CONNECTIONS 40

090.6077

R&M
Convincing cabling solutions

Project to Improve Sales Team Moving Full Steam Ahead


090.5852

"Sustainable growth" is the motto at R&M this year. Our setup today is more modern than ever and we have laid a solid groundwork for acting even more quickly and efficiently in the market. Our main focus now is to extend our international sales team.

We are all in a turbulent market trying to address the needs of our clientele. With an open corporate culture of innovation, we create the freedom required for new advances. We devise and implement customized solutions in as short a time as possible. Logistics is able to supply the customer quickly and directly at the best possible terms. But the focus is always on the quality of our product ranges. We never deviate a step from our tough standards. Maintaining and further expanding these standards is our goal and also a major and exciting challenge for the entire workforce.

Everything we do revolves around you, dear customer. Our primary task is to recognize your needs and address them in our daily work. In this latest issue of our customer magazine *CONNECTIONS*, we explore trends and product solutions for FTTH (Fiber To The Home). The issue also features a number of interesting reference reports describing a wide variety of solutions we have devised for our customers. The business aspects of the company are also well covered, with articles about innovation management, corporate social responsibility and the spirit of invention.

In the eight months I have been working at R&M I have met excellent employees who are highly motivated. It is impressive how the R&M corporate culture is practiced on all levels and in all regions, and how it always puts the customer first. The family who owns R&M also shows a great willingness to invest, even in these difficult economic times. I consider this attitude an ideal prerequisite for continued sustainable growth and success.

Immerse yourself in our world and find out just what a central part of that world you are!

Ingo Kübler | CSO
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Contents

South Korea tops the worldwide rankings for FTTH/FTTB.

A large number of network operators, municipal utilities and local governments on all continents are currently planning fiber optic networks. People are realizing that copper networks will reach the limits of their capabilities this decade. Ever greater bandwidth and improved transmission technology are needed to accommodate growing Internet traffic plus new value-added services and multimedia products. Carsten Schloter, CEO of Swisscom: "Today, the demand for bandwidth doubles every 20 months in the fixed network."

Based on current knowledge, end-to-end fiber optic cabling extending to the customer is the only way to achieve transmission rates beyond 50 Mb/s for all subscribers. Many forecasts predict we will need bandwidths between 64 and 320 Mb/s by 2020 and between 810 Mb/s and 4 Gb/s by 2030. That means network expansion is unavoidable.

Fiber promotes growth

Many governments view investments in fiber optic networks as a way to promote economic growth. The next generation infrastructure is expected to generate more jobs, increase innovation, education and productivity, improve health care services, reduce energy, enhance quality of life and much more. A series of scientific studies confirm the positive economic effects of modern communication networks. Germany alone can expect 968 000 new jobs and annual growth in the gross domestic product (GDP) of 0.6 % if the desired broadband infrastructures really are built by 2020. FTTH is also worthwhile for service providers. Average revenue per user (ARPU) could increase by 20 % to 30 % worldwide if next generation architectures are available according to Benoît Felden from the consulting firm Yankee Group.

Rise in the numbers of subscribers

Although the number of households with an FTTH connection is rising rapidly, most countries are just now entering the fiber optic era. The FTTH Council Europe reported impressive growth rates at its annual congress in Milan in February 2011. For instance, the number of European FTTH/FTTB subscribers grew by 18 % in 2010. There was a 23 % increase in the number of connectible homes (homes passed). The FTTH Council says the number of subscribers in Europe will triple by 2015, reaching 32 million.

The market is expanding at an especially fast rate in Eastern Europe. The "greenfield approach" is benefiting the markets in this region. In Lithuania, one in four households uses the fiber optic network. This country ranks sixth worldwide for FTTH/FTTB market penetration, ahead of Sweden, Norway and Slovenia.

Switzerland as front runner

The roll-out of fiber optic networks is also picking up speed in several parts of Western Europe. It is predicted that 80 % of the Swiss population will already have access to 20 Mb/s connections by 2013 via xDSL, a cable network or fiber optics. By the end of 2015, fiber optic service will be fully in place for one million households. That is the equivalent of one third of the population.

Dr. Karl-Heinz Neumann is director of WIK, a scientific institute in Bad Honnef, Germany, focusing on infrastructure and communication services, and has been observing the European broadband market for years. He warns that the goal in the Digital Agenda of the EU is unrealistic, namely to provide at least 100 Mb/s service to 50 % of all connections in Europe by 2020. He believes only Switzerland is capable of attaining this goal.

Welcome to the Age of Fiber Optics

Fiber optics is taking the world by storm. More and more places are bidding adieu to the copper phone wire they have been using for 150 years. They have realized that only fiber optics can supply us all with ultra-broadband Internet and digital value-added services while also opening up new opportunities for growth.

The four-fiber Swiss model for FTTH connections at the end customers' premises is considered a model internationally. It promotes cooperation and fair competition in equal measure. Network operators can cut costs if they collaborate on cabling and have common standards for interfaces, sockets, etc. If provided with several fibers, each customer can easily change providers. This situation ensures what is called open access, i.e. local-loop unbundling and competition at the point of access to the network.

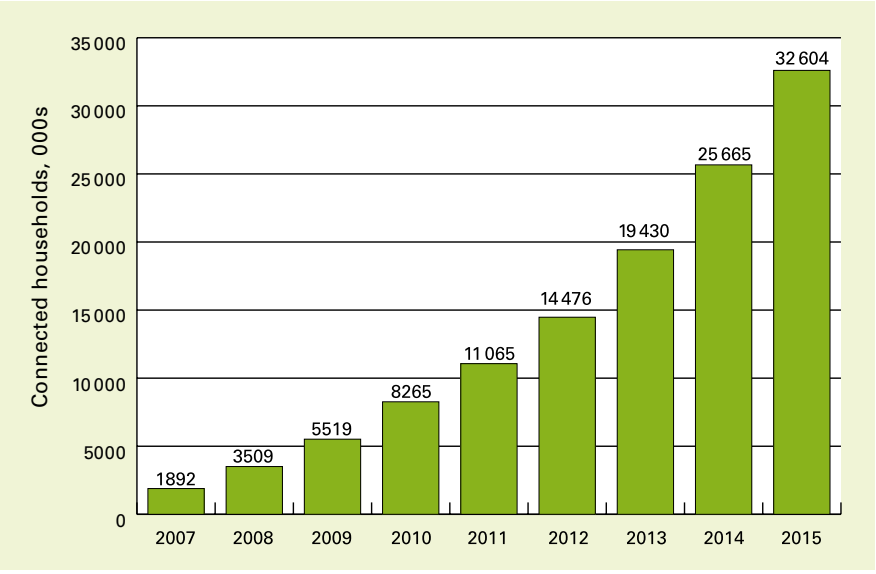
No other European country has taken an approach so attractive for network operators. As a rule, there are not even national standards for the service area interface in the experience of R&M.

Innovation in Portugal, Italy and the Middle East

The FTTH age got off to an especially dynamic start in Portugal. The network operator Portugal Telecom (PT) consistently invested to ensure its competitive lead over cable TV providers. Early decisions made by the Portuguese regulation authority ANACOM facilitated progress. "We have been operating with fiber optics for over a decade. Now it is more than a matter of access for a few thousand subscribers. We provide access for millions. That means we have a totally new paradigm," Portugal Telecom Planning Director Luis Alveirinho said in describing the current situation.

Portugal Telecom began building up the new fiber optic infrastructures in 2008 with assistance from R&M. Within a year,

FTTH Forecast for the European Region *Source: www.ftthcouncil.eu, February 2011*



The four-fiber Swiss model for FTTH connections at the end customers' premises is considered a model internationally.

FTTH connection for one million households: Portuguese installers putting in house connection boxes.
Photos: © Portugal Telecom

PT had potential FTTH connections for one million homes. The technicians were able to work at a fast pace because planning, the materials used and the installation procedures were all subject to strictly defined and greatly simplified standard rules. The quick-mounting design from R&M also helped them. They achieved an average installation time of four hours per household with no compromise in terms of installation quality. That has to be close to a record.

Portugal Telecom received the FTTH Council Europe Innovation Award for 2011 for its successful FTTH roll-out and holistic, tightly organized market strategy. CEO Zeinal Bava said the prize was more than recognition of his teams' performances. He called it an endorsement of his company's partnership with leading producers such as R&M. He went on to say that, together, PT and its partners deliver best-in-class solutions for customers in Portugal.

Fastweb, the most innovative provider in Italy, also teamed up with R&M to develop a solution for new fiber optic distributor sites. In the spring of 2010, this solution allowed the network operator to launch an upgrade at extraordinarily short notice and with surprising flexibility. Fastweb is the first provider in Italy to provide FTTH service to households at a rate of 100 Mb/s. Italy already has a total of 348 000 FTTH subscribers and 2.5 million homes passed (connectible households).

The Italian network providers want to join together to make Italia Digitale a reality and to make an FTTH connection available to at least half of all households by 2020.

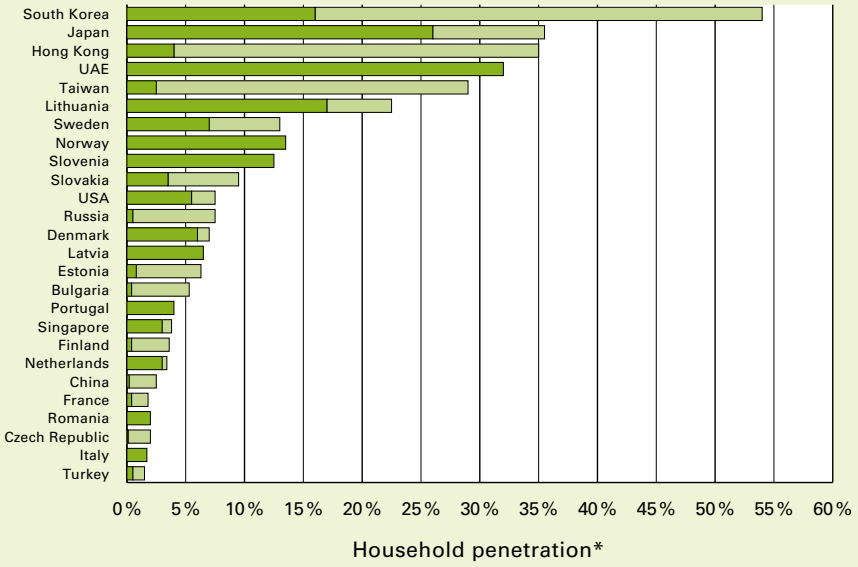
Several countries in the Middle East have opted for an all-IP strategy based on fiber optics (all-IP means all services via Internet Protocol). It is hoped this approach will give them further advantages in international competition as a location for attracting new business. One example: The network operator Etisalat recently built up an FTTH network in Abu Dhabi with the help of R&M. It can serve more than 600 000 buildings. These efforts make Abu Dhabi one of the first capitals in the world supplied with complete FTTH service. R&M has been able to draw on its strengths as a flexible supplier in a number of Middle East projects and deliver tailor-made cabling solutions.

The SCM program from R&M simplifies matters

The growth rates and successful public and private sector FTTH programs should not belie the substantial investments required to build up fiber optic networks, particularly the last meters to the customer's premises. René Schumacher, Head of Production at Swisscom: "It is a project for an entire generation."

That is why network operators demand efficient and flexible solutions that are as quick as possible so their installation and operating costs remain manageable. "Simple solutions that can be terminated in the field and installed on a big scale are what providers are looking for," René Schumacher adds. Innovative cabling systems such as the Single Circuit Management (SCM) System from R&M meet these requirements and simplify entry into FTTH projects.

The SCM program from R&M standardizes fiber management at every network level all the way to the house connection. Quick-installation technique, modular design, easy-to-read labeling and simple handling are among the special features of this connection and distribution system. It reduces needed training as well as installation and servicing times by 30 % compared to conventional fiber optic cabling systems.



European Global Ranking

Economies with the highest penetration of Fiber To The Home/Building + LAN (at least 200 000 households)

* Economies with greater than 1 % household penetration

Source: www.ftthcouncil.eu, February 2011

Fiber To The Home subscribers
Fiber To The Building/LAN subscribers

The periphery, consisting of everything from distribution and street cabinets to dome-end closures for cable shafts and house connection boxes, can be adapted flexibly or terminated on site to meet the providers' local requirements. The SCM tray system can also be individually configured. It is compatible with all common cable types on the market. At the same time, the R&M solution supports the widest variety of hybrid infrastructures in drop, feeder and access areas as well as successive migration from copper to fiber optic cabling.

With this modular approach, network operators can plan their FTTH projects based on individual strategies, investment possibilities and site conditions. That allows them to develop their markets flexibly according to needs and the competitive situation.

Two further factors of the R&M portfolio contribute to the network operators' success. First, operators can cut the time it takes to install a house or apartment connection to one to four hours. Second, they can find a quick, neat solution for the transition to vertical building cabling regardless of the environment. These factors increase the acceptance of FTTH on the part of installers, home owners and customers. Network operators can rely on a high rate of connection. ■

Why opt for Fiber To The Home?

There are many reasons every home should be equipped with a fiber optic connection. The growth of Internet applications will soon far exceed the transmission capacities of copper networks. New value-added services and multi-functional Internet applications require signal transmission that is absolutely free of interruption plus symmetrical downloading and uploading. Only fiber optics can deliver the requisite quality at an acceptable cost and entailing acceptable installation efforts. TV providers in particular can profit from FTTH. High-definition television (HDTV), three-dimensional television (3DTV) as well as Internet-based and interactive television (IPTV) are all considered markets with a bright future. Other applications that can be implemented conveniently with FTTH in the future:

- **Internet video, video on demand**
- **File sharing**
- **Games, social media**
- **Video conferencing**
- **Cloud computing, backup**
- **Building security**
- **Patient monitoring, telemedicine**
- **Local information services**
- **Personal video recorder**
- **Music distribution**
- **Home office, teleworking**
- **Software on demand**
- **Facility management**
- **E-learning**
- **E-government**
- **and many more.**

According to studies conducted by the market research firms Ovum and Yankee Group in Sweden and Bulgaria, FTTH users are a satisfied lot. And they show a great willingness to engage in teleworking and e-learning. PricewaterhouseCoopers and Ecobilan have calculated that the use of FTTH reduces CO_2 emissions. The effect is the equivalent of each household driving their car 4600 kilometers less each year. One million FTTH subscribers would reduce CO_2 emissions by one million tons according to the FTTH Council Europe.

We constantly post new articles on FTTH at www.connections.rdm.com.

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090.5936

The panel is set at an angle in the R&M Raised Floor Solution. Here it is shown configured for copper cabling. This design makes it easier to handle plug connections. Brush-type cable entry plates prevent the entry of air streams.

Space Gains in the Data Center

Data centers gain valuable space in the computer room thanks to a new intermediate distributor from R&M. They simply shift passive connection and distribution tasks to raised floors. That frees up more space in the racks for productive tasks.

This cabling platform is known as the R&M Raised Floor Solution. It is used in zone distribution and the storage area. Data centers want to achieve greater productivity and higher performance density within the space available to them. The pragmatic solution is to put cable termination and patching functions in raised floors. That means more free space and flexibility for productive active components in the cabinets and racks. Optimum use is made of the computer center's potential. The modular Raised Floor Solution from R&M supports this approach by offering an interconnection platform that works regardless of the design of the data center.

090.5938

The R&M Raised Floor Solution can also be used in offices, control stands, command centers, clinics, on the trading floor of stock exchanges and in other similar settings. For special applications and individualized needs, R&M has customizing solutions for implementation at short notice at any time.

The new advance supports density and the quick setup of high-performance networks. As many as 288 fiber optic or copper cable terminations fit into one unit. The two media can likewise be combined on the platform. It covers the connectivity needs of an entire cabinet. To set up 10 GbE channels, the user can configure the box to accommodate up to 144 connections of the type Cat. 6 Real10. For 10 GbE permanent links, the user utilizes up to 288 Cat. 6_A connections. As a fiber optic platform, the box accommodates up to 288 LC duplex adapters or 288 MPO/MTP in accordance with IEEE 802.3ba. That means future 40/100 Gigabit Ethernet applications are also supported.

The R&M Raised Floor Solution is a subfloor distribution product for data centers and accommodates as many as 288 copper or fiber optic connections.

The R&M Raised Floor Solution consists of a steel box that is inserted seamlessly into the 600 millimeter by 600 millimeter grid of raised floors. It is fastened to supports in the raised floor and connected to cable runs in a quick installation procedure. For example, each distributor cabinet or row of cabinets can be assigned one box. The raised floor design meets the requirements in the following standards for structured cabling in data centers: TIA 942, IEC 24764 and EN 50173-5.

R&M markets 19-inch patch panels from its own range of data center products for configuration. The R&M Raised Floor Solution can be fitted with up to six patch panels. A maximum of four can be installed at an incline in the box, leaving the plug connections readily accessible and visible. R&M has planning aids to help cabling projects run more smoothly and pre-terminates factory-inspected assembly kits that are delivered just in time. ■

090.5791

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FUNDACIÓN AXA
reinventando / el compromiso con la cultura

Complete Solution
for AXA Headquarters in Barcelona


090.6046

AXA Spain recently moved its Barcelona headquarters into the World Trade Center Almeda Parc and selected a complete solution from R&M for its network in this complex.

This major insurance carrier had ED Engenyeria invite tenders for the project in February 2010. R&M assisted the engineering firm in planning what turned out to be a successful project and the certified installers of I.E.A.I.S.A. To meet AXA's tough demands, the entire R&M product portfolio was used, particularly the shielded Cat. 6_A solution.

Another key factor besides the quality of the proposed solution was the tight deadline set for the installation. The work was not able to start until late March and had to be completed by May so the data centers could be configured before the staff started moving in on June 1.

The I.E.A.I.S.A. Business Director: "We made the deadlines with ease thanks to the quality and simple installation of the R&M products." The project covered the entire installation in the three-story building, including two redundant data centers connected to R&M MPO systems and two further redundant equipment rooms per story connected to the data centers via R&M VarioLine as well as a total of 1700 connections. The customer can add further user connections later on with ease thanks to the R&M EOC system. ■

WHY R&M?
- **Quality**
- **Design**
- **Simple installation**
- **Punctual delivery**


090.6047

The new headquarters of AXA Spain at the World Trade Center Almeda Parc de Cornella


090.6090

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Colocation Data Center in Sydney

090.6050


090.6051

R&M MPO LC Quad Cassette

To facilitate its operation, Harvey Norman outsourced its corporate IT infrastructure to two colocation data centers in Sydney. R&M was chosen due to its expertise and a strong partnership with local certified partners, guaranteeing support, exceptional service and on-time delivery in a very tight time frame.

Starting as a small electrical appliance store in Sydney in 1961, Harvey Norman has since grown to be Australia's leading retail chain with more than 195 stores across the country. The Australian-based retailer offers electrical, computer and entertainment goods, furniture and bedding. Over the past 12 years, Harvey Norman has expanded its presence with stores in Malaysia, Singapore, Slovenia, Ireland and New Zealand.

To allow for a better response time and to be prepared for future growth, Harvey Norman decided to colocate their primary IT systems in one of IBM's Sydney Data Centers, as well as choosing the world's leading carrier-neutral colocation company, Global Switch, to host their secondary IT infrastructure in downtown Sydney. Global Switch deploys and manages large-scale facilities for the colocation and hosting of mission-critical services to support the dynamic Internet, telecommunications and data markets.

Harvey Norman was looking for a highly reliable solution that was modular and future-proof for potential expansions. R&M's copper solution with the innovative FM45 field terminable and toolless connector fulfilled this request. A further key product and major part of the contractor's design was the R&M space-saving, pre-tested 12-fiber MPO solution. The plug and play concept is perfect for extremely fast deployment, scaling and high packing densities. It accommodates up to 288 fibers within a three rack unit space.

Due to the very tight time frame, Harvey Norman needed reliable and competent service providers that R&M provided thanks to the strong partnership with distributor Madison Technologies. Teaming up with certified installer, Fredon Industries, allowed for ideal product selection and customization to meet Harvey Norman's requirements. Greg Heise, Head of IT Procurement at Harvey Norman, was impressed: "These companies have been exceptional in the level of service they provided."

THE R&M SOLUTION

- **MPO modules (cassette) OM3 6 quads**
- **1U and 3U MPO adapter and accessories**
- **MPO OM3 trunk cables (various sizes)**
- **Angled patch panel**
- **Cat. 6 cables and modules**
- **FM45 connectors**

WHY R&M?

- **Strong partnership to guarantee fast delivery and support**
- **Local presence allowed quality control all the way to the customer**
- **Quality of products**

"As usual, I am very satisfied with the termination quality of R&M products."

Stuart Malmgron, Head of Business Development, Fredon Industries

Another key argument in favor of R&M was the factory-tested range of products. Not only the MPO fiber products, but each individual copper RJ45 is tested in a production environment before leaving the R&M facility. As a result, after proper installation and testing at the site by Fredon Industries, all copper connections were zero-defect. Stuart Malmgron, Head of Business Development, Fredon Industries: "As usual, I am very satisfied with the termination quality of R&M products. They are easy to install and save us time." ■

090.6091

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090.6155

Quantum Leap for Racks

R&M is setting new density standards for 19" racks. The new R&M HD panel for 48 ports per unit allows no compromises, neither in safety and shielding nor in user convenience and modular, flexible design.

The density of structured cabling can now increase with no loss of convenience or performance. With its new HD panel, R&M provides an ultra-compact modular solution for 48 ports in RJ45 format in a single 19" unit. The R&M HD panel – HD stands for high density – was developed mainly as a space-saving and cost-saving setup for modern high-performance data networks in data centers. It accommodates copper and fiber optic cabling.

That means it is a platform for the innovative Cat. 6_A connection module, the key to the best-performing twisted-pair copper cabling of all time. Shielded and unshielded Cat. 6_A modules can be installed in no time without tools in the module holder of the R&M HD panel. They are put in from the front. A preshaped cable-tie guide in the holder simplifies the installation of strain relief.

The panel design is proof once again that R&M is a technology leader in shielding. Even when unshielded Cat. 6_A modules are used, the R&M HD panel features a unique ANEXT reserve found nowhere else in the market. This product combines high density, high performance and high availability in an ideal way with attractively priced cabling.

The panel in the copper version is scalable, too. It can be installed as a 24-port unit and later expanded to 48 ports.


090.6160

The new HD panel from R&M provides maximum density in a 19" unit: a modular approach for fitting 48 copper and fiber optic ports.

As a fiber optic cabling platform, the HD panel from R&D also offers 24 or 48 ports and can be fitted with LC and MPO/MTP adapters. This product is the most compact way to enter the age of 40/100 Gigabit Ethernet.

Despite the enormous density, the connectors are easy to handle. In the copper version, the top and bottom rows are arranged in the opposite direction of insertion. Laser-engraved port numbers ensure clear assignments. The 24-port version has space for individual labels. Color-coded dust covers and locking mechanisms from the R&M security system improve protection against mistakes and tampering and further increase the availability of the data center. ■


090.5782

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SCM FTTH Solution for Street Cabinets

The SCM product family from R&M – SCM stands for single circuit management – can now be incorporated in street cabinets. That means network operators can expand their outdoor FTTH infrastructures in the field faster and more flexibly than ever. The new SCM solution for street cabinets serves as a platform.

Next generation networks are expanding out there in the field. Street cabinets are gaining a new significance as outposts for fiber optic distribution in urban and rural areas. But network operators want to arrange the FTTH expansion in all those far-flung locations as efficiently and flexibly as possible. R&M's answer is the SCM street cabinet solution with the single circuit management system.

The cabinets can be equipped and scaled on site as needed using the splice module or splice/patch module from the SCM family. The modules hold 24 or 48 SCM trays and connect up to 576 or 1152 fibers. They can be installed in the cabinet housing in no time at all. The snap-in design makes special tools superfluous.

The SCM street cabinet solution with the modular single circuit management (SCM) system closes the gap between the central office and the last few meters to the subscriber. Now there is no limit to the extent fiber optic networks can expand. A simple standard method of managing fibers and subscribers is now available for all levels of the new fiber optic networks.

And it is equally easy to thread in cables and fibers, add trays for fiber management and connect subscribers. The SCM system simplifies each and every work step.

For FTTH expansion, carriers use the sturdy SCM cabinets from R&M or existing street cabinets and cable distributors. The SCM street cabinet solution can be integrated into virtually all housings, along with variable cable management. The only requirement is that the cabinet has sufficient space. R&M provides an all-in design as a complete solution with mounting plates, retrofit sets and pre-terminated modules.

In each case, the SCM system ensures the 40-millimeter bending radius. Stress-free fiber guiding is therefore guaranteed for the long term as are favorable attenuation characteristics and a high level of operational reliability. These are crucial performance requirements for future high-power and xWDM applications. The 40-millimeter bending radius is guaranteed throughout, from cable management and splice trays to the patch panel, even if the cabinet capacity is fully used. That is something no other solution on the market can achieve. ■

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Quick Solution for Fast Connections

The expansion of broadband networks is currently causing an exponential increase worldwide in the volume of installed optic fibers. To assist network operators with expanding their networks, R&M provides innovative solutions for handling these quantities in an uncluttered and reliable way.

090.6052

Italy has the fourth largest population in Europe and a great affinity for media. For instance, Italians are avid TV watchers. These traits make this market ideal for FTTH solutions (Fiber To The Home). Various suppliers are now working on using fiber to dock Italian households to communication services of the present and future.

A syndicate made up of Fastweb, Vodafone and WIND is active in implementing point-to-point solutions that are viable for the future. These systems are based on the network operators' central locations (co-location points) for connecting/distributing large quantities of optic fibers in a small space (single circuit management). The different suppliers can flexibly and quickly switch their customer connections at these points in a reliable and convenient manner.

Innovative solution

In September 2009, Fastweb approached R&M with an inquiry for an innovative FTTH solution. This customer had requirements that could not be resolved with standard products, so R&M customer advisor Giuseppe Falco outlined approaches to a highly innovative solution at a meeting held shortly thereafter in Italy. He relied on products that existed only as sketches at the time. The customer was greatly interested in the proposed solution which was officially presented one month later at company headquarters. After that everything took off. R&M focused on one of its major strengths, its ability to develop prototypes quickly. Fastweb was able to assess the first one as early as November. The customer made several changes and drew up a tight timetable. Just four months later, the first ten cabinets were installed at the Fastweb facility in Rome developed in close cooperation with R&M partner FIMAR. Giuseppe Falco: "This project succeeded thanks to the classic strengths of R&M, namely its flexibility, quality and no-compromise customer orientation and to the smooth collaboration with FIMAR." ■

THE R&M SOLUTION

- **Special ODF (Optical Distribution Frame) for FTTH**
- **Combination modules, MPO modules, special fan-out and patch cords**

WHY R&M?

- **Unique, innovative, flexible point-to-point solution for the Central Office**

090.6093

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Thilo Elsner in front of the projection screen at the control center EnBW Regional AG

Picture: © EnBW Regional AG

On Edge

The project entailed modernizing the data center of EnBW Regional AG in Esslingen and installing the new equipment in the control room without interrupting ongoing operations. The task put everyone on edge.

As the power utility for southwestern Germany, EnBW AG has to ensure that the lights stay on in more than 30 000 towns. Thilo Elsner is the manager of all control centers for the high and medium voltage networks at EnBW Regional AG. He and his battle-tried team are responsible for reliable and secure operation. "Life is never dull but we sometimes break out in a cold sweat when storms like Lothar or Emma sweep across the countryside. That puts us totally on edge and we hope that nothing happens."

> R&M was able to point to extensive expertise and years of experience in the power utility sector.

Elsner and his team have to rely on ultra-modern control room equipment and a high-performance data center to do this demanding job. The two areas no longer met the steadily growing requirements for bandwidth, fail-safeness and efficiency. Modernization was urgently needed. It was carried out in a two-stage project finished by mid-2010.

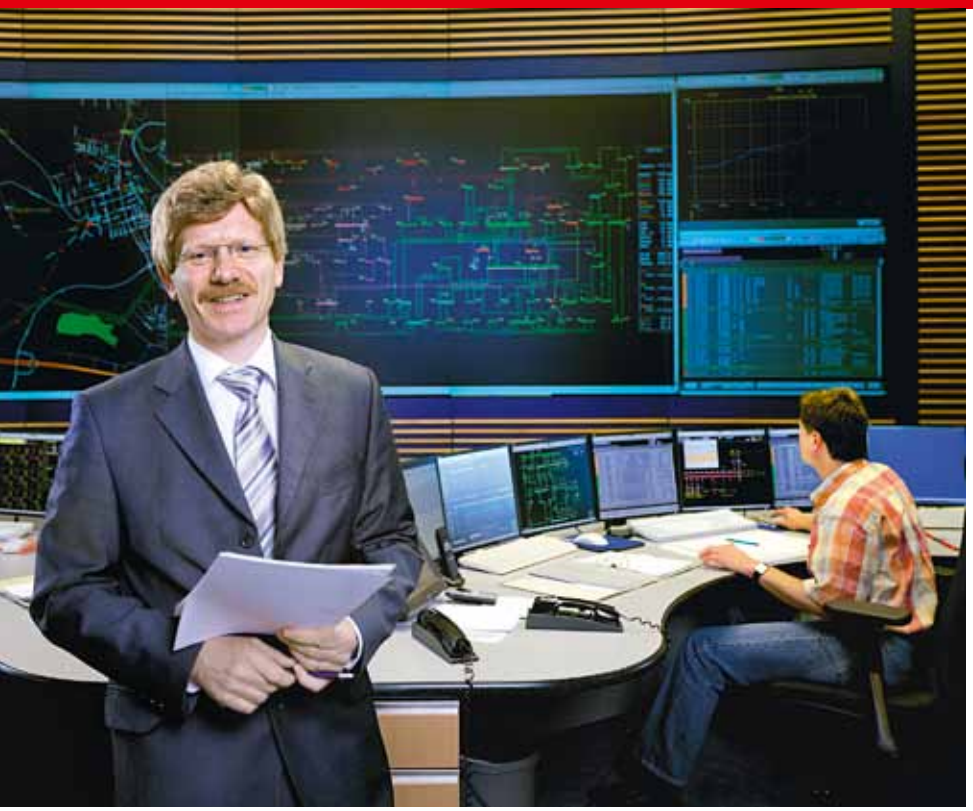
What was required was a complete solution for electricity, data and climate from a single source. The highest standards had to be met in terms of reliability, performance and security. A power utility cannot simply decide to shut off the power for a while so everything had to be installed without interrupting regular operations. The atmosphere was tense for all project participants.

Forward-looking and reliable

R&M showed a forward-looking solution back in early 2009 at eltefa, the southern German electronic engineering trade show. In doing so, it worked in close collaboration with Bensler, an engineering firm in Stuttgart. The three-part security system from R&M with color coding and plug-in and plug-out protection played a convincing part, too. R&M was also able to point to extensive expertise and years of experience in the power utility sector.

The management at EnBW Regional AG was certain it had found the right partners and joined them in carrying out the remaining planning.

GA-tec, an installation firm from Fellbach, near Stuttgart, was chosen to install the equipment. As a reliable and long-time QPP partner with R&M certification, GA-tec ensured on-schedule completion and top-quality installation



THE R&M SOLUTION
Cabling for the Esslingen Data Center, office cabling for the Heilbronn Control Center

COPPER PRODUCTS

- **180 x 19" 1U patch panels 24 x RJ45/s Real10, Cat. 6**
- **120 x R&M DC installation cables Real10 S/FTP, Cat. 6, cable feeding devices**
- **14 km installation cables Real10 S/FTP, Cat. 7**
- **About 1800 x R&M patch cords Real10**
- **Color coding and R&M EasyLatch feature for patch cords**

FIBER OPTIC PRODUCTS

- **R&M installation cables A/I DQ, 12- and 24-fiber, 50 µm, OM3**
- **16 x R&M VARIO*line*, pre-terminated**
- **UniRack 12 SC/Dx MM, 50µm, OM3 (for splices)**
- **R&M FibereasyRack 12 SC/Dx MM, 50 µm, OM3 (with pre-terminated VARIO*line*)**

WHY R&M?

- **Everything from a single source**
- **Experience in the power utility sector**
- **Forward-looking solution**
- **Compelling security system**
- **Top quality standards**
- **Twenty-year system warranty**

work. The bid from GA-tec ensured the entire installation work could be done by a single company.

Just-in-time installation

The fact that modernization was carried out during regular operations placed tough demands on Logistics, too. R&M materials had to arrive at the customer's premises on specified dates according to a precise schedule. In the copper segment alone, they included 120 Cat. 6 data center installation cables, 1800 patch cords and 14 kilometers of Cat. 7 installation cables.

The project also involved the use of VARIO*line*, the sturdy fiber optic cabling system from R&M. All components are individually pre-terminated at the factory and fully factory-tested.

R&M Germany, an R&M subsidiary, supplemented the data center range with a copper cabling system featuring special eightfold DC cables with integrated cable feeding devices.

This system reduces installation time by about 30 %. A sturdy collar protects the connection modules while the copper cables are being drawn into floor and rack. The system has a six- or eight-cable version, with all cables completely pre-terminated and fully factory-tested. It is delivered with individually selected lengths and labeling, including measurement logs.

Precise and conscientious planning is crucial especially for pre-terminated solutions. But quality cannot be allowed to stop with planning and product. It must continue on to the installation work itself. That is why R&M conducts quality activities on site during the construction phase.

Twenty-year system warranty

Top product quality, conscientious planning and meticulous installation are the three main factors. If they are all up to par, the customer can rely on consistently high availability and performance. In any case, R&M was confident of the quality achieved and granted a 20-year system warranty on completion of the project. A company could not give better evidence of the trust it has in its own performance.

The management at EnBW Regional AG agreed and gave GA-tec an installation contract for the new control center in Heilbronn. The project was a little smaller in scale than in Esslingen but involved the same R&M solution as was installed there. It is encouraging to see trust expressed in this way. ■

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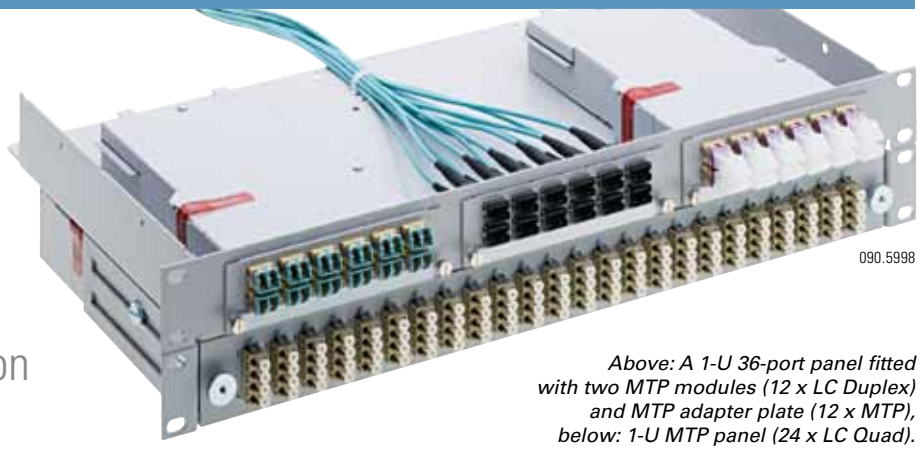
MPO/MTP – the High-Density Solution for Data Centers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Above: A 1-U 36-port panel fitted with two MTP modules (12 x LC Duplex) and MTP adapter plate (12 x MTP), below: 1-U MTP panel (24 x LC Quad).

With higher data transmission rates required as never before, MPO/MTP system solutions are steadily gaining in significance – particularly with the imminent advent of 40 GbE and 100 GbE. R&M responded in a forward-looking way by offering a leading MPO/MTP range for data centers.

MPO/MTP system solutions are steadily gaining in significance. Data centers in particular have a great need for compact and flexible plug-and-play systems that are pre-measured and pre-terminated at the factory. MPO/MTP system solutions allow users to achieve complete end-to-end cabling in keeping with the new standard for data centers. In the IEEE 802.3 standard, 40 Gb/s and 100 Gb/s were defined with MPO connector technology. The crucial factor is the insertion loss and return loss of the components. Controlled production processes and ultra-precise end-face geometry are needed to satisfy these tough requirements. With the MPO/MTP multi-fiber system from R&M, a data center is well-equipped for future transmission rates of 40 and 100 Gb/s.

Pre-terminated cables

To connect the servers with director switches and storage devices, R&M carries a round pre-terminated mini-core cable with the customer's choice of 12-fiber or 24-fiber MTP connector. The latter can be used in combination with multimode fibers (OM3, OM4) and singlemode fibers (OS2). Installing new or additional cabling entails no more than plugging in the cable and can be done in minutes.


090.5618

MTP patch cable, OM3

High-density platforms

Pre-terminated MTP-on-LC modules make up a core product line in the R&M MPO portfolio. Solutions are available with SC or E-2000™*. That means up to 96 fibers can be connected on one unit or 288 on three in combination with the high-density platforms from R&M. With the modular 1-U and 3-U solutions, users can also combine copper and fiber-optic connection technologies to guarantee maximum flexibility. To expand to 40/100 GbE, users need only replace the MTP-on-LC modules in the distributor racks with MTP adapter plates. This step multiplies the port density. The 40/100 GbE ports for active equipment are connected directly using pre-terminated MTP patch cords.

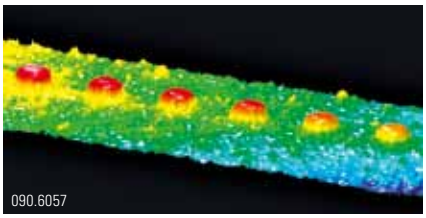
Quality lead

Recent research and development have focused on the MPO connector in particular. Besides using the high-quality MTP connectors with Elite ferrules from US Conec, R&M further optimized the polishing and quality control process. Following its own testing, R&M has introduced even tougher ferrule tolerances for MPO connectors than specified in the IEC standards and has defined new parameters. One important feature in these efforts is the core dip. R&M has virtually eliminated this dip in its improved manufacturing process to guarantee excellent contacting of fiber cores within a plug connection.

All connectors undergo inspection

Each pre-terminated MTP connector undergoes a full interferometry and IL/RL check before leaving the factory. As a result, MPO/MTP solutions from R&M ensure top performance and transmission reliability to meet the maximum requirements placed on 40/100 GbE applications. ■

** E-2000™ manufactured under license from Diamond SA, Losone*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Interferometry


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R&M Addresses HCCBPL's Need for End-To-End Networking Solutions

Hindustan Coca-Cola Beverages Pvt. Ltd. (HCCBPL), the Indian subsidiary of The Coca-Cola Company of USA, was looking for a cabling solution with sophisticated security features for their network and server area. R&M's end-to-end solution helped to create a secure and reliable network for HCCBPL in India.

Located at Gurgaon, HCCBPL is responsible for the manufacture, sales and distribution of well-known beverages such as Coca-Cola®, Diet Coke®, Sprite®, Fanta®, Maaza®, Kinley® and several others brands across India.

HCCBPL's headquarters carry out administrative and strategic tasks for which they required a high-quality cabling solution that guaranteed security, performance and reliability. The IT team had placed a strong emphasis on having security features as part of the solution to prevent unauthorized access – especially at individual workstations.

> "We chose R&M because they have a proven track record of providing holistic solutions focused on client requirements."
>
> Raghavendra N M,
> Manager BSG, Network Services

R&M's security system met these requirements precisely. "In R&M, we found a partner who really understood our requirements thoroughly. We chose them because they have a proven track record of providing holistic solutions focused on client requirements," said Raghavendra N M, Manager BSG, Network Services at HCCBPL.

R&M's focus on having a solution-oriented approach is what makes the difference. The R&M India team worked closely with the client to analyze, understand and provide required solutions that benefit the customer in the long run.

Pankaj Bhardwaj, Business Development Manager, North India, said: "It was a privilege to work with the HCCBPL IT team. Together we created a secure network using the R&M Cat. 6 Patch Guard at all workstations and server areas. It has a lock on the patch cord that only authorized persons can open with the key. We also conducted several visits to the premises to ensure that everything went ahead as planned."

R&M's planning, starting from design to final inspection, was thorough and future-proof allowing for flexibility and scalability in the years to come. The Quality Partner Program (QPP) certified installer ensured that the installation was carried out as per R&M's technical and quality standards. ■

THE R&M SOLUTION

- **Cat. 6 I/Os & patch cords, unshielded, with locks**
- **Total nodes – 3000**
- **Project success led to other installations at bottling plants in Okhla, Jammu and Bangladesh**

WHY R&M?

- **Excellent planning and network design**
- **Service provided by local R&M team**
- **Security features to prevent unauthorized access**


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New Addition to the Data Center Range

Data centers requiring new copper cabling now have an even easier time of it. R&M has structured its range of pre-terminated products to fit their needs precisely. The thin lightweight AWG26 cable is a new addition to the range. A configuration unit simplifies planning and ordering.

High-end copper cabling that is reliable, simple and efficient is the name of the game for the R&M data center portfolio. Our customers are assured of reliability from full outgoing testing. Each pre-terminated product is individually tested for all relevant parameters before leaving the factory. R&M guarantees full Cat. 6 and Cat. 6_A performance in accordance with the standards. The copper products even outperform the requirements in the IEEE 802.3an, IEC 60603-7-51 (shielded) and ISO/IEC 11801 ed. 2002 adm. 2 for Class E_A. Certificates from the independent test laboratories 3P and GHMT confirm the quality.

The clear and defined structure of the portfolio simplifies planning and installation. R&M has two types of cables as pre-terminated solutions for structured cabling at client level: DCC (data center compact) with double sheath and DCL (data center looms) with foil sheath. These solutions are usually based on six bundled S/FTP cables, completely labeled and configured with connection modules and connectors. You can choose from wire cross-sections AWG23 for link lengths up to 90 meters and AWG26 for link lengths up to 55 meters.

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Data center cables 6 x 4

Require up to 30 % less space

The AWG26 cables are new highlights in the R&M range and expand the spectrum of uses for copper cabling. In the double sheath version, they are 25 % thinner and lighter than conventional Cat. 6/Cat. 7 cables; in the loom version they are 30 % thinner and lighter. They allow smaller bending radii so they can be installed more easily and flexibly.

With this reduction in cable volume, the packing density can be all the greater for new high-performance data networks and for the applications. Air can also flow more freely in the racks, which helps make the data center more energy efficient.

R&M recommends the AWG23 versions for cabling links between 55 and 90 meters in length and where increased security and reliability are paramount. The loom cables are for flexible installations and the double sheath cables for rigid installations.

With the help of a configuration unit provided by R&M, planners can determine the necessary cabling units and lengths individually. Left and right classification and the dimension of placement lengths can be defined as desired, as can labeling. R&M can also supply everything ready for installation with feeding devices. This ensures that the system can be commissioned quickly and free of error. ■

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University of Castilla-La Mancha – a Pioneer in New Technologies

The University of Castilla-La Mancha (UCLM) was founded in 1982, although it only officially opened its doors in 1985. It is currently one of the top 15 universities in Spain. It is spread across four university campuses located in Albacete, Ciudad Real, Cuenca and Toledo, thereby justifying the major technological development of UCLM, a pioneer in adopting new communication tools in the university environment.

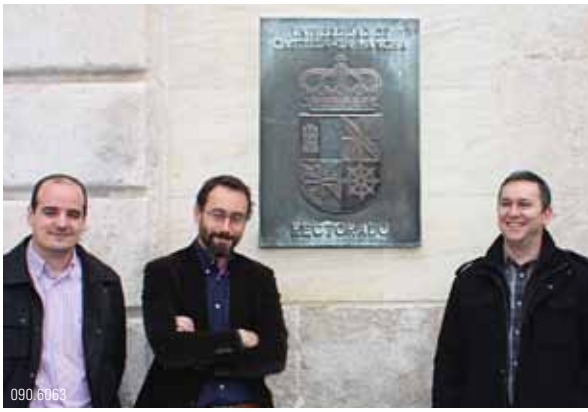
At the end of 2009, the Ciudad Real IT College asked the UCLM for advice on expanding its data center and fitting it out with state-of-the-art IT equipment. At that time, Carlos Manuel Clemente and Julián de la Morena, Technical IT Director at UCLM, asked R&M and its official distributor Cmatic for a technical proposal.

UCLM was looking for an upgrade of the IP network for voice and data services for several faculties and required a reliable, flexible and future-proof solution for new technologies with guaranteed quality. R&M was chosen as the ideal provider thanks to the modularity, scalability and security levels of their solution. The R&M security system and the good price-quality ratio were other key factors in the decision process.

Project steps

At the beginning of 2010, UCLM asked R&M to draw up a technical proposal including Real10 shielded modules for voice and data mounted on 3U Global Patch Panels and consolidation points (R&M U-BOX).

In March 2010, Ampar, a QPP partner of R&M, started the installation in the data center in the IT College in Toledo, and in June at the Ciudad Real site in a classical building dating back to 1787. "The cabling installation was extremely simple," says Julián de la Morena from the IT Service. "It's an easy-to-install, snap-in solution and the technical support as well as the training received from R&M were excellent," explains Carlos de Manuel, UCLM Systems and Network Analyst. In June, installation was completed at the Cuenca site in the former Antonio Saura Building by Electrocuenca, another QPP, taking advantage of the fact that the university was closed for the vacation. "R&M's Global Patch Panel is more convenient as it reduces the amount of space required inside the rack, and the Patch Guard locks are easy, quick and convenient to install," said David García de Dionisio, UCLM Systems and Network Chief Technician.



Julián de la Morena, Technical IT Director, Andrés Javier Prado, CIO, and Carlos de Manuel, IT Systems and Network Analyst at UCLM.

As a result of the good working relationship between UCLM and R&M, as well as the university's complete satisfaction with the products and services offered, the two are currently negotiating a partner agreement to provide technical support, maintenance and training. ■

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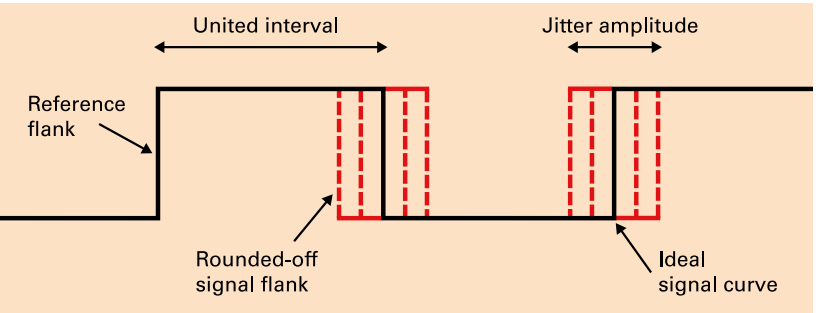
Shorter Distances for 40/100 Gigabit Ethernet: an Explanation

The new IEEE 802.3ba standard adds the possibilities for data rates of 40 and 100 gigabits to the Ethernet standard (40GBASE-SR4 and 100GBASE-SR10 respectively). The standard provides for maximum lengths of 100 meters for OM3 fibers regardless of the data rate. The OM4 will be the optic fiber of choice for longer links (e.g. larger data centers, riser backbones and medium-length campus backbones) and applications with smaller power budgets (e.g. equipment connections in data centers). It can support 40GBASE-SR4 and 100GBASE-SR10 applications as long as 150 meters in length. The 100-meter link via OM3 supports about 85 percent of all data center channels depending on architecture and scale. The 150-meter link via OM4 fibers covers almost 100 percent of the required reach.

Parallel optics enable the joint lengths for both data rates. In this case, the signals are transmitted over several 10 Gb/s links. The 40 Gb/s solution uses four optic fibers each in both directions for the transmission, whereas the 100 Gb/s solution requires ten fibers each. The data rate per link is now the same as with the 10 Gb/s Ethernet (IEEE 802.3ae) standard. That raises the question as to why the maximum length for the optical link via OM3 was reduced from 300 meters to just 100 meters and via OM4 from 550 to 150 meters.

Link costs serve as the departure point for our explanation. As mentioned above, 40/100 Gigabit Ethernet (GbE) is based on the principle of parallel optics. According to this principle, a channel for a direction of transmission consists of several parallel optic fibers, four fibers in the case of 40 GbE and ten fibers in the case of 100 GbE. Each individual fiber can now send data at a rate of 10 Gb/s. It is therefore not immediately evident what the difference is between four 10 GbE channels and one 40 GbE channel or between ten 10 GbE channels and one 100 GbE channel. For example, if four 10 GbE channels cost the same as the 40 GbE channel, the latter would offer no advantages to the customer.

To reduce the link costs, it is most important to lower the prices of the transceivers (components that are combined transmitters and receivers). These cost reductions can be traced to the less stringent technical specifications for the transceivers. They allow smaller and cheaper components to be built.

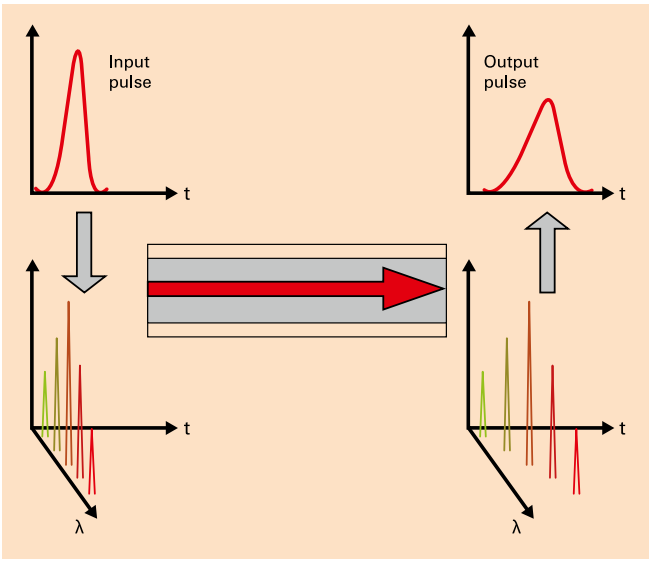


Jitter in a clock signal

The most significant relaxation in regulations was the big increase in tolerances for jitter. Jitter is (see figure to the left) a time variation of a clock signal in the transmission of bits caused by noise or inter-symbol interference. In data center applications such as 40GBASE-SR4 and 100GBASE-SR10, the jitter begins in the outgoing signal of the transmitter chip and accumulates via the optical transmitter, the optic fibers, the optical receiver, the receiver chip and various conductive tracks throughout the entire link. Since the electronic components in the link use up much of the jitter budget, the overall accumulation of jitter can only be acceptable if the optical channel is nearly perfect and free of loss.

In most cases, the lasers used in data centers are surface emitting semiconductor lasers called Vertical Cavity Surface Emitting Lasers (VCSEL, pronounced Vixel). What makes the VCSELs so interesting for data center networks is that

Chromatic dispersion of an optical pulse passing through a multimodal optic fiber. On input, all spectral components of the pulse are sent at the same time but arrive at the end of the fiber at different times.



they are easy and cheap to manufacture. However, they do have a relatively large spectral width for a laser. Specifications for precisely this spectral width were another aspect that was relaxed in the transition from 10 GbE to 40/100 GbE. The IEEE 802.3ba Task Force raised the maximum admissible spectral width for the laser in the future from 0.45 to 0.65 nm. This new value will result in greater chromatic dispersion. Chromatic dispersion is the phenomenon of an optical pulse being "smeared out" while being transmitted through an optical waveguide. An optical fiber has different refractive indexes for the different wavelengths so certain wavelengths propagate more quickly than others. Since a pulse consists of several wavelengths, a certain degree of dispersion will inevitably occur as the figure to the upper right shows.

All optical signals consist of a wavelength range. This spectrum may be just a fraction of a nanometer, but there will always be a limited spectral range.

The spread of a pulse in a fiber is more or less dependent on the square root of the spectral width. This factor in combination with the additional jitter explains why the maximum lengths are shorter for OM3 and OM4 fibers. The relaxation of specifications may have significantly reduced the total system cost of optic cabling but it did so to the detriment of link lengths and allowable insertion losses. The 10GBASE-SR application still specified maximum losses of 2.6 dB over OM3. In 40GBASE-SR4 and 100GBASE-SR10 applications, these losses are now just 1.9 dB for OM3 and 1.5 dB for OM4. Installers and users therefore have to be aware of one fact. The performance of the next generation of fiber optic networks will crucially depend on their choosing a supplier whose products ensure minimal optical losses.

A vivid way to understand the perfection of optical links is to remember that the 2000 MHz·km bandwidth-distance product of an OM3 fiber enables a modal bandwidth of 20 000 MHz over 100 meters. That is three times greater than the modal bandwidth used for 10GBASE-SR. An even more impressive fact is that the 4700 MHz·km bandwidth-distance product of an OM4 fiber delivers a modal bandwidth of 31 333 MHz over 150 meters. In other words, the OM3 channel provides a modal bandwidth three times greater than the one needed for the 10 Gb/s standard. For the OM4 fiber, the bandwidth is even five times greater. ■

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R&M Cables the Middle East's Most Prestigious Freezone

R&M successfully completed one of its largest project installations in the Middle East by implementing a large-scale network solution for Dubai Airport Freezone. Dubai Airport Freezone is considered to be the largest and best free zone in the Middle East and second in the world in terms of the number of companies located in such a zone.

As a government entity, Dubai Airport Freezone's responsibility is to provide best-in-class services and amenities to companies and investors in order to facilitate all their business requirements. As a result, Dubai Airport Freezone is considered to be an excellent place both to launch and operate a business. To date, it has succeeded in attracting over 1450 companies by providing fully operational offices and all start-up requirements, such as licensing and registration, employment visas and insurance.

Another important consideration is to equip offices with a robust, smart infrastructure as a key component in high-performance, fail-safe business operations. As a result, Dubai Airport Freezone looked to R&M with their strong reputation in the market and innovative cabling

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R&M has achieved
a leading position
in the structured cabling field
in the Middle East and Africa.

range solutions to implement a large-scale project comprising eight buildings.

Value-added advice for future-proof investments

R&M has achieved a leading position in the structured cabling field in the Middle East and Africa and is one of the top three players in the market. The company distinguishes itself in the region by not just "selling a box" but providing value-added services and consultation. In working with Dubai Airport Freezone, R&M was keen to have it become a network infrastructure leader by installing one of the most robust and highest-performing networks in the country. R&M advised Dubai Airport Freezone not to compromise by only looking at the short-term but to install a high-quality network as a future-proof investment capable of scaling.

High performance

The ITC Team in Dubai Airport Freezone could also see the significance of installing a smart network infrastructure that would last for years and consistently perform without any slow data transfer or any downtime in the network. They realized that in order to provide business services for tenant companies, it was imperative to install high-quality zero-defect components such as R&M's.

For this large-scale multi-year project R&M utilized its wide-range enterprise cabling portfolio with a mix of copper and fiber components, including its Cat. 6A shielded STP solution for ultra-high-performance connectivity. R&M recommended its Cat. 6A shielded STP for performance due to the fact that the 360° component shielding protects it against electromagnetic interference as well as data loss. This ensures maximum performance and connectivity throughout the network by enabling faster broadband transmission speeds. Data transfers are also made more fail-safe and secure due to the extra shielding of the components.

Smooth implementation

With eight buildings completed in stages, the final building was completed by the end of 2010. R&M's project team worked diligently to finish the major project on time and was one of the most important elements in the success of the installation. In total, over 40 000 points were implemented throughout eight buildings.

Dubai Airport Freezone's ITC Team thanked R&M for the smooth implementation and the extraordinary network performance that has resulted in a problem-free network.

This achieved R&M's project goal of implementing a state-of-the-art network for Dubai Airport Freezone, making them a network infrastructure leader as well as getting total satisfaction from their network users. ■


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The headquarters of Dubai Airport Freezone (DAFZ)

THE R&M SOLUTION

- **End-to-end Cat. 6A shielded STP connectivity**
- **Fiber**
- **Cat. 6a, Cat.5, Cat. 6, Cat. 6 S/FTP, Cat. 6A, Cat. 6A shielded**

WHY R&M?

- **Value-added advice**
- **Smart network**
- **Smooth connectivity**
- **Scalability**


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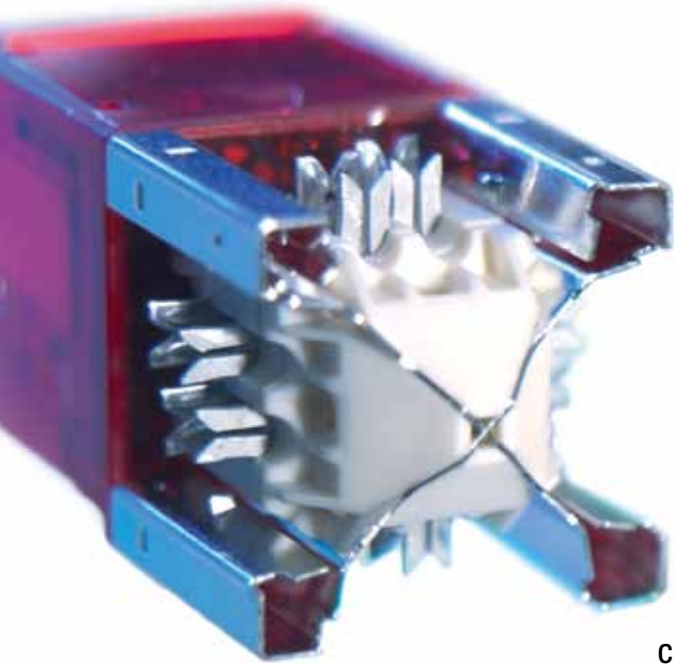
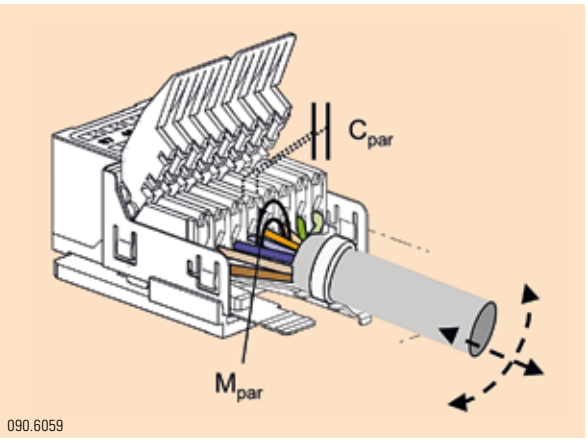
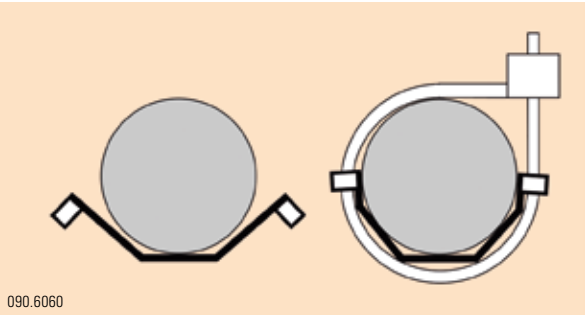
The Importance of Stable Compensation



Can you install a system and then just forget about it? Taking such a casual attitude nowadays could have fatal consequences, especially in the case of data centers. If you operate a 10GBase-T or similar high-performance data network with copper cabling, you also have to attend to the finer points in ongoing operations such as stable compensation in the connection modules. Take a critical look inside the RJ45.





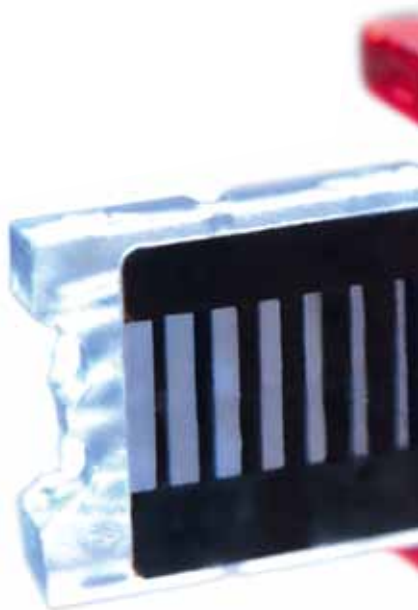
Above: Parasitic coupling with conventional Cat. 6
Below: Flexible strain relief adjusts itself to the cable.

Parasitic coupling occurs in power lines and in wire connections in a conventional RJ45 module, both capacitively and inductively. This coupling is a natural electromagnetic phenomenon but can also influence signal transmission.

It must be taken into account in connection module compensation and is part of the compensatory network. You can, however, only take a statistical mean value of parasitic crosstalk into account in compensation due to the diversity of possibilities for wire routing. All changes around this mean value are incorporated directly as dispersion in the NEXT. This is one of the reasons the cabling must undergo an acceptance measurement after being installed.

Consequences of mechanical influences

What happens if cable is moved following installation, something that occurs frequently in data centers? For example, cable already in the racks can be subjected to varying degrees of strain or pushed off to the side when systems are maintained or expanded. When you draw in new cables, you invariably move already installed cables.



Depending on the quality of the strain relief, seemingly harmless mechanical influences such as these can affect individual wires leading from the cable end to the module.

Parasitic coupling changes in the process and thus also the compensation of the RJ45 module. Strain relief is often missing or inadequately designed. The effects for Cat. 6_A components can take on dimensions of several dBs in the NEXT. Strictly speaking, a cable run should be remeasured and checked whenever a cable is moved.

A change in compensation can have critical consequences. Crosstalk between twisted pairs increases and the bit error rate rises. The network loses in terms of transmission quality and operational reliability.

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If you have class E_A and want to protect yourself from unpleasant surprises from changes in NEXT caused by cable movement, you are well advised to devote more attention to strain relief and wire guidance in the RJ45 module.

Unique shielding of twisted pairs

If you wish to achieve stable compensation against cable movement for your high-performance data network, you will be more successful with the innovative Cat. 6_A module from R&M. With the pyramid and shielded cross in the wiring block, it provides unique twisted-pair shielding for the wires. The metallic chambers for the twisted pairs prevent parasitic couplings between the twisted pairs and thus also prevent changes in compensation from different cable routing.

When designing the module, R&M focused from the outset on achieving the best possible transmission quality. Even the wiring of the cable onto the module was to have as little influence as possible on the transmission technology. No longer was the installer's work to be the deciding factor in NEXT performance for Cat. 6_A modules, as had frequently been the case in the past. The connection technology is basically suitable for Cat. 7A and also renders the module extremely insensitive to changes in wire routing. The pyramid at the end of the module forces the twisted pairs away from each other immediately after leaving the cable jacket, thus reducing possible crosstalk even in the few millimeters of distance from cable end to connection device.

Strain relief itself was also reworked again in the new Cat. 6_A module. The side walls in the strain relief device are now designed to be deformable so they can adapt to the dimensions of the cable when the cable tie is tightened. Strain relief now ensures that the cable is held superbly in the lateral direction.

Each connection module undergoes a function check (dielectric strength of 1000V, NEXT, RL) and the new connection technology is insensitive to changes in wire routing. R&M can therefore assure that the necessary transmission performances are achieved not just in the laboratory but reliably in the field as well. Once installed, the Cat. 6_A module from R&M delivers superb long-lasting operational reliability in the network and increases the service life of cabling and its period of use. ■


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R+F Netz Zollikon
Kommunikation die verbindet

Instakom ag


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FTTH Fit to Measure

Zollikon is a traditional community over one thousand years old and has a privileged location on the shores of Lake Zurich. People here value quality and performance, also with respect to broadband services. The magic word is FTTH – Fiber To The Home. R&M created a customized FTTH central office for expanding the local fiber optic network.


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Left: SCM-SE splicing tray for 24 fibers.

Right: ODF cabinet system featuring three combination modules equipped with 144 x E-2000™ duplex.*

** E-2000™ manufactured under license from Diamond SA, Losone*

Zollikon is a town of fine homes and luxurious residential developments. Fiber optic services are naturally part of the quality of life there. Community leaders are well aware of that fact. Local real estate firms cite these fiber connections as a selling point for apartments. Local electricians are also clued in and geared to this trend.

Demand for ultra-broadband service is expected to increase further. R+F Netz Zollikon, a cooperative that operates a local cable TV and telecommunication network, wanted to act in accordance with this market situation. It therefore decided to equip 6000 apartments and single-family homes successively with FTTH and enable open access for various providers. In this project, R+F Netz Zollikon is cooperating closely with the local communication firm Instakom AG, which is handling the planning.

The challenge was to set up an initial FTTH central office in a minimum amount of space. What was needed was a fiber management solution that could easily handle the growing quantities of fiber optic cables in an uncluttered and reliable way. Top quality and simple installation were two further criteria the system had to meet. Several of the bids R+F Netz solicited were not convincing in terms of quality and flexibility. It was not until R&M entered the picture that R+F Netz found a firm with the desired experience and a customized, modular solution to satisfy all requirements.

Perfect solution for Zollikon

The solution is based on an optical distribution frame (ODF) equipped with a single circuit management system (SCM). R&M promptly adapted the ODF cabinets to the special spatial conditions, thus allowing the FTTH central office to be installed easily into a subterranean garage only two meters high.

The pilot project began in 2010 and ran successfully. Instakom Managing Director Roman Frank: "We cooperated in a genuine spirit of partnership. It was a project in which everyone involved provided each other with mutual support." ■


090.6099

Peter Meier | R&M Switzerland
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IDC contacting from R&M makes RJ45 plugs fit for use in industry and other harsh environments.

Strong Connections for Harsh Environments

Data communication has to meet tougher demands in industrial environments. Standard products do not suffice. There can be heavy vibrations, high temperatures or large amounts of dust. These factors push normally contacted Ethernet connections to breaking point – and often beyond, as this example shows:

A well-known Swiss company was having a machine developed for food production and wanted it to be unsurpassed in its capacity to meet future requirements. The designers therefore selected Ethernet, a fast and common technology, as the protocol for system communication and management. Initially, these development efforts yielded great results: Over 50 substations were interconnected via a cabling ring configuration featuring standard RJ45 connectors. The machine was ultra-efficient in operation, delivering a performance unattainable for predecessor models.

No holds barred

But there was no end of jiggling and joggling during processing, which is not uncommon for production machines. And when it came time to clean the substations, the company took a no holds barred approach. The cleaners rinsed the elements with steam, heating the surrounding machine parts to temperatures of 70 °C or more in the process.

The inevitable eventually happened: The RJ45 data connectors were unable to withstand the strong vibrations and major temperature fluctuations. The machine kept breaking down for no apparent reason and was often unable to resume operation until the RJ45 patch cords were replaced. Considering the model was in use worldwide, the problem was annoying of course, but above all, it was expensive.

Professional solution

Switching to a new plug face was out of the question because there were no suitable customer-specific devices available. A special RJ45 connector turned out to be the solution to this problem. Instead of being pierced at the stranded wire in the customary way, a plug featuring insulation displacement contacting (IDC) was used. This design provides an ultra-stable connection between cable and connector. The changeover to IDC-contacted RJ45 patch cords eliminated all the problems. The machine ran trouble-free and was highly efficient once again. ■

IDC background information

Piercing is the usual contacting method in the IT industry for a cable on an RJ45 plug. A tool is used to push the pronged contact of the RJ45 plug through the plastic jacket of the cable and into the stranded wire where the electrical contact is made.

In offices and other normal environments, this method poses no problem at all. However, there is a measurable increase in resistivity within a matter of hours. This increase occurs because in piercing, the position and contact surface occur randomly and not through mechanical stabilization.

IDC contacts are different: The position of the cable and the large contact area are clearly defined. They are also stabilized permanently because of the clamping forces of the IDC contact.

IDC contacted plugs are also good solutions to problems in other applications such as Power over Ethernet (PoE). In PoE, unstable plug-cable connections can cause short circuits that pose a fire hazard – something ruled out by IDC.

Hermann Christen | System Manager
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R&M Goes Education

Hangzhou Youth & Children's Center (HYCC) is a large, public facility in Hangzhou that develops children's skills and interests while educating them in arts, sciences and sports. Hundreds of children enjoy its modern facilities, devoting their late afternoons, evenings, weekends and vacations to mastering skills of their choice. The R&M cabling solution guarantees that the online booking system for these courses handles heavy access smoothly.

The Children's Center is one of the key government projects in Hangzhou. The Center, covering an area of 40 000 m^2, is located in the new area of Hangzhou and is managed by the government. It offers extra-curricular activities such as music, foreign languages, calligraphy and computing skills. The Center also provides special recreation rooms for parents. Such Youth & Children's Centers (often called Children's Palaces) can be found in all major cities in China, but the one in Hangzhou is one of the biggest.

An online booking service was created to avoid parents having to queue for hours to sign up their children for the courses. That is why the Center was looking for an advanced integrated network that was able to carry 1 GB Ethernet to guarantee a smooth network for the high volume of online inquiries. This requirement was satisfied by reliable IDC technology-based Cat. 6 modules, patch cords and the OM3 fiber solution from R&M. The winning factor was that the Cat. 6 U/UTP cable R&M provided to the client had a transmission frequency of 450 MHz. Most of the cables available from other vendors have a maximum transmission frequency of only 250 MHz, which may cause bandwidth problems.

Being a Youth and Children's Center, safety standards and environmentally-friendly products were a major concern. Appropriate precautions ensure safety to users and network security, especially in heavily accessed areas. R&M's three-level security system and its eco-friendly products meet both requirements perfectly. The hinged dust cover for RJ45 outlets ensures that the ports are protected and sealed dust-tight. The hinged dust covers are exchangeable, reusable and are made of halogen-free material. R&M's products also comply with RoHS (Restriction of Hazardous Substances) standards.

Another feature that impressed the IT manager of the Youth Center was the easy, tool-free installation of the products: "We chose R&M after careful deliberation about the products and solu-

WHY R&M?

- **R&M's Cat. 6 solution has a capacity of 450 MHz compared to normal cable capacity of 250 MHz**
- **Flexibility: R&M security system features can also be added after installation**
- **IDC (Insulation Displacement Connection) is the fastest and most reliable termination method allowing re-termination without any loss of transmission or mechanical performance**
- **R&M's products comply with RoHS standards and are halogen-free**

THE R&M SOLUTION

- **Cat. 6 cables U/UTP LSZH**
- **Cat. 6 modules**
- **Cat. 6 24-port Patch Panels**
- **12-core indoor OM3 fiber cables**

HIGHLIGHTS OF THE PROJECT

- **First project handled by R&M for Hangzhou government**
- **The Youth Center's IT points exceed the 90-meter limit**
- **Integrated cabling solution for the online booking center provided by R&M**
- **R&M's patch cords' and modules' IDC technology is better in quality & performance than competitors'**

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090.6072

tions that we required. R&M's products not only met our safety standards but are also of high quality and are easy to install and maintain. R&M ensured that the installation was completed within the tight time limit given."

A main concern of the customer was that some IT points exceeded the 90-meter limit on the permanent link as recommended by ISO/IEC standards. However with R&M high-quality cable and IDC technology contacts the required bandwidth is not compromised.

The project was carried out by R&M certified partners with R&M's technical support engineers providing round-the-clock technical support on site or via phone throughout the installation and implementation.

This is the first project handled by R&M for the Hangzhou government. The client was more than satisfied with the solutions and services provided by R&M and it definitely seems to be the start of an enduring relationship with the Hangzhou government. ■


090.6169

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Products for Specific Clients' Requirements

Due to its long, international experience, R&M understands very well the need to modify its products to meet a specific client's requirements. In this situation it is particularly important to respond to customer needs at regional office (MO) level.

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A good example of this is at the MO in Poland. Due to the fact that the public operators (carriers) are particularly demanding, the largest number of customized products has been invented just for that segment of the market. A very important issue for carriers is the safe and functional operation of fiber optic cables inside and outside the distribution cabinet.

One of the first products was the cable splitter. It allows the cable to be entered into the cabinet, the fixing of the central element of optical cable and the distribution of individual fiber tubes directly into the appropriate panels/cassettes in protective flexi pipes. To date, three versions of the splitter have been created, for 2, 4 and 12 flexi cables respectively. It is a very simple but also helpful device allowing the cable to be properly maintained and protected inside the cabinet from its entry point up to the patch panel or fiber cassette.

A range of products for 19" requirements

The patch panels have also been modified to meet customer requirements. A range of standard patch panels has already been created: EasyRack, UniRack and Global. For all three types of panels several variants of entry points for cables/tubes held in flexi pipes have been developed. For this purpose, a system of easy couplings has been used, thus eliminating the risk of damage and the need for cable ties while allowing installation without any specialized tools. In the EasyRack panel, the existing system of cable reserve was improved by replacing the elements with sharp edges with a more curved shape. In addition, new front plates have been deployed to increase the capacity of the ports compared with the standard unit.

Four versions have been developed: 3 x 12 and 2 x 18 (for E-2000™*, SC), 24 x SC-D and finally 24 x LC Quad connectors. The front patch cable guide has also undergone changes. In the versions for EasyRack and UniRack the dimensions have been changed to allow the regulated insertion of patch panels in a 19" cabinet. The most advanced changes, however, have been made to a Global Modular enclosure. It has been adapted so that it can be operated entirely from the front of the cabinet. For this purpose, a special assembly shelf has been added, facilitating installation and improving subsequent support. The

"All modifications and improvements are the result of good cooperation between R&M and its customers."

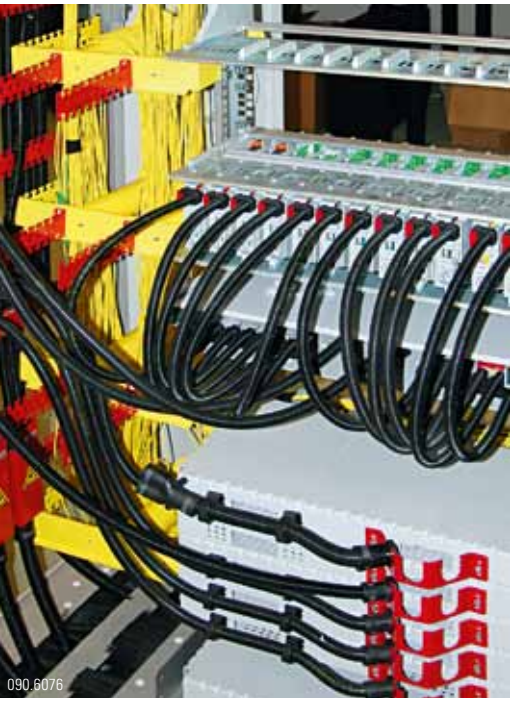
Leszek Sroślak,
Key Account Manager at R&M Poland

dedicated drawer for spare tube reserve was equipped with holders to fit tubes held in flexi pipes. The whole construction is a six U rack, which, thanks to its modular construction, may be reduced or enlarged depending on your needs. The fiber module cassettes have been fitted with special handles for use with 10 mm diameter flexi pipes. Equipping them with splitters and circulators has widened the scope of their application.

The EasyRack has given rise to the EasySpliterRack – a shelf equipped with passive elements, such as splitters dividing the power of broadcast signals over a 10:90 ratio. It allows the monitoring of both the optical cable infrastructure and the entire system without interrupting transmission. The main transmission line operates on E-2000™*/APC connectors.

Distributors for FTTx solutions

For FTTx applications two types of small distributors (SRbox) with patch fields have been invented for 12 and 48 splice connections. The housing allows the cable to be entered from all four sides and is equipped with a lockable door. A hinged shelf with an R40 splice tray simplifies installation.



To satisfy customer requirements, new 44U cabinets have been designed. They come in two styles and sizes, 900 x 600 and 900 x 400 mm, and are equipped with a dedicated system for holding patch cables up to seven meters long. To make better use of vertical rack space they can be enlarged to 52U using a special aluminum design for this purpose.

Constructions holding spare line cables are the last group of customized products. The real innovation lies in the method of installation. Individual boxes are fixed to the frame via one edge of the hinge allowing the whole structure to rotate. The result is a saving of space up to four times that of standard solutions.

System of safe and easy cable guiding within the 19" cabinets

Left: 44U cabinet with patch cord guide system.

Right: SRbox, small FO distributor with hinged splice tray.

All modifications and improvements are the result of good cooperation between R&M and its customers. The main creator and designer of the above-mentioned structures is Leszek Sroślak, Key Account Manager at R&M Poland, who for 12 years has been implementing technology to strengthen R&M's position in the Polish market – with considerable success. This has only been possible because of the company's particular sensitivity to customer needs and its ability to achieve its own goals. ■

** E-2000™ manufactured under license from Diamond SA, Losone*

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New Life Breathed into a Remarkable Building

Sustainability as a goal of renovation

On erecting the Bell Tower in 1958 on Place Francis Wellis in south Antwerp, architect Hugo Van Kuyck gave the Flemish seaport one of its most striking buildings. This tower served as headquarters for the Bell Telephone Company. The complex consists of a main tower, the Arthur building and the parking garage on Haantjeslei. For 48 years, it was home to Bell, a company that now conducts business under the name Alcatel-Lucent. When Alcatel-Lucent moved out in 2006, Vooruitzicht, Fortis Real Estate and the city of Antwerp made a joint decision to convert the property known locally as "The Bell" into an administrative center for the city.

Following renovation, the main building will have 25 000 square meters of floorspace and serve as a workplace for more than 2200 people. Previously these employees were scattered across the city in dozens of different places, which made administration more complicated. In 2007 CPAS (Centre Publique d'Action Sociale) decided to participate in the project. The staff of both organizations will benefit from significantly better working conditions.

Driesen-Meersman-Thomaes and Styfhals & Partner were the architectural firms contracted to execute the renovation. The project involved a special building, so sustainability was a major objective for all building installations.

Multi-functional areas and flexible workstations

The twelve-story tower has dozens of self-contained and open multi-functional work areas large and small for meetings, continuing training, selection committees, exhibitions, receptions and seminars, also for outside parties.

> "'The Bell' was intended to be a lasting investment so only branded products were supposed to be used. For that reason, R&M was the only supplier we felt was qualified."
>
> Rudy De Geest, technical analyst, and Bert Gios, project director

Flexible office facilities are installed in the five stories of the main building. Instead of being tied to a fixed work area, the employees now choose their work spot based on needs and tasks.

Project manager and coordinator was Eugène van Kol from Van Reeth, an engineering office specializing in data transmission, among other things. As such, he was also the subcontractor responsible for selecting the installation company for ICT cabling. Van Kol: "For me, the deciding criteria for awarding the contract were the quality-to-price ratio of the components and the partner's experience and reliability. In a highly pragmatic procedure, we ultimately opted for Netconnect, a certified R&M partner, which did impeccable work."

Digipolis is the ICT provider for the city of Antwerp and CPAS. Technical analyst Rudy de Geest and project director Bert Gios were the gentleman put in charge of all technical aspects of the ICT solution, from cabling for all work areas to the telephone systems and the data center. "The city drew up a list of requirements based on the information Digipolis provided. We were asked to give our opinion of the technical specs for materials and for the plan. 'The Bell' was intended to be a lasting investment so only branded products were supposed to be used. For that reason, R&M was the only supplier we felt was qualified."

An architectural jewel: the staircase connecting the twelve stories with each other.

Pictures: © Ilse Ruttens-Van de Velde – mimoa.eu

> "The renovation of an older building poses entirely different requirements for the installations than a new building does. Complex and usually unforeseeable problems can arise."
>
> Kurt Cavens, project manager at Netconnect

A special challenge

"The renovation of an older building poses entirely different requirements for the installations than a new building does. Complex and usually unforeseeable problems can arise," Kurt Cavens noted. Cavens was project manager for Netconnect, the R&M installation partner. "The Bell was originally built with relatively thin concrete floors and massive load-bearing pillars. Today's designs entail thicker concrete floors and less sizable load-bearing structures. We therefore faced the problem of water penetrating into the lower stories. In a departure from our normal practices, we constantly changed and adapted our plans to the circumstances. The deadlines were tight. The date set for project handover was July 1, 2009, the same day office furniture was supposed to be moved in."

Technical aspects

Copper cable bundles were installed in the raised floors to provide modern flexibility in the work areas. Each bundle was laid from its distribution box to the connections at the individual user clusters. There are six connections at the consolidation points. They connect each user via a bendable cable with his or her workstation. R&M pre-terminated the cabling needed for this purpose with Cat. 6/s RJ45 plugs and tested it. Thanks to the use of consolidation points, the connection to the work area was easy to combine with the power supply and the cable bundle could be integrated neatly in the office furniture.

The entire installation consists of 600 kilometers of Cat. 6A S/FTP copper cabling, six kilometers of MM (OM3) FO cabling, 10 500 Cat. 6/s copper connections, around 2000 CP cables and 350 OM3 – 50/125 µm fiber optic multimode connections. The data center required eleven kilometers of Cat. 6A S/FTP copper cabling, 4.5 kilometers of MM (OM3) and SM (OS1) fiber optics, 1680 Cat. 6/s copper connections and 6000 MM (50/125 µm) and SM (09/125 µm) fiber optic connections.

Since Netconnect handled the entire installation work, 10 GB has a safe and reliable future. ■

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Innovation as a Core Area of Expertise

R&M considers innovation extremely important. For our company, innovative products, innovative actions and innovative processes are crucial to success. This innovation, in turn, requires an open culture of innovation allowing the necessary leeway but also clear structures.

The headquarters in Wetzikon manage innovation at R&M. They develop core products and draw up guidelines for future regional engineering.

Innovation is one of Gianfranco Di Natale's areas of responsibility at R&M. Since April 2011 he is member of the Board of Directors as CTO. The 40-year-old mechanical engineer (specializing in automation) graduated from a university of applied sciences and earned an MBA from Strathclyde University in Glasgow, Scotland. He also has years of experience in product development and product management. In this interview, he shares his thoughts on the subject of innovation.

Gianfranco Di Natale, how does a business manager define innovation?
Innovations are inventions or advances that allow us to differentiate ourselves from the competition. This has become much tougher to do in recent years. It used to be that you could succeed quickly with inventions. Today, you need much more than that. Innovation alone is no longer enough. You usually have to combine different positive factors to enjoy any commercial benefits. For instance, you combine a product innovation with an internationally coordinated value chain to withstand cost pressures. You also have to keep in mind the shift that has taken place from product innovation to process innovation. This dimension is increasingly important for a company like R&M. We apply this idea at all levels of the company and forge appropriate networks within the company.

And how exactly do you do that?
We bring together the areas focusing on this aspect. Sales, Production, Purchasing and Logistics are the main disciplines but the business realm as a whole is affected. R&M is making consistent progress in this direction today, but we still have much left to optimize. The possibilities are virtually endless and visionary. Innovation processes are talked about from the outset of projects and our value chain is geared to an international approach. From the very start, we consider what possibilities a product later has to have and incorporate our findings in the development process. We practice a corporate philosophy of innovation and development with a global character.

How innovative is R&M really?
R&M has always developed superb and innovative products known to be lasting and durable. We are becoming increasingly professional in our operations but must shift our resource planning to a longer-term horizon. We are already in the process of defining "R&M 2020".

R&M has a good mix of professionalism and pragmatism. A company our size

Innovation comes from the Latin words novus and innovato and means something new or something renewing. In the everyday language of the business world in particular, the word refers generally to new ideas and inventions and their economic application. In a narrower sense, innovations result from ideas, provided the ideas are implemented in new products, services or processes that end up actually being used successfully and that penetrate the market.

needs that mix to remain appropriately flexible. R&M is highly innovative in several respects. The Cube comes to mind, for example. It is wonderful to work in this building.

R&M is also highly innovative when it comes to technical advances in products. ODF (Optical Distribution Frame), the new distributor platform for fiber optic networks, illustrates this fact vividly. We clearly recognize our customers' needs and take practical action to meet them but we must learn to guide and structure our innovation and development processes more effectively. Basically, a critical number of ideas is required for us to generate genuine innovations.

R&M practices
a corporate philosophy
of innovation
and development
with a global character.

What specifically has become more innovative in the 18 months you have been at R&M?
Big changes have occurred in our shift of focus from product innovation to process innovation. We are highly innovative with our regionalization strategy, which is based on the supply chain. The product advances are designed from the outset so their core components can be produced in highly automated processes at the main company facility and assembled to customer specification on site. R&M is also extremely competent and professional in global purchasing.

How does a company anchor the idea of innovation within itself?
By creating the necessary freedom for it and by practicing a corporate culture of genuine innovation. People have to be able to work freely and make mistakes. They should not be measured in all that they do. Top management serves as an important role model in this regard! R&M is also making good progress in this respect.

How do you get people to think and act in an innovative way?
It is a matter of company culture. We all have our own limits in our minds and have to be pushed to go beyond them if need be. It is about moving from process loyalty to free thought, about venturing beyond your own turf. You should let the spirit wake up and live as unconventionally as possible. In my own life, I can generate good ideas by inviting an illustrious group of friends round for dinner and spending time with them. They give me fresh ideas and help me better understand how the world works. We come up with innovative ideas together.

What exciting innovations does R&M plan to unveil in the near future?
The programs FO Field, LC, modularity ODF/SCM are all examples. And there are a number of process innovations in the pipeline.

Gianfranco Di Natale, in what area are you innovative? What innovations have you put in place?
What comes to mind professionally is a project I initiated and carried out for a previous employer. It involved an unconventional way of developing, producing and selling weaving machines. A completely new way of thinking guided the project. Customer-specific solutions were allowed to flow into it directly so the throughput time was short and the price was correspondingly attractive.

Privately, I consider myself innovative in the way my wife and I manage our time. We keep searching for ways to use our time well and to meet our own needs. I consciously set aside blocks of time to give myself ample leeway for the family. We combine our activities so everyone ultimately benefits and gains from them. I think it is fun to keep looking for and finding ways to optimize productivity and value creation. For instance, I have an automatic timer installed in my computer. Shutdown time is 11 p.m.! Ever since I did that, I rarely work in the evening because I know the computer will shut itself down automatically. ■

Interview conducted by Erica Monti, Corporate Communications, R&M

Green Construction: the R&M Cube

The new R&M company facility has caused something of a sensation with the construction industry and the media. The R&M Cube sets standards in heating, air conditioning, energy and sanitation technology.


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Just months after its completion, the building is considered a model of carbon-neutral low-energy construction and a trailblazer in terms of industrial architecture. Green construction is the key word.

In keeping with its corporate philosophy, R&M opted for a sustainable and ecological design. The building was designed to make daily processes as efficient and ecological as possible (please consult *CONNECTIONS 39*). Amstein + Walthert AG of Zurich planned the necessary systems for building services.

Low-exergy building services

In the Cube, R&M relied fully on low-exergy building technology (see information box). That had the following advantages:

- minimum possible energy consumption (reduction of exergy)
- ultra-low maintenance costs and high efficiency
- use of available heat (anergy that would otherwise not be usable) in closed systems
- no use at all of fossil energy sources such as oil or natural gas.

> The style of construction and the building installations have a degree of energy efficiency unprecedented in company facilities.

The Cube generates 80 % less CO_2 than a comparable, conventionally run industrial building. The facility meets the tough Minergie Standard (Swiss quality mark for low-energy homes).

The style of construction and the building installations have a degree of energy efficiency unprecedented in company facilities. With its excellent surface-to-volume ratio, the compact, cubic shape

of the building reduces the heat losses where this is most important, namely from the building shell. The Cube has exceptional insulation values against heat and cold thanks to the window and shading systems used and to the back-ventilated Alucobond facade.

With its innovative energy and installation technology R&M does not even have to resort to fossil fuels for its residual energy requirements. Heating and cooling are provided solely through a clever networking of the Cube with the connected underground thermal storage unit.

The waste heat released by the machines and equipment is used so sufficient heat is available inside the rooms for many months of the year. During the summer, excess heat is discharged and sent by way of ground probes to storage units as deep as 250 meters below the surface. When heat is needed again in the winter, it flows back into the building after being raised to a higher temperature by a heat pump. This approach ensures a pleasant indoor climate throughout the year.

The cooling system for the data center is also innovative. It is based on what is called the "cold aisle principle". Cold air is blown only into the rack cabinets and the aisles between them, not the entire room. Heat exchangers return the generated heat to the building heating system, thereby reducing the usual energy requirements by 60 %.

Water management is likewise a big issue, given the rising rates for drinking water. A 20 000 liter tank collects rainwater and uses it for toilet flushing.

High-end communication technology
High-performance structured building cabling supports modern communication technologies such as Voice over IP (VoIP) and Unified Communications applications. The IP phones and other terminals are powered via the data network (Power over Ethernet), eliminating the need for a multitude of power cables, outlets and power supply units. Intelligent building automation ensures that the control system for building services is geared to actual needs. ■

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Exergy and anergy

Thermal energy cannot be fully converted into electricity and other types of energy. Exergy and anergy are two terms coined to describe this situation. Exergy is the portion of thermal energy convertible into electricity or mechanical work. Anergy is the non-convertible portion. It remains strictly thermal energy. In conventional heating systems, anergy is not usable but in a low-exergy mode of construction it is.


090.6171

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The entire Limberg II power plant was designed as a subterranean facility to protect the environment.

Megawatt Meets Micrometer

The Kaprun hydroelectric power plant facility in Austria has undergone massive expansion in recent years. The power plant capacity was more than doubled, from 353 to 833 megawatts. R&M supplied the network connection equipment for the new section of the power plant.

Herbert Tisch, R&M Austria, and Adolf Aichhorn, Verbund Telekom Services.

The Kaprun power stations are located in the Kaprun Valley not far from the Grossglockner, the highest mountain in Austria. This facility is a symbol of reconstruction after the Second World War and remains a key part of the national power supply to the present day. Over the past five years, this venue has been the largest power station construction site in Europe: Construction of the Limberg II pumped storage power plant began here in 2006 and cost a total of 405 million euros (505 million Swiss francs). The project has been in a phase of thorough testing and trial operation since the beginning of 2011. R&M Austria is the system supplier for the IT and telecommunication infrastructure of the new power station. Verbund Telekom Service GmbH awarded it the contract. This construction firm is spun off from the listed Verbund AG, Austria's leading electricity company, and is in charge of all IT and telecommunication projects for that company. Verbund AG covers more than 40 percent of Austria's electricity needs and the company produces 90 percent of its electricity from hydroelectric power.

Reliability for many years

Adolf Aichhorn was the engineer at Verbund Telekom Services in charge of the project. One reason he wanted to work with R&M was that the company is highly reliable: "The basic reason was the long-time collaboration between the Verbund Group and R&M both in fiber optics and in copper. What's more, connectivity solutions from R&M satisfy the stringent quality standards so essential for a power utility. You see we do have high expectations in terms of operating and supply reliability and security for years to come. Last but not least, we appreciate the competent personal service on site and the good collaboration. Products are also available at short notice. These factors gave us the flexibility to make project changes during the construction phase without any problem."

R&M began deliveries in June 2010. In the fiber optic segment, it supplied various types of connectors such as E-2000™*, LC and SC; in the copper segment, the VS Modular was installed as main distribution system.

Power for generations

Top power capacity and modern design are two outstanding features of Limberg II. The pumped storage power plant is located entirely inside a mountain to minimize any impact on the surface.

The two machine units have an output of 240 megawatts each. A cavern 62 meters long, 25 meters wide and 43 meters high was excavated inside the mountain to accommodate them. The entire nave of St. Stephen's Cathedral in Vienna would fit into this cavern. For construction and safety reasons, the generator transformers and switchgear were placed in a separate room known as the transformer cavern. This cavern also boasts impressive dimensions: 61 meters long, 15 meters wide and 16 meters high. A total of 70 000 m^3 of rock was removed in seven months to create the two caverns.

Austria has no choice but to expand hydroelectric power capacity in order to keep electricity imports to a minimum.

Hydroelectric power for Austria

Water is by far the most important source of energy for Austria: It constitutes about 60 % of total national electricity output. By comparison, only 37 % is produced in caloric power plants and a mere 3 % from alternative energy sources such as wind, solar and biomass. Austria has no nuclear power plants. Electricity consumption in Austria has more than tripled over the past 40 years and is forecast to continue increasing another 2.3 % a year until 2015. At the same time, the country is under international obligations such as the Kyoto Protocol that require it to shut down less environmentally friendly power plants. Austria therefore has no choice but to expand hydroelectric power capacity in order to keep electricity imports to a minimum.

Some of the water used for producing electricity in the Kaprun power plants is meltwater from the Pasterze Glacier on the Grossglockner. This water collects in Margaritze Reservoir and is pumped through the 11.6 kilometer long Möll tunnel into Mooserboden Reservoir. Although Kaprun is in the northern Hohe Tauern Mountains, about 60 % of the water used for electricity production originates in the south.

The Kaprun power stations are operated by Verbund Hydro Power AG (VHP), a subsidiary of Verbund AG. VHP specializes in building, operating and maintaining power plants and has approximately 1 020 employees. With a turbine capacity of more than 6 000 MW, its 90 hydroelectric power plants produce about 22 800 GWh of electrical energy (1 GWh = 1 million kilowatt hours) every year – more than one third of all electricity consumed in Austria. That makes Verbund AG by far the largest producer of environmentally friendly electricity from hydro power in Austria and a leading producer in Europe. ■

** E-2000™ manufactured under license from Diamond SA, Losone*

Data networks of maximum reliability are essential in facilities that generate electricity for entire regions.

1 Mooserboden Reservoir
2 Wasserfallboden Reservoir
3 Inlet structure
4 Sluice chamber Höhenburg
5 Access tunnel
6 Supply tunnel
7 Surge chamber
8 Pressure tunnel
9 Inlet, outlet
10 Sluice chamber, underwater
11 Underwater tunnel
12 Underground power plant
13 Access tunnel Limberg II

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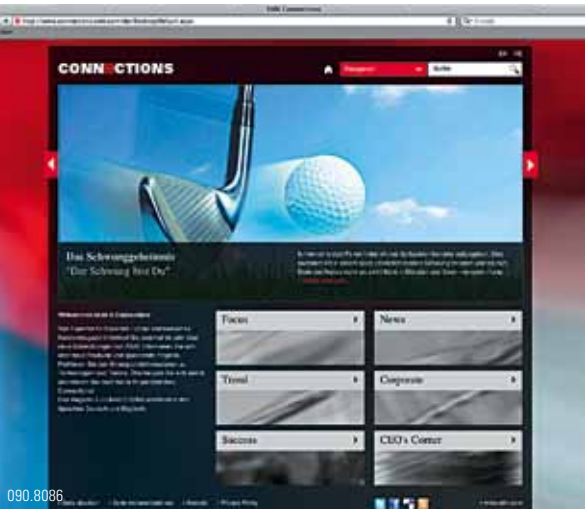

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The R&M customer magazine has been established on the market since its first issue in 1991 and has been constantly further developed in an ongoing process. The magazine appears twice a year, which is relatively infrequently. To ensure that it yields the full benefits of a customer magazine, we have now created a supplementary electronic format. This step was also something requested by readers during the last survey.

We are satisfying the needs of those readers who continue to appreciate a printed magazine but also want to consume certain information in their fields of interest electronically. In the future, readers will be able to read *CONNECTIONS* as usual as a printed magazine and also on the Internet using whatever media they prefer.

Electronic format to supplement print version

The e-magazine is set up as a microsite and intended to ensure readers additional benefits. It makes available additional information on the topics in the print version (Focus, News, Corporate, Successes and Trends) but also conveys information about new innovations from our company at various intervals throughout the year. CEO Martin Reichle will also present issues from his popular column "The Last Word" in a broader way with a more multimedia approach. The electronic format enables video material and picture series to be included. The electronic version is also equipped with a full-text search function.

090.8088

It will certainly be worth your while to subscribe to the magazine as an RSS feed and to use the social bookmarking functions. ■

We would appreciate your taking a look right now: www.connections.rdm.com


090.6173

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Météopole, Toulouse.
Photo: © Météo-France

Météo-France:

Excellent Forecasts for the Networks

The main job of Météo-France is to warn authorities and the public of dangerous weather phenomena. To do so, the organization has to monitor the atmosphere around the clock all year long. For its own network, Météo-France opted for R&M.

The Competence Center for Climate Research is located in Toulouse. Part of this complex is the Poincaré Building, one of the nerve centers for the authorities. It houses the forecast control center. This core strategic task calls for a first-class network infrastructure that delivers maximum reliability and capacity for handling ever-larger streams of data.

Bruno Meunier, Managing Director of ARIS, an engineering office specializing in intelligent buildings, explained: "We bid for the contract and were selected because we satisfied a highly demanding list of requirements. Météo-France wanted to completely modernize the VDI cabling infrastructure to handle the growing volume of data with an optimized bandwidth and to support the transition to the new IP technology."

In terms of technology, Météo-France selected the Real10 10 Gigabit solution, including a patch guard security system from R&M. The installation work was finished in six months with the system operating at full capacity and without interruption the whole time.

Gilles Despeyroux, Managing Director of the contracted installation firm: "The project consisted of equipping 14 technical rooms. With help from the Météo-France telecommunication teams, we concurrently executed three zones in multiple stages. We have noticed the superiority of R&M products repeatedly since being certified for R&M*freenet* two years ago. They push the envelope in terms of performance and their ease of installation allows us to work at a fast pace on site."

Josiane Thalamy, DSI from Météo-France, noted in closing: "For us, the excellent quality of all components for copper and fiber optic cabling was one of the most important criteria. The bid from R&M turned out to be the most advantageous. The quality of the patch cords in particular was superior to all other suppliers. R&M was also extraordinary in the support it gave and the warranty it granted for the connections.

THE R&M SOLUTION

- **Class E_A copper solution: 2380 connections**
- **OM3/OS2 fiber optic solution: 240 hybrid connections multimode/monomode**
- **20-year warranty on the installation**

There is a 20-year warranty on all components for copper and fiber. That was only possible because of the training and certification of the companies entrusted with the installation. The manufacturer also runs random checks on the installed connections itself." ■

Richard Blanc | R&M France
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Winner of the iF Product Design Award 2011: the Cat. 6_A connection module from R&M.

090.6084

product design award 2011

iF Product Design Award
for Cat. 6_A Module

Our Cat. 6_A module continues its success story. This, the best performing RJ45 connector of all times, recently won the renowned iF Product Design Award.

Exemplary product design, compact size, optimum ergonomic handling are three traits that struck the panel of judges for the International Forum Design (iF) when they held the Cat. 6_A connection module from R&M in their hands. In explaining its choice of winners, the panel said this: "The clear lines of the design in red and white underscore the message: Swiss quality." The panel agreed that this innovation definitely deserved the renowned iF Product Design Award.

The award was presented in early March 2011 at the start of the CeBIT computer trade show in Hanover, Germany. R&M has now joined the illustrious league of the world's best product designers.

The design award confirms that R&M always provides its customers with more than merely a connector. The Cat. 6_A module stands for consistent technological progress coupled with well-conceived design, top quality, extensive functionality, easy handling and long-lasting use. The iF Product Design Award is also the crowning touch for R&M for what has been a unique product advance.

In its red plastic body, the Cat. 6_A holds a lot of high tech for twisted-pair copper cabling and high-frequency signal transmission. R&M achieves particularly effective decoupling and shielding with the pyramid-shaped wiring block and the separation plates. The typical electromagnetic interference between the twisted pairs – crosstalk – is eliminated almost completely. The connections therefore exhibit good transmission quality and reliability. That is the basis for reliable data transmission and fast responses by the servers.

The iF Award applies to the entire life cycle of the product. It is an internationally recognized mark of quality. Design is not the only criteria the panel applies. Its overall assessment also includes craftsmanship and choice of materials, degree of innovation and environmental compatibility as well as safety, brand value and the degree to which form reflects function. The iF Product Design Award is one of the most famous and oldest design competitions and was held this year for the 57th time. The panel of international experts picked 993 winners this year from the 2756 submissions. ■

090.5782

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Spirit of Invention

I have boundless admiration for people who invent and develop new things with perseverance and creativity. When doing so, they cover a lot of ground and encounter many obstacles along the way. They learn from the mistakes they inevitably make. This is possible in a corporate culture where employees are allowed to make mistakes.

Ridicule
The world lives on inventions but most inventors are met with smirks when they present something new. They are mocked by scholars and ignoramuses alike. Well-known inventors like André-Marie Ampère, Alessandro Volta, Michael Faraday, Luigi Galvani and Georg Simon Ohm, all of whom were involved with electricity, were ridiculed for a long time. Along with all the burns, they incurred derision and mockery for their revolutionary findings. Today children in school learn their names and the scientific achievements associated with them. Inventors are people who think unconventionally and make the impossible possible.

Scientific proof
We now have scientific proof that the stomach contains cells similar to those in the brain. They might explain our "gut feelings". The location of these cells is much less important than our ability to listen to them and follow our intuition.

The main challenge for Ampère, Volta & Company was to convert their empirical findings into scientific evidence. This was a truly challenging task because in the olden days there were no measuring devices the scientists could have used. Producing evidence proved a pitfall for many an inventor. Many inventors did not become known until long after their death and their revolutionary inventions were passed on with modern methods.

Passion
Ample space is needed for inventions to develop. Unconventional thinkers reach their goals with much passion and perseverance. They have setbacks along the way but ultimately go all the further because of them. And learning from mistakes helps you get on. And that is true for more than just inventors.

None of us will come up with anything by memorizing easily retrievable Internet knowledge and being afraid of making mistakes. Instead, we should be encouraging young people's passion for inventing early on in school and rewarding them for small inventions. ■

Film tip: "I.Q.", 1994

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