I.C.F.

NEWSLETTER

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Report on Vancouver Congress

The Congress 2003 was held in Vancouver, Canada on October 8th to 12th with the attendance of around 150 persons (including spouses) from all over the world. The participants have enjoyed several current topics and deepened their mutual friendships through those business sessions and social events as well. At the closing of the business session, Council members gave their views on the current and near term future market. It was the common understanding that the visible signs of the recovery in the market cannot be seen yet. However, the President urged member companies to take more actions to reduce the over capacities and improve our industry structure even with some financially painful actions. The participants shared his remarks and promised to see each other at the next Congress with more brighter and firm financial situation.

The full reports of the congress are now on the web page (www.icf.at), also the CD version and printed version have been sent to all attendants of the Congress. Member companies can download those reports from the web page too (Members only and password protected area) including the study report on the "Regional Analysis on Americas".

10 Trillion $ Investment in Power Sector in 30 years

The International Energy Agency (IEA) has recently released its study on the Investment required for the next 30 years in the world power sector to keep the balance between increasing demand and supply. According to the report made after two years study, it is essential to invest $10,000 billion in this sector by private investors and governments. As the huge blackouts which happened in the western countries in the last summer gave us the lesson, over 50% of the investment needed in the power utility will have to be put into building and improving the transmission networks. Cable industry has to cooperate in this field to meet the requirement of the consumer and utilities.

Smart wire?

Do you know how many sets of Electronics Equipments, such as DVD , Digital Camera, Hard Disc Reader and so on, are produced in the world per year? Anyway, it is now reaching astronomic figures. These electronic equipments and devices are definitely using so-called flat wire, tape wire or ribbon wire and flexible printed circuits for the internal wiring. These devices are smaller and lighter than previous models. This means finer and lighter wires and more complexes or sophisticated pattern of Flexible Printed Circuits (FPC) are required. Our industry should try to develop such products by investing more in R&D. Then we will be rewarded for the volume and the profitability. (The cover page design features the pattern of FPCs)

New Secretary General

The current Secretary (S. Otohata) will return to Japan with much gratitude for members' cooperation and support during his period of service and asks the same support to be extended to his successor, Mr. Thomas Neesen, who will be in charge from January 2004.

Plastic Optical Fibre (POF) – A Market Set to Boom?

Ever since Glass Optical Fibre (GOF) started to make big inroads into the telecom business in the 1980s, it was obvious that fibre would come to take a large portion of the market currently occupied by copper. As both GOF and copper products developed over time in technology and price, the territory that each should occupy became clearer. Copper remained the logical choice where data speeds were quite low and distances were short, the high cost of terminal equipment and installation limiting the use of GOF. This gave copper the bulk of the outside plant subscriber loop (though here it is now being challenged by fibre), the horizontal layer premise telecom/data wiring and data wiring within OEM equipment.

As the GOF/copper divide became clearer an apparent middle ground between the two emerged, a middle ground that Plastic Optical Fibre (POF) is now laying claim. The market area concerned is that where speed is at the high end of copper's capability and distances too low for fibre to be economic. This logically creates a market space at speeds of over 100 Mbit/s (the present top end for copper in data networking) and at distances of under a few hundred metres, above which GOF becomes more economic. With established POF products able to achieve 500 Mbit/s over 50 metres and new generation products promising 10Gbit/s over 100 metres (with only gradual tail off at greater distance), cheap terminal equipment and low cost installation, POF appears to be a natural choice to fill this void. Moreover, with its freedom from Electro Magnetic Interference (EMI), POF appears to be a suitable candidate to fill some of the market space that may otherwise be filled by copper where EMI is not a consideration. The inherent flexibility, low weight and ease of connection of POF add to its attraction.

As yet, POF appears to have failed to live up to its potential. Recent developments in POF products and in the markets that they serve suggest that this situation may change. In the following article, we review POF's development and potential.

POF Development and Capabilities

POF was originally developed by Du Pont, with its acrylic-based product named "Crofon" in 1966. Though early technical development was impressive, commercial application was lacking. The focus of development passed to Japan, with Mitsubishi Rayon taking an early lead and introducing the first commercial products. Other companies became involved in the commercialisation of POF, primarily from a materials angle. In Japan, Asahi Glass, Toray and Fujifilm now offer a POF fibre and cable product range. In Korea, the textiles company Samyang and more recently Nuvitech have been offering POF products. Cablemakers have also been involved in the commercialisation of POF. Names that stand out include Fujitsu in Japan, Lucent and more recently OFS in the United States. Nexans in Europe is also a major contender in the POF field.

With the many companies involved, POF has come a long way from the product made by DuPont. Typical attenuation levels have fallen from 500–1,000 dB/km in the mid-1960s to little over 100 dB/km today for an acrylic-based product (at 650 nm). The typical product offered today is of a type designated as SI-PMMA (Step Index Polymethyl Methacrylate). SI-PMMA fibres theoretically allow data speeds of up to 500 Mbit/s over 100 metres and more than 2 Gbit/s over very short distances. Practical applications tend to be at speeds up to 100 Mbit/s over 50 metres, still well above the normal application range of copper.

Though it has admirable qualities, SI-PMMA fibre is now coming to be regarded as the "low speed" end of the POF spectrum. A faster, but less rugged (and more expensive) graded index product based on perfluorinated compounds, normally of PMMA, is now being commercialised. The product, normally referred to as GI-POF, offers potential speeds of up to 10 Gbit/s over 100 metres and the ability to cover distances of several hundred metres without undue loss of signal. Field use in the plus 1 Gbit/s at distances of over 100 metres is now well established for I-POF. Asahi Glass pioneered the commercialisation of GI-POF. Others are now in the process of bringing products to market. These include cable makers Nexans and OFS, the latter working with an extrusion process that, it is claimed, will substantially reduce the cost of production. Non-cable companies about to commercialise GI-POF include Digital Optronics (working with Samyang),Fujifilm and Nuvitech.

Alongside the development of fibre, terminal equipment has also had to improve to bring out the potential of POF. With the development of low cost transceivers using red and green LEDs, the commercialisation of POF has become more possible. Companies involved in this technology include household names such as Osram (Siemens), Toshiba and Honeywell, but also specialists such as Firecomms, Infineon, Hamamatsu and Zarlink. The devel-

opment of slightly more expensive RC LEDs and VCSELs (Vertical Cavity Surface Emitting Laser) by the same companies for use with GI-POF is actively underway, with fairly low cost products already on the market. With its proprietary VCSEL developed by Fuji Xerox, Fujifilm is perhaps unique in being able to offer both its own light source and cable.

On the connections front, POF technology is much less challenging than GOF. Because POF figures have a larger diameter and a much greater tolerance level, POF is comparatively easy to connect. In order to have a full commercial product offering, however, cheap, high quality connectors have to be available. Companies such as Molex, Tyco, FCI, Delphi and others have been active in this field.

The Market for POF

IGI Consulting Inc. estimates the value of the POF market in 2002 at US.$ 451 million. This is more than twice the figure quoted for 1998. Other than a limited decorative light and visual display sector (not covered by IGI), the main markets for plastic optical fibre are in high-speed data applications over short distances where, for reasons of capacity, cost or the operating environment, the use of copper or glass optical fibre is not favoured. The market sectors in which POF is used can be grouped as follows:

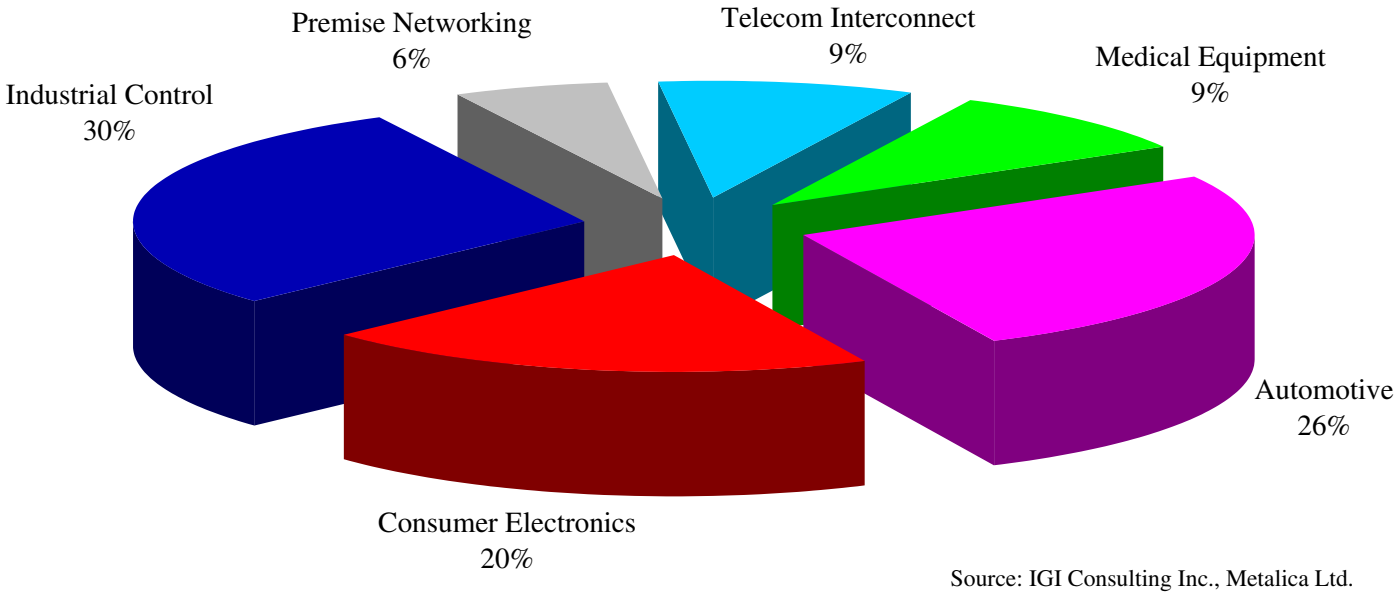
- Industrial Control
- Medical Equipment
- Automotive
- Consumer Electronics
- Premise Networking
- Telecom Interconnect

We follow with a brief review of each industry segment.

Industrial Control: IGI Consulting estimates the value of the industrial control market at US$ 133 million in 2002, making this the largest market segment for POF. It is also the longest established, the share of the total market having slipped from nearly 50% in 1998 to less than 30% today. The rationale for POF use over copper hinges on its ability to withstand electro-magnetic interference. POF is used in industry to connect controllers and sensors to devices, allowing control of factory floor operations and information feedback. POF has succeeded in this market

POF Market Apportionment in 2002 by Value

Total = US$ 451 million



Source: IGI Consulting Inc., Metalica Ltd.

partly because it has long been recognised in industrial data bus standards such as “SERCOS” (Serial Real-tome communications system), “Profibus” (Process Fieldbus) and “Interbus” (Industrial I/O Bus). These standards specify POF as an alternative to be used alongside copper in electrically noisy and performance critical environments up to 16 Mbit/s.
Currently, the industrial data bus standards are in the process of being upgraded. This is potentially beneficial to POF. The next generation of standards will incorporate much of the protocol applying to LANs Ethernet, accommodating speeds of up to 100 Mbit/s. The enhanced data bus standards are necessary with the increasing depth of penetration of automation in industry, requiring many more input/output devices and a resulting quantum increase in the number of data links and in the amount of traffic passing between them. In the industrial context, we could quickly be entering a phase where POF will find a niche as much for its transmission capability as for its freedom from EMI.

Medical Equipment: The medical equipment market, at US.$ 42 million in 2002, is quite small, but POF has a high penetration in this comparatively minor market. Like industrial control, POF finds a use primarily because of its electrical characteristics rather than its high-speed data capability. It is used in machines with a high EMI environment (X-ray machines, CAT scans etc) and where the isolation of patients from high voltages is required. A specific advantage of POF over both copper and GOF in the medical context is that it does not react in a high radiation environment. This could also be an important factor in military applications.

Automotive: The highest growth of the main POF markets has been in the automotive sector. Starting from nothing in 1997, by 2002 automotive sales are thought to have reached US.$ 119 million. The use of POF in cars started with Mercedes Benz in 1998 with an optical bus in audio systems. Today, Daimler Chrysler (which now owns Mercedes Benz) is still a leader in POF use. The other main proponent is BMW. From modest beginnings, POF is used in some cars in separate data bus systems for both information and entertainment (“infotainment”) and safety. Production models of BMWs now contain up to 100 metres of POF. The logic behind POF use, according to BMW, is not cost, but performance. High data rates, reduced weight, less packaging and freedom from EMI are all factors in the BMW decision to use POF.

The same logic, as yet, has not been employed generally by the automotive industry. This will almost certainly change. In Europe, sixteen automakers ratified a common data network standard in 2000 called “MOST” (Model Orientated Systems Transport), which specifies POF as a transmission medium option, based on a 50 Mbit/s standard. Things have not progressed so far in Japan or the United States. Both are in the process of adopting a variant of the 1394 data bus standard applying to consumer electronics. Full adoption and the appearance of POF in production automobiles in Japan and in the United States are expected 2003–2005. The electronics are already in place. As early as February 2002, Texas Instruments released the first automotive 1394b bus solution to support in-car infotainment. This allowed for speeds of 100 Mbit/s over 10 metres on either POF or Category 5 copper cable.

Consumer Electronics: IGI Consulting estimates the consumer electronics market for POF at US.$ 90 million in 2002. Like automotive, this market sector has grown from very modest beginnings in the late 1990s. The current position of POF depends upon its use in the pieces of audio-visual equipment that use laser light in their operation (CD players, DVD players) and on camera equipment that downloads data onto computers and other digital equipment (digital cameras, camcorders, video game stations etc.). It is becoming the norm for audio-visual equipment to have optical as well as audio and visual input/output sockets, hence the potential for optical wiring within and between consumer electronic devices.
The penetration of POF could go much deeper as consumer electronics become more and more adapted for use within an integrated information and entertainment environment in the home. Industry standards have been developed for this to happen. The most recent 1394b protocol implies a much greater degree of connectivity between devices than the former 1394a standard. It is probable that the 1394b standard will be adopted rapidly by the consumer electronics industry. IGI Consulting estimates that there were 140 million 1394 / 1394b capable devices produced in 2002 and forecast an increase to 548 million devices in 2006.

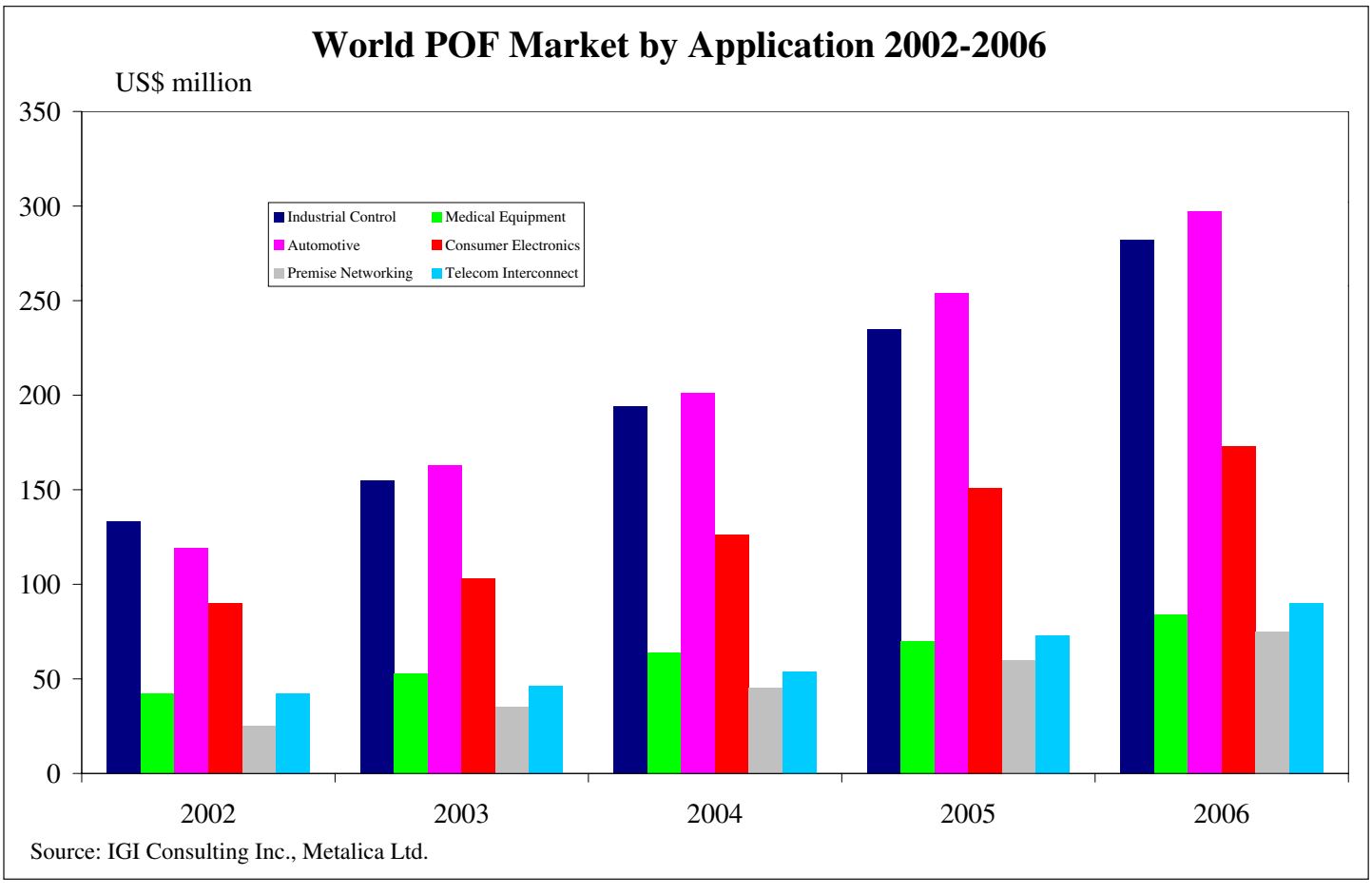
Premise Networking: The introduction of the 1394b standard is potentially much more important for the home networking market than for the consumer electronics and other equipment connected to the network. The 1394 high-speed interconnection protocol enables simple, low-

cost, high-bandwidth real-time data connectivity between computers, peripherals and consumer electronics. The original 1394a specification called for data transfer rates of 100, 200 and 400 Mbit/s over a distance of 4.5 metres. 1394b enables higher performance (of 800 Mbit/s to 3.2 Gbit/s maximum), longer distance (up to 100 metres) and a variety of cable media (including shielded and unshielded twisted pair copper, POF and GOF). The standard product is still seen as being copper "Category" twisted pair cable, quoted as being applicable at speeds of up to 100 Mbit/s over 100 metres. But, significantly, POF is now also quoted as an alternative, at speeds of up to 200 Mbit/s over 50 metres.

In time, integrated data networks in the home will almost inevitably become a reality. In the office and factory, though the requirements are rather different, a similar forward progression in connectivity is also taking place. Here, the speeds and distances can be much greater. The Gigabit Ethernet has arrived in corporate networks and the 10 Gbit/s network is on the near horizon. Whether or not normal non-residential data networks will really evolve to such an extent, beyond the capabilities of copper, at present appears unlikely. The current trend, however, does appear to offer on opening for a low cost alternative to GOF where copper cannot be used.

To date, POF has achieved only a small slice of the premise network market. In Japan, Asahi Glass has been the main proponent of POF in premises, claiming to have made installations on sixty sites (including offices, schools, condominiums and hospitals) between March 2000 and April 2003. Asahi used its perfluorinated GI-POF in each case, including residential, the speed of 1.25 Gbit/s and cable runs of over 100 metres involved the centralised wiring configuration chosen requiring capabilities above standard SI-PMMA. Though the Asahi installations show that POF works (and that it is a suitable adjunct to Japan's rapidly progressing fibre to the home programme), neither Asahi nor its competitors have succeeded in creating a mass market for POF.

Telecom Interconnect: The market for POF within telecommunications central offices and other switching and routing points is very small, but potentially valuable. According to James Walker of Digital Optronics, the main



Source: IGI Consulting Inc., Metalica Ltd.

proponent of POF use in this sector, there is a rapidly growing requirement for very high speed short distance board-to-board or rack-to-rack interconnection and that GI-POF is a much cheaper solution than the alternative, GOF. The market being addressed is for 10 Gbit/s and 40 Gbit/s interconnections over distances of up to 30 metres.

Market Potential

Forecasting the market for POF, like any other emerging technology, is fraught with the potential for large errors. In most of its market sectors, POF has a low penetration relative to competing materials. Should it achieve much greater acceptance in any one sector, this would have a massive impact on the size of the POF market overall. Moreover, if POF did succeed in one sector, volume production and pressure from customers would almost inevitably bring down prices, opening up the potential for greater penetration in other market sectors. This being said, Paul Polishuk of IGI Consulting has made an informed estimate of market potential; we present his forecasts here. According to Mr. Polishuk, market size is set to more than double between 2002 and 2006 to reach slightly over US$1 billion in value.

If the POF market does take off, then the actual turn out could be much higher than Mr. Polishuk suggests. Before this could happen, POF would have to really prove its worth in at least one of its main market segments. One issue that has to be addressed in looking at the potential is whether or not POF will prove to be as problem-free in operation as its proponents claim. A possible area of concern is temperature rating. While enhanced products are available, the standard heat rating of seventy degrees may be insufficient for many applications. Perhaps a more pressing concern than this, however, is the true nature of the value proposition in using POF.

Although it is claimed that POF is “cheap” as a package including cable, transceivers and other equipment and installation, the commercial figures to back this up are not really available. Currently, GI-POF cable costs several US dollars per fibre metre. This is expected to come down to US$1/metre, which is still double the cost of multimode GOF and many times the cost of copper. According to industry insiders, the high cost of the cable is more than offset by the low cost of terminal equipment (US$ 2–3 for an automotive connection, or as much as U$ 15 for a GI-POF data network link) and installation costs that are comparable to copper. If these figures are correct, then the all-in cost of POF may prove to be only 25–50% of the price of GOF for links in the tens of metres range, but still significantly higher than copper in data networking. In OEM applications, the all-in cost of POF may not be substantially higher than copper.

Given these figures, POF could be seen as an economic means of future-proofing data networks in the home and office at a reasonable cost. But, given the ability of copper to serve distances of up to 100 metres with speeds of up to 100 Mbit/s, POF is unlikely to deeply penetrate the mass market. Indeed, the wireless solution offering lower speeds and distances is rapidly gaining acceptance as an easy, cheap and sufficient option.

South Korea could prove to be the breakthrough for POF in home networking. In May 2003, the Korean Ministry of Information & Communication announced a programme to wire ten million homes by 2007 with 20 Mbit/s networks; the ministry quotes POF use as an option. If this government funded project utilises POF and it is shown to be successful, this could make POF look much more like a real contender in the privately funded market elsewhere. For POF to have any real potential in home networking, however, prices will have to come down to be more comparable with copper and, perhaps more important, packages of cable, light sources, connectors and other ancillaries will have to be available through normal electrical distribution channels.

Much the same can be said of premise use of POF in commercial and industrial buildings. While data speeds in the office and factory are approaching the maximum capability of copper in some cases, and the 10 Gbit/s Ethernet standard where applied would take it well beyond, the package of products and installation support that would be necessary for widespread use of POF in commercial LANs is lacking. Perhaps the greatest potential lies in the part of the premise market already taken by GOF, the riser and campus segments, where distances are quite short but data volume too much to be easily handled by copper. While the potential exists, however, it appears that the commercial infrastructure is not in place for it to be fully realised.

Distribution is not such an important issue in the OEM markets for POF, where the companies involved buy in sufficient volumes for them to sort out their own sourcing arrangements. We see the OEM markets as having much more potential than the premise markets largely because of this. The automotive market, in particular, looks promising. Given the successful use of POF by two car companies and the perceived need for an alternative to copper on the grounds of weight and EMI profile, it appears very likely indeed that the use of POF by car manu-

facturers will become more general. The arguments are less pressing in consumer electronics, but as 1394b becomes the industry standard, then quite rapid growth again appears probable.

In summary, this review of POF shows that the market has considerable potential for growth. We believe that the most assured growth is in the OEM sectors, for which the standard SI-PMMA fibres available today are quite sufficient. While the focus of product development is on the more sophisticated GI-POF, we believe that much has yet to be done in the way of taking the product to market to ensure that the true potential of POF in data networking is realised.

News in Brief

(Provided by Metalica Ltd. UK)

CommScope to Buy Avaya's Data Cable Solutions Business: An agreement has been reached for **Avaya Inc.** to sell its Connectivity Solutions business to **CommScope Inc.** for US$ 263 million. Connectivity Solutions is a world leader in structuring data cabling and equipment for telephone central offices, with fiscal 2003 sales of US$ 542 million and an operating income of US$ 3 million. It employs around 2,000 people in the United States, Ireland and Australia.

Essex Electric Plant Expansion: After the closure of its Sikeston plant, Missouri earlier this year, **Essex Electric Inc.** has announced the completion of a 100,000 sq. ft. building expansion at its facility in Florence, Alabama. The new manufacturing space is being equipped with both new and upgraded equipment as part of a US$ 25 million investment in 2003 and 2004 in connection with the company's current restructuring and expansion projects.

Superior Telecom Emerges From Chapter 11: Effective November 10th **Superior Telecom Inc.** emerged from Chapter 11, its Plan of Reorganisation having been confirmed by the bankruptcy courts. The newly formed company **Superior Essex Inc.** has become the parent and holding company for the principal operating subsidiaries **Superior Essex Communications LLC** covering telecom cable business and **Essex Group Inc.** covering winding wire. A syndicate led by Deutsche Bank Trust Co. Americas has assumed ownership of Superior Essex Inc. The company's debt has been reduced by US 1.1 billion to US$ 200 million.

Other Chapter 11 News: The holding company **GenTek Inc.** has emerged from Chapter 11, its balance sheet debt having been reduced from US$950 million to US$280 million. Gentek has various cable and related holdings in its portfolio, including **Noma Cabletech, Prestolite** and **Woods Wire.** Another Chapter 11 victim, **Rome Cable Corp.** has not fared so well; having failed to achieve a financial rescue package it announced closure in September with the loss of 240 jobs. Rome Cable was primarily a building wire producer. Meanwhile, the owner of **International Wire Group Inc.,** the investment group **Hicks, Muse, Tate & Furst Inc.,** is attempting a company restructuring in order to salvage some of IWG's equity and keep the company out of Chapter 11. IWG makes bare and insulated wire for the OEM sector.

Restructuring at Tyco: The diversified giant, **Tyco International Ltd.** has announced a sweeping restructuring plan that will cut 7,200 jobs and close more than 200 facilities. The company will sell **Tyco Global Networks,** its undersea fibre optic cable company, and exit fifty other businesses. The implication for Tyco's other cable holdings are not yet clear.

Developments at General Cable: In November, **General Cable Corp.** announced the completion of a US$ 670 million refinancing which, the company claims, will increase liquidity and create a capital structure that will allow General Cable to take advantage of organic and strategic growth opportunities. In the prior month, General Cable had made steps to rationalise its Industrial and Speciality segment with the announcement of the closure of its Taunton, Massachusetts bare wire and PVC compounds facility with the loss of 77 jobs and the announcement of a feasibility study to determine the fate of its South Hadley, Massachusetts and Marion, Indiana facilities. The charge against General Cable's fourth quarter accounts relating to the Taunton closure is estimated at US$ 7.0 million, while a decision to close the other two facilities under study would mean a further charge of around US$ 20 million.

Andrew Corporation Acquisitions: In China, **Andrew Corp.** has acquired selected assets of **Yantai Fine Cable** that makes subscriber-access drop cable for the cable-TV market. The new subsidiary, Andrew Broadband Telecommunication (Yantai) Co. Ltd., will take on 300 staff and occupy the former Yantai Fine Cable premises in Yantai, Shandong province. Meanwhile, in the United States, Andrew has acquired selected assets of **Channel Master LLC** in Smithfield NC for US$ 18 million. Channel Master makes high volume antenna and related products for VSAT and DBS for the satellite communications market. Andrew has also announced an investment in **Andes**

Industries Inc. and its operating subsidiary **PCT International,** which makes broadband RF and fibre optic cable.

Wire rod Capacity Expansions in China: In Jiangxi province, copper producer **Jiangxi Copper** has completed installation of a new 150,000 tpy copper wire rod mill. Commercial production is due to commence by the end of 2003. Further south, in Santou, Guangdong, Taiwan-based **Mahualon Wire** has started production at its new 175,000 tpy Southwire wire rod line. In the north of the country, the steel oil pipe producer **Tianjin Pipe Co.** (TCPO) has completed the building of a 150-180,000 tpy Contirod copper wire rod line in Tianjin, at a cost of US$48.3 million. The plant, owned by TCPO subsidiary Tianjin Seamless Products Co., is to begin commercial operation early in 2004.

SWS Works to Expand Automotive Business in China: Japanese wiring harness company, **Sumitomo Wiring Systems Ltd.** (SWS) has announced plans to expand its wiring harness operations in China, aiming to double Chinese sales to Yen 50 billion by 2005 and quadruple capacity within three years. As part of the plan, SWS is investing Yen 1.4 billion in a new automotive wiring harness plant in Suzhou, due to commence operations in April 2003.

Showa Electric Wire Harness Plant in Dongguan: A non-automotive wire harness plant has been established by **Showa Electric wire & Cable** in Dongguan, China. The facility will be a toll-processing unit for Showa's Hong Kong subsidiary.

Tie–up of Furukawa Electric with Valeo: A global partnership in automotive wiring harnesses has been agreed between cable maker **Furukawa Electric** and automotive components company **Valeo** to draw upon complementary geographical coverage and engineering prowess. Valeo has seventeen manufacturing sites in Europe, while Furukawa Electric has eighteen manufacturing sites worldwide, focussed mainly on Asia.

Mitsubishi Cable Aims to regain Profitability: With its announced second structural improvement plan, **Mitsubishi Cable Industries** aims to improve its profitability by Yen 190 million per month by March 2004 at a one-off cost of Yen 5.4 billion restructuring charge. The plan calls for rationalisation in fibre optics, the farming out of copper telecom cable business, scaling down in high frequency cables, a review of network related business, amongst other initiatives.

LG Cable Spin off Realised: The Korean Fair Trade Commission has approved the long-planned spin-off of **LG Group** affiliates **LG Cable,** LG-Nikko Copper, LG-Caltex Gas and Kukdong City Gas. LG has had to unravel a complex structure of cross-holdings to meet legal requirements affecting Korean business structures.

Cable Plant Auction in Uzbekistan: One of the former Soviet Union's largest cable companies, Uzkabel, is to have 64% of its stock auctioned by the Uzbekistan State Property Fund, at a starting price of US$ 13.82 million. Bids will be accepted until December 10th. Uzkabel has a wire rod capacity of 50,000 tpy.

New Wire rod Line in the Ukraine: A 12,000 tpy Outokump Wire Rod line has been commissioned by Odeskabel in the Ukraine. Output will be used by **Odeskabel** and other cable makers in the Black Sea region.

Belden to Relocate European Data Cable Output to Hungary: The US-based cable company **Belden Inc.** is to shift data cable production from its plant in Venlo, Netherlands to **Belden-Duna Kabel** in Budapest, Hungary. This will increase Belden-Duna turnover by around 1.4 billion Forints (US$ 6.1 million) to 3.5 billion Forints (US$ 15.3 million).

Eurocable Group of Croatia Expands: The Croatian energy cable company **Eurocable Group** commenced operations at a second cable factory in the Zagreb area in October. The new unit, costing € 10 million (US$ 11.5 million), will make flexible cables and, the company claims, will increase company output from 12,000 tpy to 40,000 tpy product. The company intends to invest a further € 10 million in a cable factory in Kalingrad free zone, Russia. The Eurocable Group was formed late in 2001.

Yazaki Builds in Romania: The leading automotive wire company **Yazaki Group** is in the process of building a € 10 million (US$11.5 million) wire harness plant near Ploiesti in Romania. The plant, due to commence operations early in 2004, will employ 1,600 people.

Leoni in Central Europe and the FSU: The German wire and harness maker **Leoni AG** is consolidating its presence in Central Europe and the former Soviet Union. Having opened new automotive wire harness plants in the Ukraine and Romania in July and September of this year respectively, and already employing 1,500 people between them, further construction is underway to build harness plants in Ilava, Slovakia and Mukachevo, Ukraine.

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