to the Home. The living areas are tied in with copper cabling. R&M was selected to supply the fiber optic and copper network and is delivering a complete, customized solution with innovative cabling components.

In many respects, “Limmatfeld” will certainly be considered a showcase that will set the standard for many other sites – not only in terms of urban planning, architecture, energy efficiency and sustainability, but also because of the

fiber optic cabling straight through to the customer. “We want to make a mark with the decision to equip every apartment with Fiber to the Home,” says Andraskay. “Fiber optics are forward-looking and modern. With this move, we are certainly on the path towards the Gigabit Society.”

This Gigabit Society is based on totally integrated fiber optic cabling and allows unhindered, quick and secure movement along the data highway. As a proven expert, R&M is pressing forward internationally with flexible complete solutions – between Dietikon and Dubai, Schwamendingen and Shanghai, Hombrechtikon and Hong Kong. ■

Further information:
www.limmatfeld.ch



090.6343

Beat Stucki | R&M Switzerland
beat.stucki@rdm.com

Grades for Multimode – Ahead of the Standards

With IEC 61753-1, defined grades for fiber optic interconnecting devices have been available since 2007. They only apply to singlemode models, however. Until now there has been no comparable standard for multimode connectors. R&M closes this gap with its own definition of grades for multimode connectors.

Anyone planning fiber optic networks requires certainty, especially when it comes to the attenuation budget. Connectors pose the main burden for that budget along with fiber optic cables. To provide planners with reliable criteria, the International Electrotechnical Commission defined attenuation values and geometric parameters for singlemode connectors in 2007 in the IEC 61753 and IEC 61755-3-1/-2 standards. The di-

vision into grades (see tables) served as the basis for the compatibility of fiber optic connectors from different manufacturers and for the determination of manufacturer-neutral attenuation values.

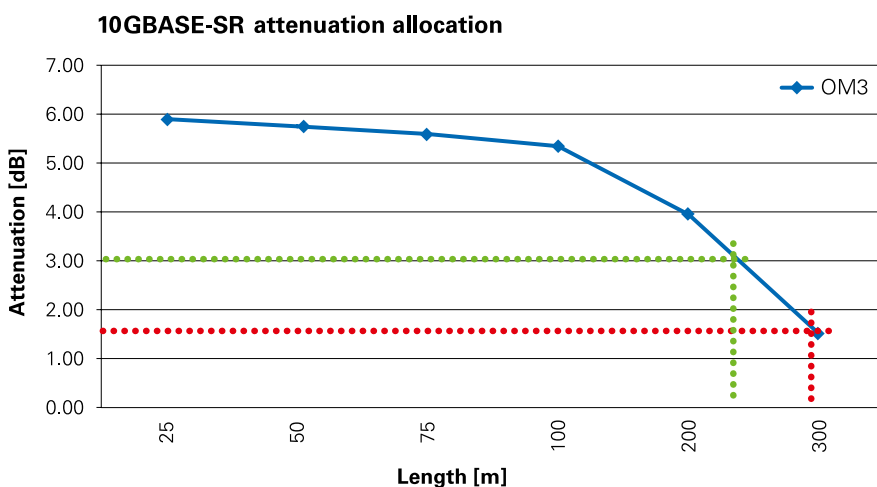
However, the Grade M still contained in the draft versions of the standard for multimode connectors was not incorporated in the adopted standard. Ever since, manufacturers and planners have

been making do by drawing on information from older or accompanying standards to obtain guidance values for connector values. R&M applies the Grade M as it was described until just before the publication of the IEC 61753-1. ISO/IEC supported these values with a required insertion loss of ≤ 0.75 dB per connection.

These quality requirements for multimode connectors no longer suffice in light of the widespread introduction of 10 Gigabit Ethernet (GbE) and particularly of the future bandwidths 40 GbE and 100 GbE.

The following is an example: According to IEEE 802.3ae, type OM3 fibers are supposed to transmit 10 GbE over a maximum distance of 300 meters. Under the standard, however, only 1.5 dB remain for connection losses (diagram to left, red line) after deduction of fiber attenuation and power penalties. Assuming today's Grade M multimode connectors and insertion loss of 0.75 dB per connector, a maximum of two plug connections is possible. This is hardly realistic.

Conversely, two MTP and two LC plug connections are now supposed to be realized, for example. With insertion loss



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Determination of the attenuation budget for an OM3 fiber assuming 10 GbE (blue = remaining attenuation budget for connections; red = residual budget at a length of 300 meters; green = remaining cable length for two MTP and two LC connectors)

of 0.75 dB for each connection, total attenuation amounts to 3 dB. Consequently, the link is allowed to be about 225 meters at most (diagram to left, green line).

For the same example and a bandwidth of 40 GbE, the distance declines to just under 25 meters. These examples show that the attenuation budget available for connectors is steadily diminishing.

Classification

The definition of grades for multimode connectors is therefore long overdue. So far, the standard body dealing with IEC 61755 has failed to present any values that are reliable and, above all, reasonable. R&M wants to bring a measure of clarity into this matter at last and has defined its own grades for multimode connectors based on long-time empirical values. The division is based on the classification for singlemode, supplemented by the Grade EM and Grade 5 to describe PCF and POF connectors.

Applied to the above example, a maximum of 1.5 dB attenuation is available for four connections (diagram to left, red line). Applying the new multimode grades to two CM-Grade MTP connectors and two BM-Grade LC connectors, one obtains a maximum of 1.2 dB attenuation with a certainty of 99.9994 % and a maximum of 0.7 dB with a certainty of 93.75 %. The desired maximum length of 300 meters can be achieved with no problem at all.

That means customers can now also enjoy greater certainty and freedom when planning multimode systems. If customers need additional connections, they simply select higher-grade connectors. The previous practice of applying maximum values leads to incorrect specifications. Instead, customers should apply median values or 95 % values in planning.

Grades according to IEC 61753-1

IL*	(≥ 97%)	Mean	Remarks
Grade A	≤ 0.15 dB	≤ 0.07 dB	No final definition as yet
Grade B	≤ 0.25 dB	≤ 0.12 dB	
Grade C	≤ 0.50 dB	≤ 0.25 dB	
Grade D	≤ 1.00 dB	≤ 0.50 dB	
Grade M	≤ 0.75 dB (100%)	≤ 0.35 dB	Not specified in IEC 61753-1

RL**	(100%)	Remarks
Grade 1	≥ 60 dB	≥ 55 dB unmated (APC only)
Grade 2	≥ 45 dB	
Grade 3	≥ 35 dB	
Grade 4	≥ 26 dB	

R&M definition of grades for multimode connectors

IL*	100%	95%	Median	RL**	100%	Remarks
Grade A _M	0.25 dB	0.15 dB	0.10 dB	Grade 2	45 dB	Only single fiber connectors, LSH, SC and LC
Grade B _M	0.50 dB	0.25 dB	0.15 dB	Grade 3	35 dB	Only single fiber connectors
Grade C _M	0.60 dB	0.35 dB	0.20 dB	Grade 4	26 dB	Multi fiber connectors
Grade D _M	0.75 dB	0.50 dB	0.35 dB	Grade 4	26 dB	Analogous to today's Grade M
Grade E _M	1.00 dB	0.75 dB	0.40 dB	Grade 5	20 dB	For PCF and POF

*IL = insertion loss, **RL = return loss

As with the singlemode grades, the grades for multimode connectors require guaranteed each-to-each values (i.e. values where each connector is measured against the other one). Competitors tend to draw on data from measurements against a reference connector but this data does not help. It merely results in pseudo certainty in planning.

To plan networks that operate reliably in the future and to respond effectively to a steadily diminishing attenuation budget, customers are advised to rely on R&M connectors and on a reliable classification by grades for singlemode and multimode. ■





Dr. Mohammed Al Zarooni, General Director of the Dubai Airport Freezone, Peter Reichle, CPO, and Jean-Pierre Labry, Managing Director of R&M Middle East & Africa Ltd., at the opening of the new facilities in Dubai.

R&M Now Even Closer and More Responsive to its Customers

Anyone starting a cabling project today usually needs customized solutions.

Eighty percent of all products and solutions R&M delivers are customized.

The supply chain strategy reinforces this trend.

It brings the two departments Logistics and Engineering even closer to the partners and customers of R&M.



Example of a custom-made product from R&M

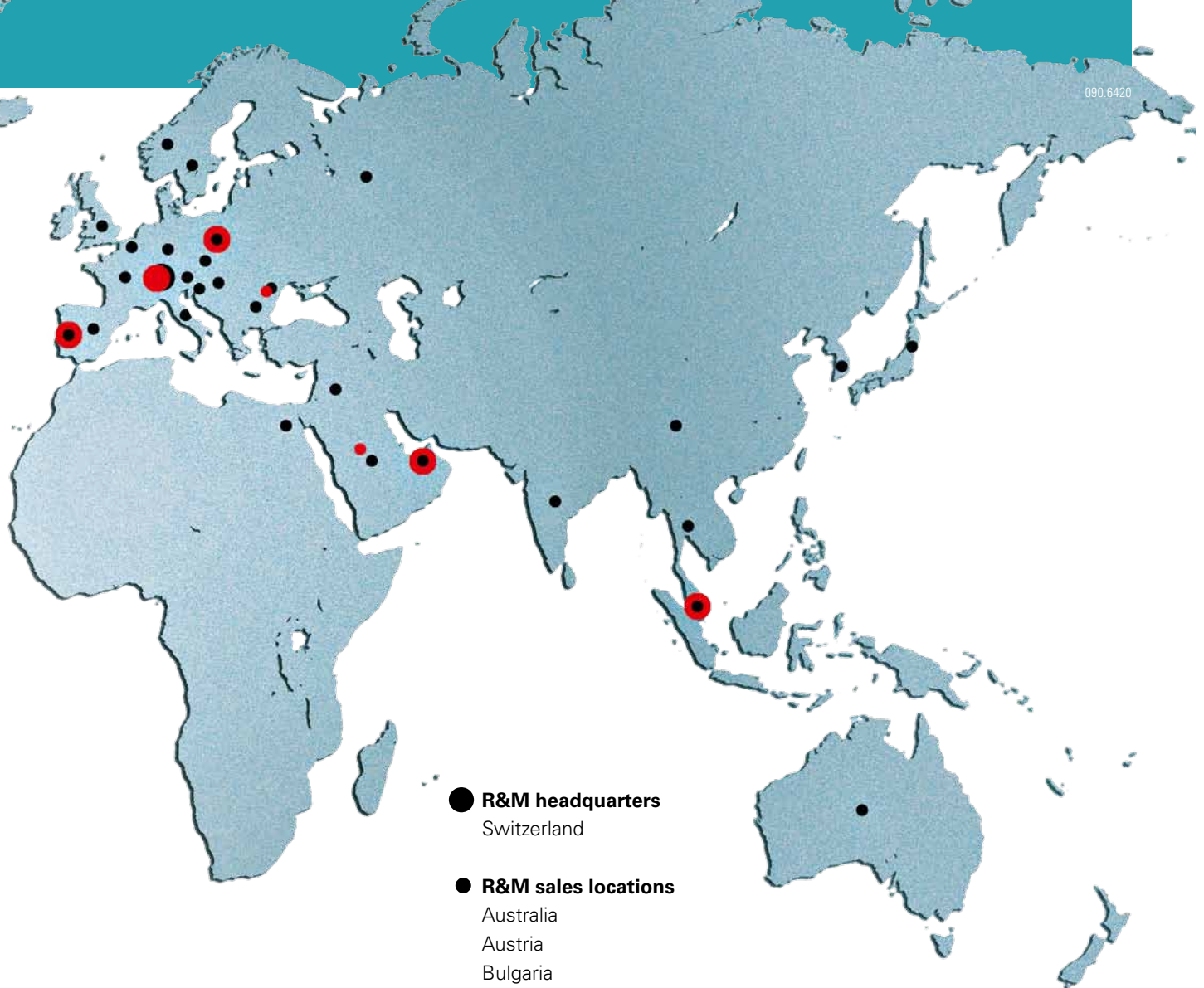
We want to be on site and respond effectively to regional needs. We also want to be able to supply specific adaptations and individual advances at short notice but without compromising our quality. This attitude has been characteristic of R&M for decades and our customers value it. We are now perfecting this approach as part of our supply chain strategy. The need is great. R&M has recently seen growing demand for tailor-made cabling solutions in all its sales regions, from China and India to the Middle East and Europe.

Decentralized supply chain hubs meet this need. In Singapore, Dubai, Poland, Romania and Portugal, R&M has expanded its branch establishments into appropriate centers of competence. Further centers of this kind are being set up in Saudi Arabia and the Netherlands. The hubs unite product management with expertise and local engineering,

manufacturing and assembly, warehousing and logistics, as well as support and training. Everything is at a single site. As a result, these hubs can offer genuine local customizing and shorten typical delivery times by 30 to 50 percent.

The range of performance of the hubs extends from one-off advances and customized manufacturing and termination to fully supplying larger projects and key accounts. Local suppliers of installation material, national standards and specific technologies can be integrated as long as the solutions satisfy the strict quality standards of R&M.

Swiss precision and quality thinking prevails at the supply chain hubs. R&M headquarters in Wetzikon fully monitors and controls the hubs. R&M has defined standard processes worldwide for engineering and all supply chain procedures.



● **R&M headquarters**
Switzerland

● **R&M sales locations**

- Australia
- Austria
- Bulgaria
- China
- Czech Republic
- Egypt
- France
- Germany
- Great Britain
- Hungary
- India
- Italy
- Japan
- Jordan
- Kingdom of Saudi Arabia
- Netherlands
- Norway
- Poland
- Portugal
- Romania
- Russia
- Singapore
- Slovenia
- South Korea
- Spain
- Sweden
- Switzerland
- Thailand
- United Arab Emirates

● **R&M supply chain locations**

- Poland
- Portugal
- Singapore
- Switzerland
- United Arab Emirates

● **R&M supply chain locations being set up**

- Bulgaria
- Kingdom of Saudi Arabia

Concentrated expertise to deliver solutions

With its supply chain strategy, R&M has clearly enhanced the status of the branch locations. The partners and customers benefit from comprehensive service within their region. Additional jobs are generated locally. This benefit fills the representatives of these facilities with pride, as Dr. Mohammed Al Zarooni, General Director of the Dubai Airport Freezone, noted at the opening ceremony for the local R&M hub in January of this year. ■



090.6398

Markus Stieger-Bircher | COO
markus.stieger@rdm.com

Matmut: “Our Insurance Policy for Quality”

During the expansion of its headquarters, the large French insurance group Matmut remained true to its traditional roots in the heart of Rouen. In the planning of three new buildings, a great deal of attention was paid to generously laid out workplaces bathed in plenty of light. And during the expansion of the network infrastructure, the planners made no compromises when it came to quality and reliability and thus chose products from R&M.



So that the technology corresponded to the contemporary architecture, the insurance company updated its entire network infrastructure to the state of the art. That company is now ready to completely fulfill the requirements for service and quality through the increased use of Voice and Video over IP.

The story of the network at Matmut's headquarters is also a story about network technology. It started with the

Token Ring® protocol over coax cable, which has long since been replaced. Thereafter followed the incessant advance of Ethernet and TCP/IP, continually challenged by the increase in data volumes it allowed. Thanks to ongoing updates, they managed to keep up with leading-edge technology. The last overall renovations started in 2007 and were concluded with the commissioning of the new buildings.



Matmut Group

With 2.9 million members and 6.4 million insurance policies, the Matmut Group is a major player in the French insurance market. Its portfolio includes a broad, complete range of insurance products for individuals and property as well as financial services.

ECR Informatique

Founded in 2001 and active throughout the country, ECR specializes in the installation of IP networks (Wi-Fi, RJ45, fiber optic). Since 2011 it has been a part of the UNIR Group, which focuses on the installation of high- and low-voltage infrastructure. Since it was founded, ECR has been Matmut's preferred installation partner.



090.6390



Here, Wi-Fi plays only a marginal role. For most communications outlets, Matmut decided in favor of speed and reliability and installed an average of one RJ45 socket for every five square meters in each of the four floors of all six buildings.

The final phase, equipping the three new buildings, was completed in 2010. The concept was developed internally by Bruno Rabine, who is responsible for networking and telephony at the Group. Keeping this portion of the job in-house made it possible to clarify in great detail the company's requirements and to meet its needs in terms of quality and a long service life. The technical validation and encryption was handed over to IBM. Responsibility for the installation work was given to the company ECR Informatique. This team, led by Jean-Fred Bachelet, ultimately selected the R&M solution for this project.

Now 1600 additional outlets are ready for operation in the new buildings. For this, 4800 RJ45 boxes and 225 km of Cat. 6 cable had to be interconnected. The fiber optic backbone between the three engineering services rooms, from which each ensures network access for two buildings, has a capacity of 20 Gbit/s.

Bachelet, coordinator of the installation, praised the exceptional quality of the R&M products, saying, "R&M's quality standards far exceeded the applicable standards for this product category. In fact, the slightly higher level of prices was quickly compensated for by superior performance and perfect quality. Even in large volumes, each and every piece was faultless. For us, R&M is our insurance policy for quality." Further, he was impressed not only by the products; the same held true for the entire brand, "...always available and in every single case extremely competent – the guys at R&M are simply first-class people to deal with."

Rabine, responsible for operating the network, confirmed the system's reliability. "If the buildings are still here in a hundred years, the network will still be operating. Here we're dealing with components that from the very start have functioned without a single problem, and this now for quite some time. Even after moving offices or after frequently plugging equipment in and out, the outlets are not exhibiting the least bit of wear and tear."

Everyone is quite satisfied with the choice. The installation company ECR was able to complete the assignment on time without any problems. Matmut now has a reliable local network with excellent quality. It has opened the doors to a new age of communication. As if there were still some need to prove the satisfaction of all those involved, a new project is already under way. ■

THE R&M SOLUTION

- Initial planning: 2007
- Implementation completed: 2010
- 22 000 m² of office space on four floors in three buildings
- 1600 workplaces
- Three RJ45 sockets per workstation totaling 4800 connection points
- On average, one RJ45 socket for every four and a half square meters
- 225 km of Cat. 6 copper cable
- Fiber optic backbone



090.6410

Xavier Auvert | R&M France
xavier.auvert@rdm.com



Free enterprise in action

Free enterprise in action instead of excessive regulation of business, that is certainly a motto for more than 90 percent of all successful, well-run companies. But the idea of corporate governance is also vital. And it is a matter of course in most owner-managed companies.

As a family company in business for 47 years and now run by the second generation, R&M has had three core values from the outset: modesty, honesty and respect.

Corporate spirit

Corporate governance can sometimes not go far enough and can involve excessive regulation. For entrepreneurs there is a simpler formula that captures the corporate spirit while also including the idea of corporate governance:

**Corporate spirit =
values of (patience x customers
x sustainability)**

Corporate Spirit

Values of patience

A tour of a company quickly reveals whether employees are performing their jobs enthusiastically or merely working to rule. A well-lubricated corporate culture emphasizes steady progress and team success over hierarchical thinking and power games and is essential to business success.

This passion is deeply connected to meaningful work. For instance, R&M does much more than “just” develop and manufacture communication connectors. With its fiber optic and copper cable solutions, R&M lets people throughout the world continuously communicate and exchange information with each other.

Values of customers

Every businessman knows that a company’s competitiveness can only be ensured if it constantly provides better solutions in the market than its competitors. “Differentiation + customer benefits” is the simple formula for success in this case. R&M tries to do not just that but also to build up and expand long-term, trust-based relationships by offering professional customer service.

Values of sustainability

In sustainable corporate development, long-term thinking takes precedence over short-term profit maximization. The Cube, the new R&M business complex at headquarters in Wetzikon, is an example of how a production facility can use the latest bore-hole heat exchanger technologies to cut CO₂ output by about 80 percent of what it is in conventional buildings.

Conclusion

Regulations are needed but often only for a minority of all companies. Regulations against greed and power are simply fighting the symptoms of the problem. To get at the root cause, free enterprise should be promoted more extensively as a basic attitude. Children should learn about it growing up and while they are in school. ■



Martin Reichle | CEO
martin.reichle@rdm.com

Freenet Revs Up Internet Sales



090.6419

Ofertix is the leading online portal in Spain for buying brand articles at bargain prices. It has over three million users and annual sales of EUR 25 million. In December 2010, founder and Director Antonio Alcántara decided to build larger business premises in Sant Just Desvern, Barcelona, to accommodate the rapid growth of Ofertix.com. In the 9000 m² complex, the departments for production, photography, design, after-sales services, IT and logistics can now use the newest technology to provide customers with even better and more numerous services. The high-performance network crucial for these capabilities comes from R&M.

For Ofertix, a high-performance communication infrastructure is vital for business. ACISA was the engineering firm commissioned to take care of project planning. Aware of the tough demands to be met, ACISA contacted the R&M certified installer TANTIK soluciones sl. in order to find the best solution. TANTIK Managing Director Cayetano Belmonte then assumed responsibility for planning the entire network.

Ofertix Director Antonio Alcántara and his engineers insisted on a high transmission rate for voice and data services along with a network of maximum reliability for the correct handling of the orders placed by online customers. Fol-

lowing these specifications, Belmonte developed an initial design based on a complete solution from R&M for the LAN at the new headquarters of Ofertix. Belmonte had worked successfully with R&M for three years prior to this project. After various changes to the original design and thanks to intense consultations with him, Ofertix finally opted for the unshielded STAR Freenet Cat. 6 system.

The network supplies five floors, each covering about 1800 m² in area. An eight-wire backbone UTP Cat. 6 connects the thirteen secondary racks with the main rack. Each secondary rack combines 550 connections via Cat. 6 STAR Freenet UTP, switched onto 50 24-port

patch panels and 25 50-port patch panels for telephone service.

Cayetano Belmonte, Managing Director of TANTIK soluciones sl.:

"The R&M solution meets all customer requirements without any difficulty, guaranteeing reliable, secure data transport."

Ofertix Director Antonio Alcántara and his engineers assigned to the project:

"TANTIK soluciones sl. installed the voice and data network at the new premises of Ofertix using copper cabling products from R&M. These components are distinguished by their quality and large bandwidth, their low cost and the possibility of expanding them later (they are readily switchable to fiber optics)."

Two of the additional security elements included are color coding and protection for connections to prevent them from being tampered with by unauthorized parties. These features also swayed Ofertix and TANTIK soluciones sl. to select the complete solution from R&M. ■

THE R&M SOLUTION

- 550 user connections Cat. 6 UTP
- 50 x 24" patch panels Cat. STAR
- 25 x patch panels for phone service with 50 pairs of phone wires
- Cable guides and 45 x 45 boards

WHY R&M?

- Quality and design
- Guaranteed high performance
- Reliability and security
- Easy installation



From left to right: Cayetano Belmonte, Managing Director of TANTIK soluciones sl.; Antonio Alcántara, Director of Ofertix; Miguel Ángel Santos, Account Manager R&M



Elena Iglesias Lopez | R&M Spain
elena.iglesias@rdm.com



Installation of a section of the 87 km underground power cable, which will supply power to Victoria's new desalination plant

R&M Supports Largest Desalination Project in Australia

One of the worst droughts and low stream flows that hit Melbourne has left its water storage less than 35 percent full. The increasing population was also a contributing factor that added pressure to Victoria's water supply system. With that, Thies Degrémont was entrusted the task to design and construct a new desalination plant, which helps save, recycle, distribute and create water for Melbourne and the regional communities, independent of rainfall.

The \$ 3.5 billion Victorian Desalination Project will deliver Australia's biggest desalination plant with an initial production capacity of up to 444 million liters per day and the capability to expand to 548 million liters per day. The plant is connected by an 84 km pipeline to Melbourne's existing water network and with 87 km of underground cable to the electricity grid.

More than 200 km of fiber optic cables will be installed along the pipeline and power line to monitor performance, allowing communication with the plant, and also providing capacity for future broadband connection for local communities. At the processing plant, plastic and fire-rated fibers were selected to avoid interference between the heavy machines and to ensure a fast equipment response time in milliseconds, which is crucial.

R&M was chosen for this project due to its high-quality products and known reliability, to ensure a future-proof investment and reliable communication flow in the years to come. The customer, Thies Degrémont, was looking for a complete end-to-end solution partner for its FO connections. R&M was able to offer a customized solution to address Thies Degrémont's requirements, such as supplying cables in various lengths to avoid excessive material waste.

Thanks to its local presence and the regional supply chain hub in Singapore, R&M guarantees on-time delivery for customized solutions even within tight deadlines. One of Thies Degrémont's requirements was fire-rated and rodent-protected cables. R&M was able to provide both. R&M was also able to recommend Polymer Cladded Fiber (PCF) cables as an alternative to Plastic Optical Fiber (POF) to achieve longer communication distance inside the plant.

High flexibility and fast response time were major challenges faced. A large-scale project like this requires extensive communication and interaction with large engineering departments. ■

THE R&M SOLUTION

- 24- and 60-core long haul outdoor cables
- 2-core PCF cables + ST PCF connectors
- 24 x SC-Duplex unirack (FOBOT)
- Various OS1 and OM3 indoor cables
- Highly fire-rated 24-core OS1 cable
- SC connectors, field-terminable in OM3 and OS1

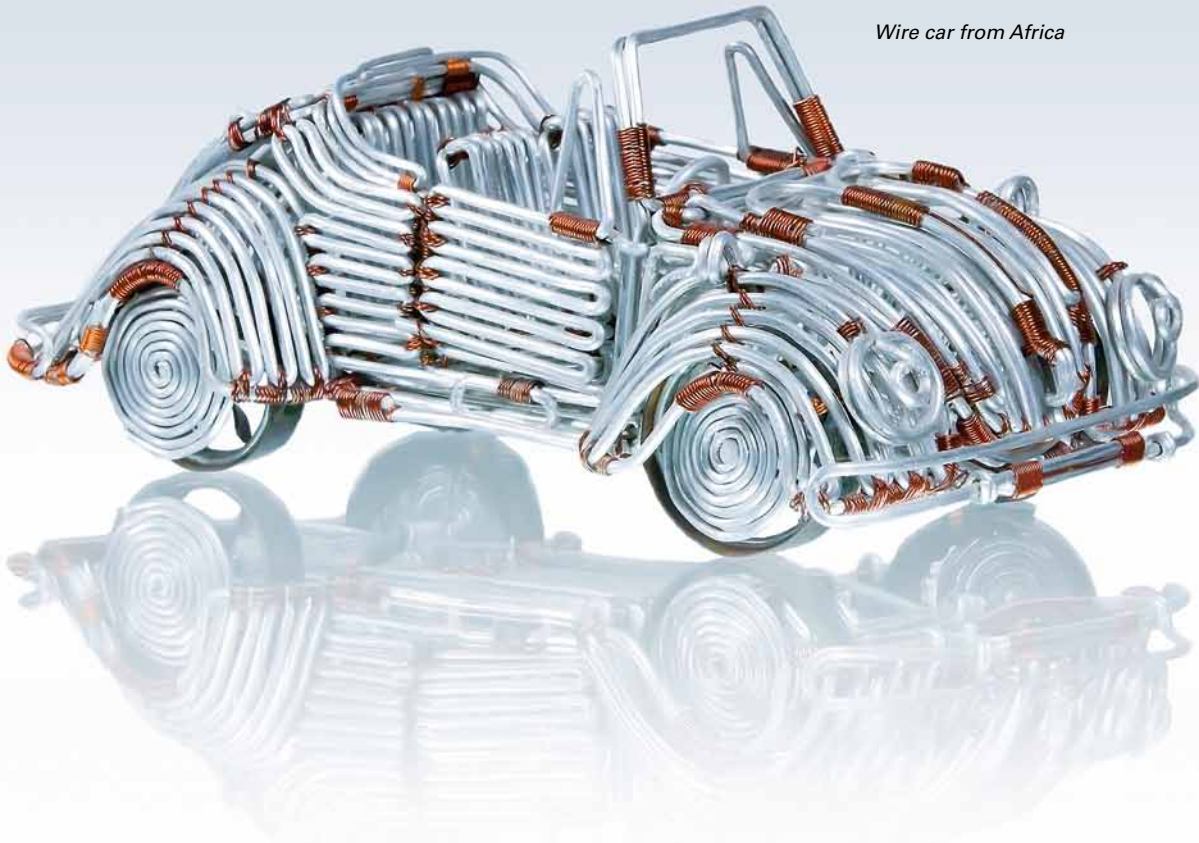
WHY R&M?

- Regional support team able to respond to changing requirements of customer on time
- End-to-end solution for FO connections
- Fire-rated and long-haul anti-rodent cables
- Availability of non-glass fiber POF/PCF products in Australia



Emmanuel Beydon | R&M Australia
emmanuel.beydon@rdm.com

Wire car from Africa



Joie de Vivre = “Muscle Power” x “Bright Eyes to the Power of Two”

Bright eyes

Recently my wife brought me back a “wire car” from her trip to Africa. Hardly my dream car – but it represents the drive and motivation of a young man in Africa who, with only two different types of wire, has managed to translate his innermost wish, at least in a model, and earn his livelihood at the same time.

My wife told me she found him sitting by the roadside, bright eyed, surrounded by his works of art. In his thoughts he was transported to a dream world, one where presumably he saw himself as a wealthy man sitting in a car, and yet there he was, bending wires to create new cars.

The passion of that creative output is apparent in the many functionalities of the model car itself, with for example all the car doors, the trunk and the hood swiveling open.

Muscle power

The young man had taught himself the skills and the know-how needed to make these cars. In his native country, opportunities for training and further training are few and far between. And yet his passion for cars was clearly strong enough to motivate him to keep on perfecting his craft.

Joie de vivre

Clearly the young man’s joy of life as he went about his handiwork was strong, with the relevant know-how already in place, boosted time and again by his passion.

But by the evening it had begun to ebb as once again he became aware of the hopelessness of his situation: the inability, without sound basic training, of moving on in life and being able to compete for an exciting job.

Compared with those regions of the world where prosperity and an extensive offer of training and education exist, it raises the question: How can we make sure that we keep those bright eyes alive and fan the enthusiasm of all age groups in order to increase the zest for life and enthusiasm of the group as a whole? ■

W. Reichle



090.6175
Martin Reichle | CEO
martin.reichle@rdm.com



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Headquarters

Reichle & De-Massari AG
Binzstrasse 31
CHE-8620 Wetzikon/Switzerland
Phone +41 (0)44 933 81 11
Fax +41 (0)44 930 49 41

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