

2003 - Restart of Microsystems Activity

After a difficult year in 2002, caused by a global economic downturn, 2003 has shown a promising business recovery. This was demonstrated, for example, by an increase in the total value of quotations by 43% and of orders by 70%, (see Table 1).

The launch of the Framework 6 program in 2003 has been reflected in the results, with approximately 6.2 M€ of the budget being directed to European Commission funded projects. Large enterprises are the most active with Europractice partners in European projects, with only 11% in-

	2000	2001	2002	2003
Number of partners providing data	44	45	49	47
Number of contacts	1105	1114	1362	1443
Number of quotations	505	612	500	571
Total budget of quotations	38.7 M€	47.0 M€	47.3 M€	68.6 M€
Average budget	76 K€	76.8 K€	94.6 K€	120.1 K€
Number of contracts	347	379	365	351
Total budget of contracts	24.3 M€	34.8 M€	21.9 M€	37.7 M€
Average budget	70.0 K€	91.8 K€	60 K€	107.4 K€

Table 1: Comparison of the last 4 years of Europractice

The activity of larger companies has recovered to the level of 2001 and SMEs continue to be more and more active, (see Fig. 1). In contrast, since 2001, the turnover from the academic sector has continued to decrease, due principally to a reduction in the average budget for each programme. In Europractice 4, SMEs generate 58% of business while large companies account for 36%.

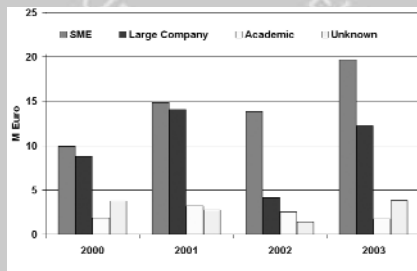


Figure 1: Origin of Customer

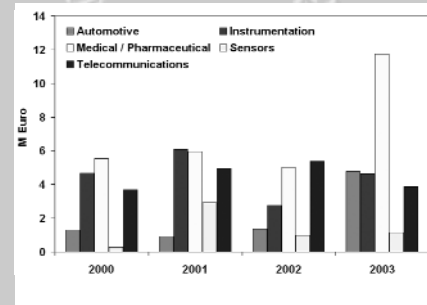


Figure 2: Main industrial sectors

As in previous years, the biggest drivers come from the medical, instrumentation and telecommunications sectors, with an upturn in the automotive sector in 2004. The business in the medical and pharmaceutical sectors has increased by a factor of two compared to the three previous years (from about 6M€ to 12M€). (see Fig. 2)

In conclusion, 2003 has been a very good year in term of quotations and turnover. The application of Microsystems in the medical and pharmaceutical sectors is increasingly important and the business generated by ACC partners has taken off.

During Europractice 3, the leverage effect of the European Commission funding was close to a factor 5 on the Microsystems business. With the economic downturn year 2002, this factor decreased to 3 but, with the business recovery, the leverage effect was superior to 5 this year, demonstrating an excellent level of return.

The Europractice 2003 report is available for download at:

www.europractice.com/news/

Printed copies may be ordered from:
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EUROPRACTICE is exhibiting at Nanofair 2004

Europractice is a 'Silver Sponsor' of the event, and part of the package includes 50 vouchers for day tickets to the exhibition. If you would like to attend the event, please let us have your details. As there are a limited

number of tickets, it will be on a first come first served basis. The event is being held in St Gallen, Switzerland, 14 -16 September 2004. For further details please visit the website at www.nanofair.ch

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A New System for the Monitoring of Organs Due to Transplantation

Success story at i2m Design south office of MEDICS

i2m, acting as a link between research and industry, is now developing the pre-industrialized prototype of a system for monitoring organs due transplantation. The key element of the monitoring system is a microsensor that measures the impedance of the organ tissue. The needle shape of the microsensor and its micro size allow easy insertion in the organ with limited damage. Data measured by the sensor are transmitted to a PDA (personal device assistant) by a telemetry system continuously informing the transplant team of the preservation status of the organ.



Figure 1: Wafer with microsensor

Carbueros Metalicos SA. (Air Products Group) has purchased the exploitation rights of the system for this spe-

cific application and i2m Design provides support for the technology transfer. The microsensor is used at present in a very specific application, but it can be foreseen that many other application fields such as oncology or food quality control could profit from this innovative technology.

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Support for Eastern Organizations Who Want to Join EUROPRACTICE

Support will be given to Eastern organizations that want to join Europractice following an EC Call that is expected for October 2004. The BRIDGE project partners and subcontractors are going to identify suitable Eastern partners and support them through training and help in finding the right partners.

Organizations from Bulgaria, Hungary, Poland, and Romania, please contact:

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Organizations from Cyprus, Czech Republic, Estonia, Latvia, Lithuania, Malta, Slovakia, and Slovenia, please contact:

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CSEM to Win Price with "Time-of-Flight Camera"

In 2003 CSEM was awarded the European Grand Prize for Information Science Technology (IST), together with its partner CEDES in Landquart (CH), for their joint development of a novel 3D camera. With the ESPROS/TOF and SwissRanger series of optical 3D cameras the optical time-of-flight principle has, for the first time, been commercially exploited in a fully solid-state, miniaturised and cost-effective camera that can acquire complete 3D image sequences at video speed or even faster. Once time-of-flight range cameras are sufficiently small and affordable, they will be as ubiquitous as today's electronic still and video cameras in a growing number of professional and consumer applications.

This project is an excellent example of

CSEM activity in the field of applied research and product development. During the first step new ideas and concepts are developed together with the implementation of "technology platforms". In a second stage this know-how and the related technologies are transferred into innovative products, in cooperation with selected key industrial partners.

The availability of low-cost, easy-to-use and eye-safe 3D cameras offers many applications in such domains as automatic manufacturing, safety and security, automotive and public transportation. One of the first markets addressed together with our industrial partner CEDES is safety, in particular automatic doors and gates control.

The IST prize is very important in terms of making companies and a broader public aware of the new opportunities offered by groundbreaking technologies. Dissemination of this information and technology is done either by direct contact with the potential customers or through the valuable help of the Europractice projects that support the set-up of projects, which can include some aspects of the technologies developed for the manufacturing of this camera and give access to powerful networks for dissemination.

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A New Start-up from Europractice - HPOP

On April 1, 2004 a new start-up company, High Performance Optical Polymers Ltd., became operational. Set up in the Naiot Technological Incubator and funded initially by the Office of the Chief Scientist of the Israel Ministry of Trade and Commerce, the company intends to develop a range of polymers with improved optical and thermo-mechanical properties.

HPOP, as it is already being called, is a spin-off from the participation of Dr. Steve Daren, the CSO, in the Polymicro, Europractice Consortium. HPOP's primary objective in Polymicro was to approach companies involved in the fields of micro-optics, electro-optics and sensors and to persuade them of the advantages of switching from traditional glasses to polymers.

Most of the companies approached were aware of the potential advantages of polymers, i.e. reduced weight, ease of mass manufacture and subsequently lower prices, and in many applications such as spectacles and sunglasses, plastic lenses already dominate the market. However in the top range applications such as aerospace, military and telecommunication the response was usually that polymers suffer from a major disadvantage that outweighs all of the known advantages, too high temperature sensitivity.

For a given change in temperature, the dimension changes in a polymer are at least an order of magnitude greater than in glass. For an engineer designing an optical component that has to function in a nominal temperature range from -40°C to $+80^{\circ}\text{C}$, this is an insurmountable difficulty. This problem was recognized as the major barrier to progress in this field, so it was decided to try to understand the source of the problem and perhaps find a solution.

Thermal expansion is a result of increased energy being introduced into the material, leading to increased molecular motion. Given sufficient energy, the chains of a polymer molecule will start moving relative to each other. In textbook terminology,

this is exactly the description that is given to describe what occurs to a polymer as its temperature is raised above its glass transition temperature. There should therefore be a connection between the glass transition temperature (T_g) of a polymer and its coefficient of linear thermal expansion (α). Intuitively, the higher the T_g , the lower α should be. The values of T_g and α for some common thermoplastic polymers are shown in the graph below.

The typical values for α for glasses are around $8 - 10 \times 10^{-6} \text{ cm/cm}^{\circ}\text{C}$. In order to achieve an expansion coefficient approaching these values, a thermoplastic polymer would, according to the graph, need to have a T_g in the range of $180^{\circ}\text{C} - 200^{\circ}\text{C}$. But therein lies the trap. A polymer with a T_g in this range is likely to have a processing temperature in the range of $280^{\circ}\text{C} - 300^{\circ}\text{C}$. These are high temperatures and not every polymer is stable in this range. The polyimides that appear to meet these requirements tend to be yellowish, not very transparent and not easily processed. They are therefore limited to those optical applications where they can be used in thin layers below 50 microns.

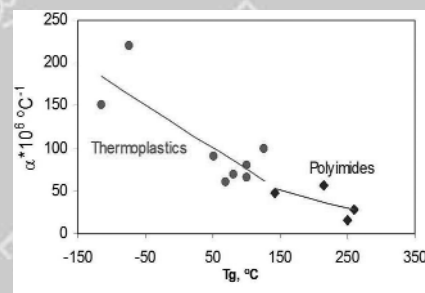


Figure 1: Thermal expansion of Thermoplastics and Polyimides

The challenge therefore was to produce thermoplastic polymers with a T_g in the range of $180^{\circ}\text{C} - 200^{\circ}\text{C}$, and a processing temperature around 240°C . At the same time, there is a continuing demand for materials with increased refractive indices in the range of 1.70 - 1.80. HPOP decided to address this issue also.

Multinational companies involved in electronics and telecommunications

have already expressed interest in transparent polymers with the above combination of refractive index and much reduced thermal expansion. It is hoped that within the next twelve months, HPOP will commence marketing its initial range of monomers and polymers for advanced optical applications.

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