



Annual Report 2003
Increasing Automation

komax

About the illustrations

Quality standards and productivity requirements are continually rising. At the same time the components to be processed are becoming ever smaller. Both these factors are in turn resulting in increased process automation. To succeed in this fast-moving market Komax has to offer its customers solutions to tomorrow's needs today. This is not possible without effective innovation management and motivated and dedicated employees.

General note

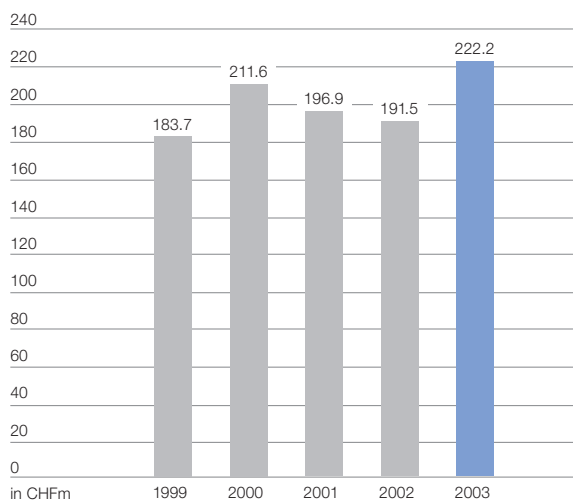
For the sake of readability, the masculine pronoun is used throughout this Report to include the feminine gender.

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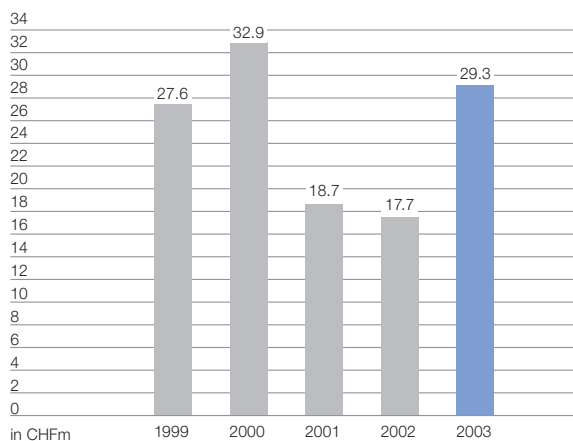
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Highlights

Net sales of the Komax Group



Operating profit (EBIT) of the Komax Group



Key figures of the Komax Group

in CHFm	2003	2002	+/- in % ²⁾
Net sales	222.2	191.5	+16.0
EBITDA	37.9	25.8	+46.9
Operating profit (EBIT)	29.3	17.7	+65.9
Group profit after tax (EAT)	20.8	13.2	+57.6
Research & development	19.3	17.3	+11.6
Free cash flow	15.2	3.7	+410.8
Investments in fixed assets	6.2	16.8	-63.1
Net investments in participations	0	0.3	-100
Net cash (+) / net indebtedness (-)	-10.4	-23.7	-56.1
Shareholders' equity	143.7	126.2	+13.9
Headcount (as of 31.12.)	707	680	+4.0
Net sales per employee	0.319	0.278	+14.7
Basic earnings per share	CHF 6.60	4.23	+56.0
Equity per share	CHF 45.16	40.00	+12.9
Repayment of par value			
per share	CHF 1.50 ¹⁾	1.00	+50.0
Price high	CHF 90.50	95.00	-4.7
Price low	CHF 35.80	39.50	-9.4

¹⁾ Proposal of the Board of Directors of Komax Holding AG.

²⁾ Percentage change in the amount calculated in CHF 1,000.

Komax – Increasing Automation

Komax can look back on a successful year in fiscal 2003 despite the adverse circumstances prevailing at least in the early part of the year. The rise in sales of complex wire-processing machines, fueled by increasing process automation and ever higher quality standards, was particularly marked. Wire-processing system business also notched up impressive sales growth, thanks mainly to the increased use of new connection technologies (fiber optic cables, flexible flat cables) and safety systems (air-bags). At the same time there was a further increase in levels of automation in block loading and in the production of entire wire harnesses.

To profit from these developments in the future, Komax rolled out a dozen or so new products in the year under review, either in the form of innovative additions to its existing range or totally new solutions. All these products attracted considerable interest in the market. Parallel to this the Group further optimized its internal structures and processes and adapted them to the changing environment.

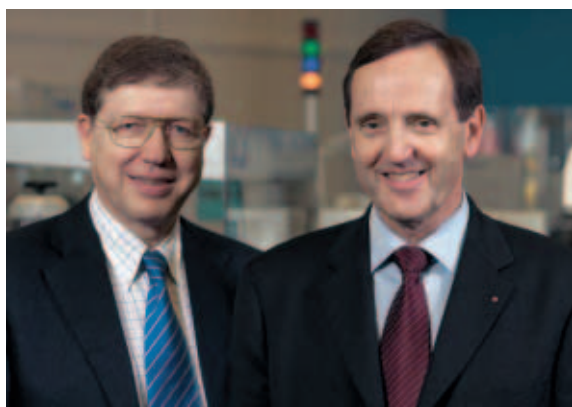




Report of the Board of Directors

Dear Shareholders

The markets relevant to Komax were marked by ongoing automation – driven by the growing use of electronic and electrical systems, ever higher quality and productivity standards and the use of new connection technologies. The good results show that we are on the right track with our products.



Melk M. Lehner (on the left), Chairman of the Board, and Leo Steiner, President and Chief Executive Officer

Despite the continued uncertainty of the economic situation, Komax came very close to achieving its long-term growth rate targets in the fiscal year just ended. Sales and profit rose significantly in the second half of 2003 compared with both the year-back period in 2002 and the first six months of 2003. The Group also made further progress in implementing its strategic objectives.

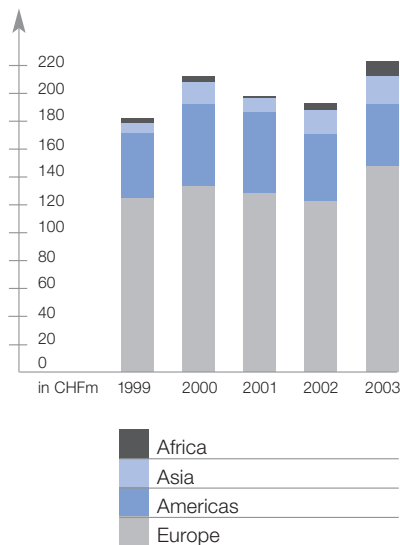
Sales – up 16%

Sales increased by 16.0% to CHF 222.2 million (2002: CHF 191.5 million) despite the slightly negative currency effect (-0.6%). The development of the European wire-processing machine business was very encouraging. Sales of complex fully automatic crimping machines (Alpha 433 and Alpha 488) to the automotive industry grew particularly strongly. This is attributable to the growing use of new connection technologies (e.g. twisted pairs), a certain degree of pent-up demand and the numerous new car models. The machine business also posted increased sales in North America, thanks not least to the automotive and household appliances industries. Asia, and China in particular, developed in line with the high expectations.

Sales in the wire-processing system business exceeded the targets. The driving forces here were the increasing level of automation, especially in block loading, and the increased use of new technologies (fiberoptic cables, flexible flat cables) and security systems (airbags). The performance of the traditional assembly automation system business (assembly lines for connectors, sensors and actuators) was unsatisfactory. The persistent restraint in capital goods spending was responsible for this. As a result, order intake in Europe levelled off perceptibly in the second half after very good figures for the first six months. The development in the USA was the opposite.

All told, with a book-to-bill ratio of nearly 1.1, the Group's order intake easily outstripped sales.

**Komax Group
Sales by region (1999-2003)**



Profit – strong growth

The operating cash flow margin (EBITDA margin) amounted to 17.1% of sales or CHF 37.9 million (previous year: 13.5%/CHF 25.8 million). Operating profit (EBIT) was CHF 29.3 million, or 13.2% of sales (previous year: CHF 17.7 million/9.2%). Currency rates had an impact on operating profit (EBIT) of -0.2 percentage points. The gross profit margin fell slightly year-on-year (from 61.3% to 61.1%); this was attributable to negative currency factors and a higher level of outside services in the system business. Expenditure for development and basic engineering amounted to CHF 19.3 million (previous year: CHF 17.3 million).

The Group achieved a financial result of CHF -1.9 million (previous year: CHF -0.8 million) on the basis of unrealized and realized currency losses. Group profit after tax (EAT) rose from CHF 13.2 million in the previous year to CHF 20.8 million. The tax rate was 24%.

Par value repayment – instead of a dividend

The Board of Directors will propose to the Annual General Meeting that instead of a dividend, the share capital of the company should be reduced by lowering the CHF 9.00 par value of registered shares by CHF 1.50 to CHF 7.50 (a total of CHF 4,772,109) and that shareholders be repaid CHF 1.50 per share in cash. After approval of the proposal by the Annual General Meeting the legally prescribed procedure for the par value repayment will be set in motion. If the transaction runs to plan, the par value repayment of CHF 1.50 per registered share will be remitted to shareholders in accordance with the existing directives by the end of July 2004, without deduction of withholding tax.

Markets – relocation of production

The ongoing relocation of wire harness manufacture to eastern Europe continued last year. Consequently, sales and installations of machines in non-EU European countries rose strongly again. In Asia, China has established itself as a sought-after production location. We have matched our market presence accordingly. Our subsidiary Komax Shanghai, China, which has been operating since January 2003, developed very positively in line with expectations. This success is due in no small measure to the further expansion of our local sales and service structures over the past 12 months. The joint venture in Japan, which was also set up at the beginning of the year, has yet to meet its targets. There are a number of reasons for this: the persistent weakness of the economy, partial

relocation of production to countries such as China, and local competition. In light of the cautiously optimistic economic forecasts for Japan, however, we are confident that we will achieve our targets.

Technology lead – successful new product innovations

A strategically important step in increasing our competitiveness was the rollout of various product innovations. The Group unveiled a number of innovative extensions of its existing product range as well as totally new solution concepts, the result of intensive customer discussions and market contacts. All products have been well received by the market. In particular the fully automatic system for processing flexible flat cables, the only machine of its type in the world, met with lively interest. Further large orders are evidence of the steady growth in demand for mechanized processing of new connection technologies. This trend is attributable in no small part to the increasing standardization of our systems. The resulting quality advantages, short delivery times and lower production costs make the investment attractive for our customers – even when compared with manual processing.

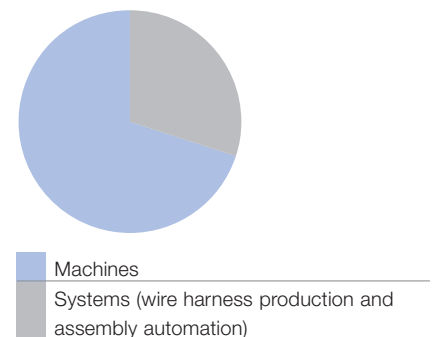
Systems – utilizing synergies

Komax's wire-processing systems business and Sibos' assembly automation activities were merged at the beginning of 2004 with the object of utilizing existing synergies more effectively and so improving efficiency and productivity. The structures will be adapted accordingly in the coming months and all engineering and assembly activities will be consolidated in Rotkreuz, Switzerland. Thanks to the optimum production conditions in the new building that was commissioned in 2002, we will be able to reduce lead times and cut costs. This reorganization will start to show first results in the current year, but the real benefits will come in 2005.

Quality management – aiming for Business Excellence

Another project for boosting efficiency and raising quality at headquarters was the changeover to the new ISO 9001:2000 standard, which is based on process-oriented quality management. In line with this standard, a model with ten corporate processes was defined during the year under review, describing all relevant activities in the affiliated main processes and subprocesses. We are using our successful recertification as an opportunity to develop our quality management over the next few years with the aim of achieving Business Excellence.

Sales system and machine business in 2003



Outlook – positive signals

We are cautiously optimistic for fiscal 2004. The book-to-bill ratio and the satisfactory level of orders on hand at the end of 2003 as well as positive signals from the economy allow us to take a confident view. Thanks to its sound market position and the successful rollout of new products, the Group has further strengthened its strategic positioning. We are thus in a better-than-average position to profit from any improvement in the investment climate.

Thanks – to our partners

It takes more than just competitive products and successful strategies to ensure satisfied customers. First and foremost, motivated employees are the key to the long-term success of a company. With their dedication, innovativeness and quality consciousness, our employees have played a significant role in helping Komax to achieve impressive growth in a difficult economic environment, and for this the Board of Directors would like to express its sincere thanks to all members of staff and their families. Our gratitude also goes to our customers for their partnership and to our suppliers for their support.

And we thank you, our esteemed shareholders, for your loyalty. We will continue to make every effort to justify this trust by taking the business forward again in the current year.



Melk M. Lehner
Chairman of the Board
Komax Holding AG



Leo Steiner
Chief Executive Officer
Komax Holding AG



Innovative products for new market requirements

The ability to offer innovative and timely solutions for new market requirements is a key success factor. For this reason Komax invests substantial amounts in development and engineering. Its commitment is rewarded with success: The Group generates about 70% of its sales with products that are less than three years old.

“If we don’t make our products obsolete ourselves, our competitors will do it for us!” True to this maxim, Komax rolled out a dozen or so new products in the year under review, including further developments of existing products in its range as well as totally novel solutions for new requirements. The products were developed in close cooperation with customers – in some cases under contract – to meet specific real-life needs and feature flexibility and modularity.

The new products attracted considerable interest at “Productronica”, Komax’s most important trade show, which was held at the end of November 2003. This shows that the solutions meet a real market requirement.

Komax Gamma 255 – for ultra-fine cross sections

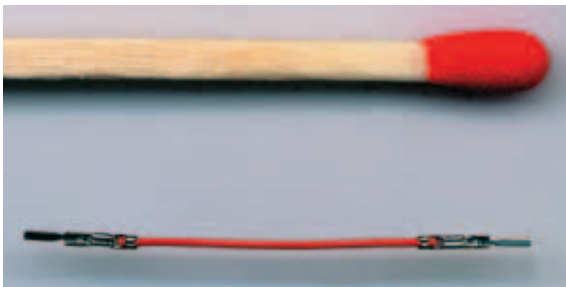
The wires in electronic devices are becoming ever shorter and finer as space becomes scarcer. At present such wires are usually processed manually, with all the attendant problems of quality and repeatability.

With the completely redesigned Gamma 255 fully automatic crimping machine, ultra-fine cross sections can be processed to very high quality standards. Crimping, twisting, flux application and tinning are possible on both sides with minimum change-over times. All quality monitoring modules and the proven Komax TopWin control unit are integrated as standard equipment. Moreover, the machine can be operated in 20 different languages!

Komax Zeta 655 – a quantum leap in fully automatic wire harness production

Block loading and the production of entire wire harnesses are still predominantly manual jobs, usually performed in countries with low wage costs. This has advantages and disadvantages. On the one hand, humans are highly dexterous and therefore very flexible, but on the other hand, the monotony of the work leads to mistakes and inadequate quality.

In conjunction with the Zeta 633 fully automatic crimping machine, the new generation of Komax Zeta 655 assembly robots provide a flexible system for the fully automatic production of wire harnesses across the whole complexity spectrum. The use of modern sensor technology throughout guarantees maximum process security and processing quality. Faulty contacts and incomplete locking mechanisms are detected reliably so that subsequent test steps are avoided. At the same time cycle and change-over times are very short.



Gamma 255 – processes wires with a cross section of 0.0123 mm² and length of 20 mm without problem.

Zeta 655 – simultaneous processing of up to 36 different wires and many different connector housings.

Flexible flat cables – the wiring of the future

The use of modern on-board network technology in the automotive industry is calling for new processing concepts. To save weight and space flexible flat cables (FFC) are increasingly being used in addition to conventional copper cables. Processing these materials is technically very demanding and is normally carried out by machine.

Komax offers a flexible solution based on the Lambda 9100 for the cost-effective and high-quality processing of such cables. The system provides a large selection of processing methods with corresponding quality monitoring systems. This fully automatic machine, unique in the world, met with lively interest at "Productronica". Further large orders for the processing of FFC cables including block loading are evidence of the growing need for alternative connection technologies and their mechanical processing.

Komax Zeta 633 SP – just-in-time splicing

Splice connections – a low-cost alternative method of joining several cables – are frequently used in the harnessing of cars. The cables are joined by means of an ultrasonic welding technique, almost entirely by hand for want of automatic solutions. This often leads to quality problems and is not a very efficient method.

The Komax Zeta 633 SP fully automatic splicer can fabricate butt and head-to-head splices reliably and without retooling. The integration of the splicing process in the work flow cuts logistics costs and processing time for the product significantly. There is also considerable potential for cost saving in material storage and material transport, especially with high output rates.

System business – new standard cell

The use of standardized components is a crucial success factor in the system business since they offer the only means of simplifying engineering, shortening lead times and cutting manufacturing costs. At the same time this procedure increases the reliability and flexibility of the systems.

The new Sibos Modulo standard modular cell can be adapted to specific customer wishes. An assembly line can be expanded to any required size by coupling several cells together and exchanging the front and rear sides.



Processing of flexible flat cables is technically demanding and is normally carried out by machine.

Sibos Modulo – sliding doors and graphical user interface guarantee optimum access and simple operation.



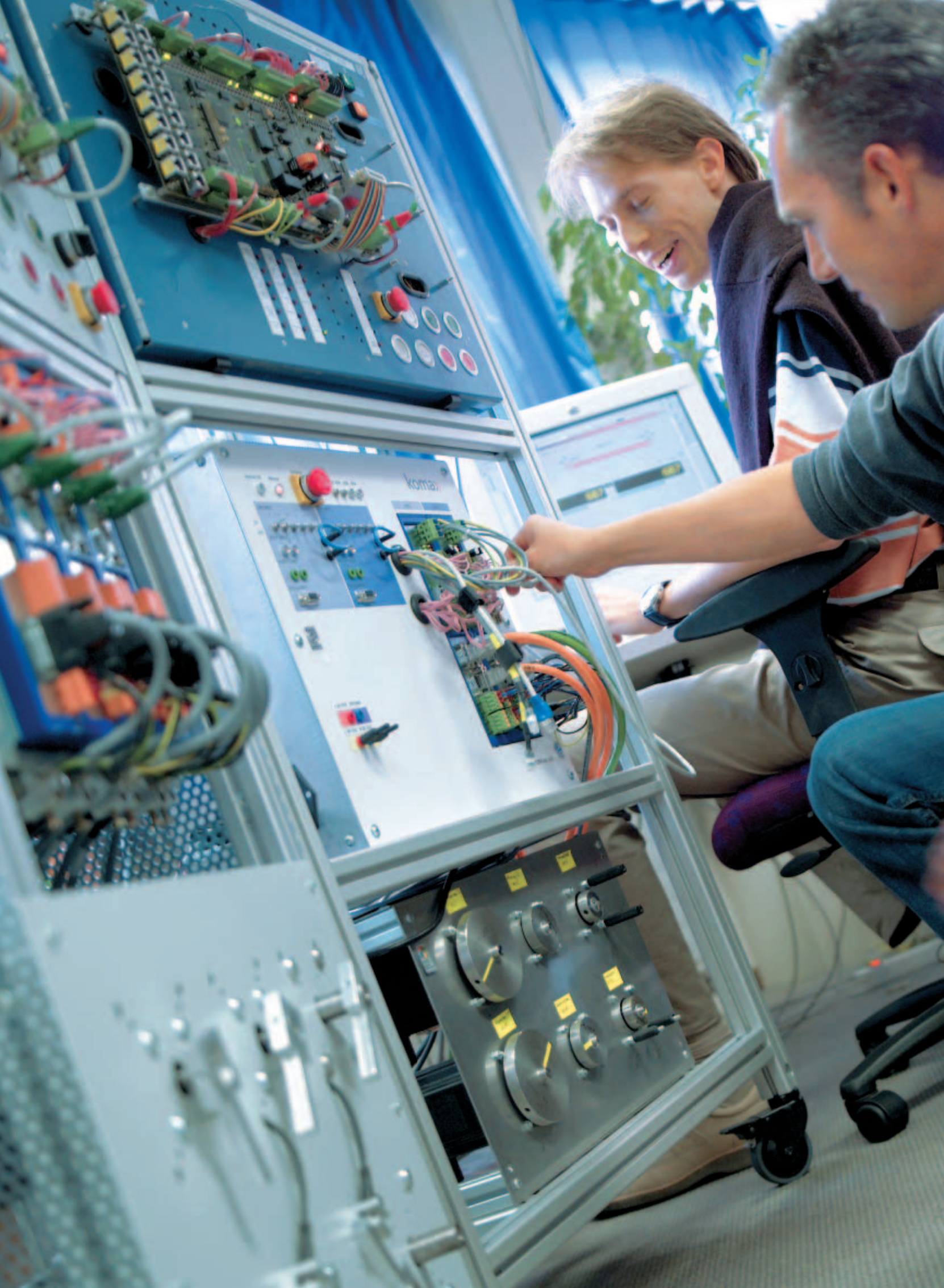
Further development – of the existing range

Apart from the completely new products described above, Komax also launched a series of advanced versions of existing machines aimed at increasing the efficiency and reliability of customers' production processes. These products and modules are based on the latest technologies, and are modular in construction, which makes them highly flexible. Thanks to their high degree of standardization they also offer an outstanding price/performance ratio.

The benchtop press bt 722, the seals model mci 762 and sleeve applicator mci 792 attracted great interest, as did the new coilers, binding modules and dereelers. This was due in no small part to their simple operation, short change-over times and integrated quality monitoring modules.



Today, integrated quality controls are vital success factors.

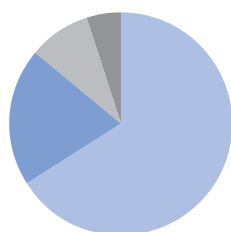


2003 – report on operations

Back on track for growth

Last year Komax succeeded in achieving its long-term sales and profit targets again and at the same time realized many of the operational objectives set for 2003. This was accomplished despite the adverse circumstances prevailing at least in the early part of the year.

Komax Group
2003 sales by region



Europe	66%
Americas	20%
Asia	9%
Africa	5%

Numerous uncertainty factors dominated the first part of the fiscal year – the development of the global economy and the international stock markets, and the situation in Iraq, to name but a few. Consequently, the beginning of the year was characterized by short-term investments and restraint as far as new projects were concerned. However, the situation changed noticeably as the year advanced, resulting in a very good second half.

Particularly in the second half the Group undertook a number of major projects that had been in the pipeline for a long time, but had been repeatedly postponed. This coincided with a parallel increase in sales of spare parts. The satisfying level of order intake resulted in good utilization of capacity, which in turn put great pressure on order handling and production.

Markets – a geographical shift

The proportion of installed and billed machines in eastern Europe continued to increase compared to the traditional western market. The winners included the Ukraine, Rumania, the Czech Republic and Turkey. Some of the “old” markets posted massive increases, notably Italy, France and Germany. Spain on the other hand suffered a slump in sales. Sales in the wire-processing system business developed very encouragingly; the western European wire harness manufacturers in particular are concentrating on fully automatic processing of complex special applications and new connection technologies. This is in contrast to the mass production and in some cases manual processing in so-called “low-wage countries”.

In the Americas, second-half business with wire-processing machines showed a marked improvement over the first six months. Orders from the automotive and household appliances industries were responsible for this. Nevertheless, it is still too early to talk of a sustained recovery of the capital goods market. This was demonstrated most clearly by the lack of major investments, particularly in the assembly automation sector. First-ever sales were posted in Nicaragua and Honduras, but business in Brazil stagnated at a persistently low level.

In Asia, the main feature of the markets relevant to Komax was strong growth in China. At the same time, traditional markets such as India, Thailand and Malaysia stagnated; Korea even slumped quite sharply. One of the main reasons for this is the relocation of wire harness production to China. Thanks to its expanded presence in China, the Group profited in full from this development. Major successes were also achieved in the Philippines.

In Africa, the countries South Africa, Tunisia and Morocco have become sought-after locations, in some cases at the expense of Portugal and Spain. Tunisia and Morocco recorded especially strong growth rates and Komax posted a massive increase in sales. Europe remains the strongest region with sales of CHF 146 million, followed by the Americas (CHF 45 million), Asia (CHF 21 million) and Africa (CHF 10 million).

Customer structure – growth of key accounts

The past fiscal year again saw a number of takeovers and mergers of wire harness manufacturers. In particular, Komax's major customers – the so-called key accounts – are growing constantly by swallowing smaller competitors. The Group still has a healthy customer structure, with its ten biggest purchasers accounting for about 40% of sales revenues. Sales to individual buyers amount to less than 10%.

Competition – solid market position in wire processing

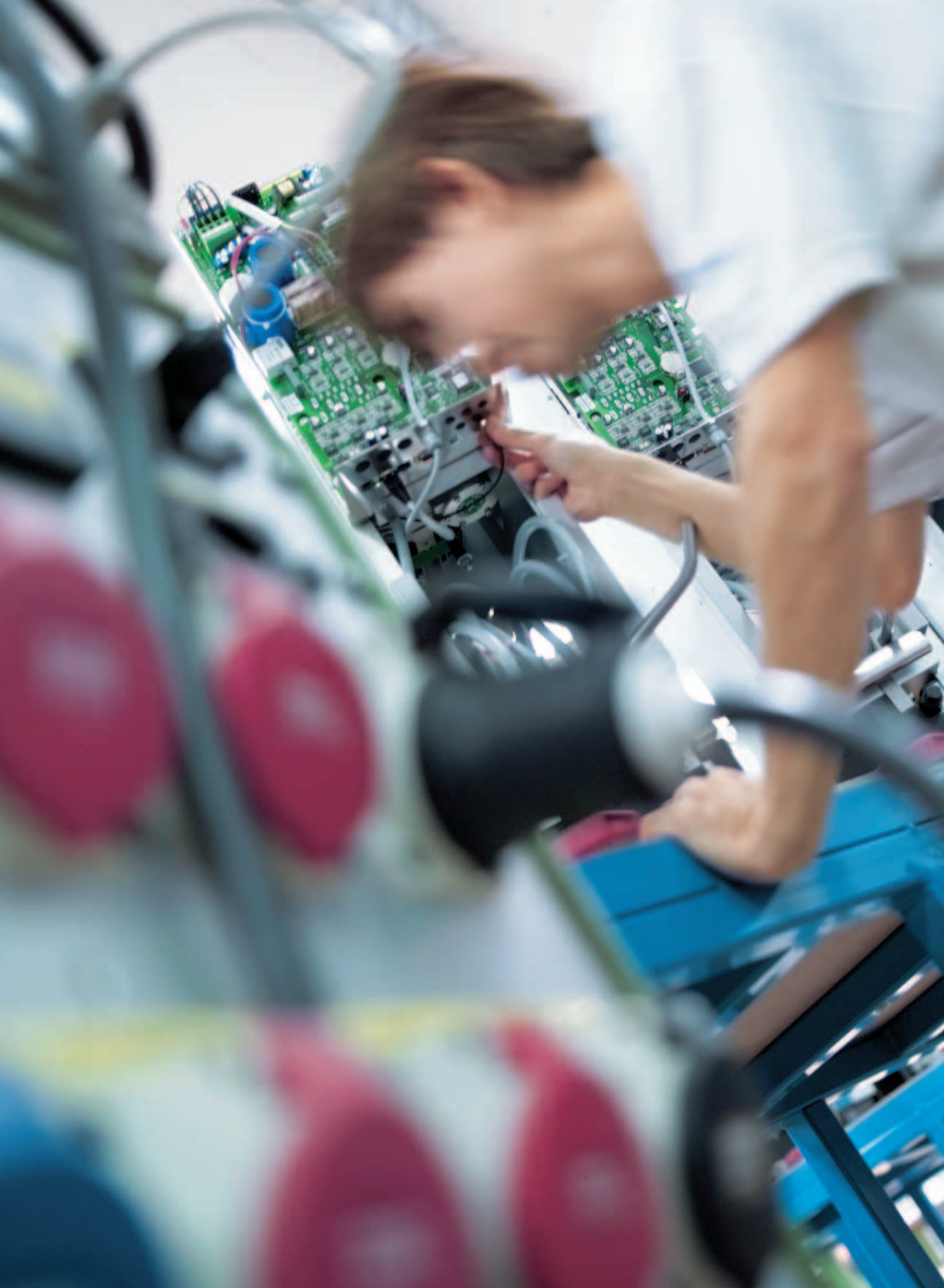
There have been no major changes on the supplier front. With an average global market share of getting on for 50%, Komax has a very solid market position which it further increased during the year under review. In the Asia region the Group faces Japanese competitors and various local manufacturers, the latter mainly in the low-price segment. Two of the Japanese companies are also active in America, where they compete alongside North American rivals; nevertheless, Komax was able to further expand its market share which now stands at a good 40%.

Sales – complex fully automatic crimping machines gain ground

Business with the large Alpha 433 fully automatic crimping machines increased strongly compared with the previous year. Sales of fully automatic twisting machines (twisted wires reduce electromagnetic interference) and double crimping machines also rose sharply. Sales of the Zeta family (fully automatic crimping machines for the fabrication of complex cable sets) launched at the end of 2002 also beat expectations. This is attributable to stronger demand from key-account customers working predominantly for the automotive industry. The degree of automation tends to increase parallel to growing requirements for reliability, complexity and flexibility in machinery and systems.



Sales of complex fully automatic crimping and twisting machines have soared.



Development – expansion of the product range

In the year under review Komax invested CHF 19.3 million (2002: CHF 17.3 million) in development and basic engineering, focusing its main attention on the further development of platform components as well as the final development of various product innovations. Together with the processor-oriented ISO 9001:2000 quality audit, a timetable for the regular rollout of software updates was introduced. In future, all relevant software components for the machines will be updated on a quarterly basis. This will make it much easier to plan and to meet delivery deadlines.

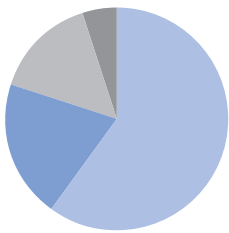
The Group further extended its technology lead with the rollout of a dozen or so new products (see also page 10 ff). Special mention should be made of the new generation of fully automatic crimping machines for ultra-fine cross sections (Gamma 255), the Zeta 655 assembly robot for the mechanized assembly of wire harnesses, the fully automatic splicing machine (for the automotive industry) and a new basic module for processing flat cables. The platform components developed by Komax were used successfully in these new products in the areas of drive technology, real-time control and user interfaces (TopWin). The Group also made commercially interesting advances in the process development area, for example with the new mci 721 crimping press, on which process monitoring has been improved by a factor of more than two.

Parallel to this, the Group pressed ahead with standardization in system business. The corresponding platforms and components must now be further developed and implemented in the current year. New software tools for development controlling (Innovation Process Control) and for project management (RPLAN) were also put into operation. With some 25 development projects underway, controlling of completion, time schedules and costs is of vital importance.



Komax has expanded its product range, adding the fully automatic crimping machine Gamma 255 for ultra-fine cross sections and the Zeta 655 assembly robot.

Komax Group
2003 sales by application



Automotive industry	approx. 60%
Household appliances	approx. 20%
MedTec/Solar Energy/Others	approx. 15%
Telecommunication/Electronics	approx. 5%

Wire-processing systems – marked growth

Sales of wire-processing systems increased about 30% year-on-year. This is attributable first and foremost to the increased use of new connection technologies and safety systems.

There is a growing demand for weight- and space-saving flexible flat cables (FFC), driven by the steady increase in the number of electrical and electronic systems used in cars. The processing of FFCs is far more highly automated than that of conventional wire harness structures, hence the considerable interest shown in the fully automatic FFC crimping machine presented at “Productronica 2003”. This machine is unique in the world.

In the burgeoning market for fiberoptic cable technology (FOC) the Group extended its leading market position with the set-up of several systems and with new orders for the current year. This is due in no small part to the Group’s ability to reliably process all known makes of FOC. The market for airbag applications also expanded: today, an average of five airbags is installed in every car – and the trend is upwards. For safety-relevant applications such as this, reliable processing with multistep test procedures has top priority. Several systems have been ordered for the current year.

Assembly automation – ongoing standardization

Sibos was confronted with a persistently weak investment climate. After a good first half, the order intake by the Group in Europe then declined in the second half. In contrast, North America experienced the opposite, with an upturn in sales towards the end of the year after a rather weak first three quarters. The overall effect of these developments was an unsatisfactory level of order intake and sales. For all that, some interesting systems were produced, thanks not least to the increased use of standardized components.

Sibos Ascor used the new Modulo standard cell for the first time. The assembly lines for gas valves, coaxial cables and interchangeable dental nozzles offer good accessibility, a superior quality standard, and high flexibility (retooling and upgrading). The response from customers has been duly positive. In cooperation with Komax and Sibos Ascor, Sibos Prime produced a system with integrated assembly automation and wire processing.

In Europe, Sibos rolled out a fully automatic, standardized palletizer that satisfies the requirements of modern automated systems. At the same time there was a marked increase in demand for production systems with integrated add-on processes. One example was an assembly line for electronic power steering systems that fully integrates processes such as reel to reel with injection molding technology or fully automatic quality controls and which can be networked to the customer's ERP system. Systems such as this often attain a length of 30 meters or more.

Production – full capacity utilization

Most of the Group's production facilities were utilized to full capacity thanks to the high level of order intake. With just-in-time production, it was possible to adapt capacities by a factor of up to two. This, combined with the optimization of all processes and the unstinting commitment of everyone involved, helped cut lead times by 25% and enabled the Group to maintain three- to four-week delivery times in its machine business in most cases.

Local infrastructures were built up at the Komax Shanghai subsidiary in line with the production strategy, and the first cutting and stripping machines have been assembled. At the same time the Group realized further cost-saving potential in its purchasing activities.

Environmental protection – a comprehensive package of measures

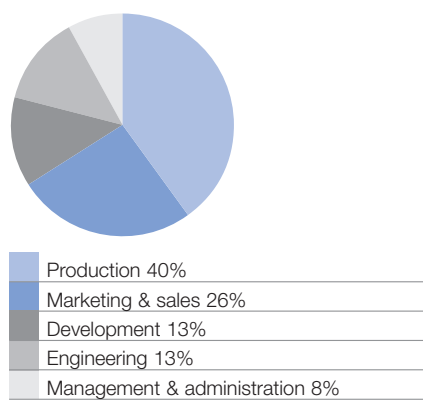
Komax undertook various measures in the year under review aimed at reducing its environmental impact. Chief among them was the complete renewal of the heating system at headquarters, where a modern control system will significantly cut energy consumption in the future. Supporting measures to reduce electricity and hot water consumption were also successfully initiated, and these will continue to play a central role in the current year.

Parallel to this, the Group intensified its efforts to recycle, both in production (aluminum and steel) and in offices (waste paper, PET plastic, glass, batteries, etc.). At Komax it is standard practice to employ only environment-friendly materials in the development of products.



The wire-processing system business grew strongly thanks to the increasing use of safety components (e.g. airbags) and new connection technologies (e.g. fiberoptic cables).

Komax Group
Employees by function in 2003



IT – increasing demands

Global cooperation within the Komax Group and with external partners is placing ever higher demands on IT structures. For example, the volume of stored computer data doubles each year on average, and new technologies are accelerating this trend. By investing in a storage area network (SAN) Komax has created the necessary flexibility for future expansions. At the same time this technology ensures that if one server fails, its functions are taken over by another server within seconds. Another project involved standardizing the Komax companies' website designs. Today, all information is administered by a content management system which eliminates duplication and allows changes to be made quickly and easily.



2004 – further expansion

The healthy order intake and level of orders on hand at the end of 2003 combined with the positive signals from the economy fill us with confidence for the current year. Komax is in a better-than-ever position to profit from any upswing thanks to its sound market position and comprehensive product range.

The Group's growth prospects are better than ever. The need for safety and comfort is driving up demand for connectors, sensors, cables and actuators. At the same time high quality and productivity requirements and the use of new connection technologies and ever smaller components are resulting in increasing automation. Komax will consolidate its position in the global market through selective expansion of its product range and optimization of its infrastructures.

Sales network – adaptation

The relocation of wire harness production away from the traditional European markets to eastern Europe and Africa is set to continue in the current year. In line with this trend, Komax will further expand its sales network in Morocco, Iran and the Ukraine. The aim is to offer key accounts and local customers comprehensive and professional services on the spot.

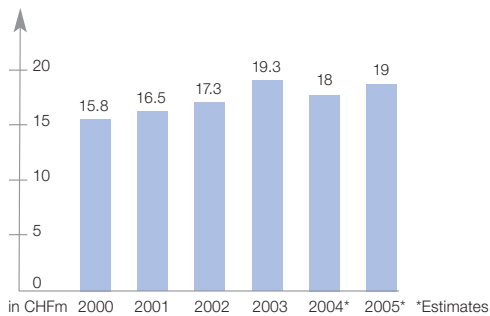
In Asia the main emphasis is on strengthening activities in Japan and on expanding Komax Shanghai, in the latter case by pressing ahead with the establishment of a network of additional agents, and by expanding local production and procurement.

Product range – expansion

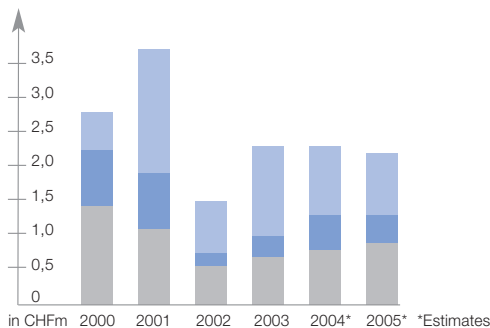
Komax will continue to invest substantial amounts in research and development in the future to safeguard its technology lead. A major challenge this year will be to successfully roll out the new Gamma 255 and Zeta 655. At the same time their range of functions will be enhanced and production optimized so as to further reduce lead times, decrease production costs and create added benefits for the customer.

This year again Komax will expand its range of fully automatic crimping machines and cutting and stripping machines to cater for the continuously changing requirements of modern wire harness production. Standard components and platforms will be used to an increasing extent.

Research & development expenditure 2000–2005



Investment in information technology 2000–2005



█	Applications (ERP, PDM, Office)
█	Communication (eShop, Internet, Intranet)
█	Infrastructure (Hardware, networks, operating systems)

System business – optimization

The Komax wire-processing system business and the Sibos assembly automation business were merged at the beginning of 2004. A structural reorganization is planned in which activities will be divided into Sales, Operations and Business Development units. At the same time all engineering and assembly activities will be concentrated in Rotkreuz, Switzerland.

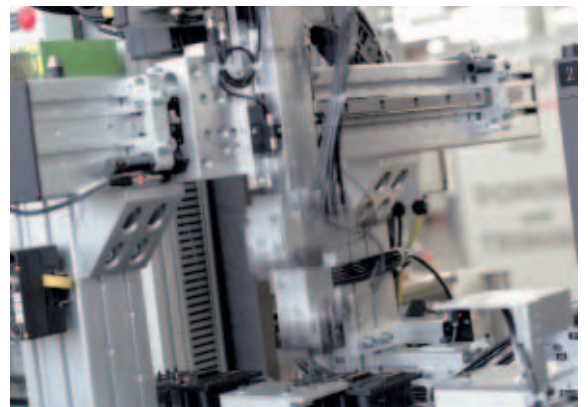
In the system business the use of standardized platforms and basic technologies is a crucial success factor. This is vital for cutting delivery times and increasing the flexibility of products while at the same time bringing down production costs. For this reason Komax will press ahead rapidly with the further development of the existing standard components over the next two years, focusing on mechanical modules as well as control and software components, and their application in the entire Group. At the same time project management will be further expanded, including the corresponding software tools.

These measures will enable existing synergies in the system business to be used more effectively, thereby boosting efficiency and productivity.

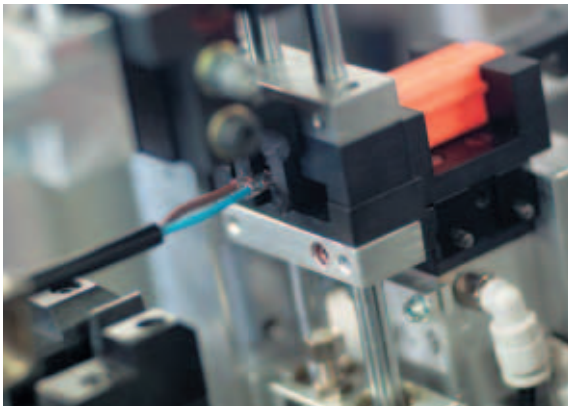
Production – increasing performance

At the beginning of 2004 a project was rolled out aimed at implementing an integral approach to supply chain management. The objective is to boost efficiency along the entire delivery chain, and so further increase the competitiveness of Komax. Another priority is to create the necessary structures for serial production of the products launched at the end of 2003.

By optimizing its procurement and logistics procedures and its production and assembly processes, the Group will be able to coordinate and utilize production capacities in the machine and system business more effectively. Measures to this effect have already been initiated.



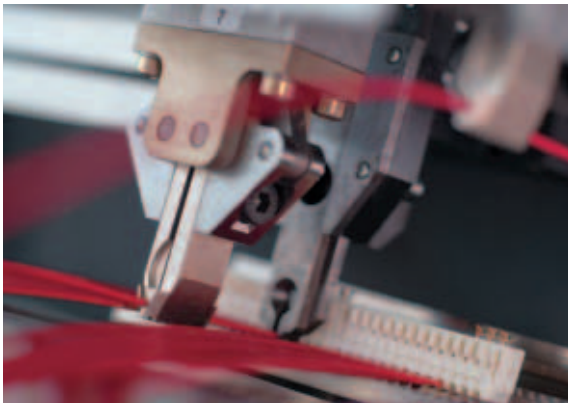
The use of standardized components is the key to high efficiency and short lead times.



Internal processes – optimization

Parallel to the measures already described, the internal processes in all areas are to be reviewed and reorganized where necessary. A vital aspect of this is the use of new and existing software tools (intranet, Customer Relations Management CRM, Project Management RPlan, etc.) for support. A new quality management system is to be rolled out, backed by a novel early warning system (measured variables and key figures) which will help improve efficiency and quality.

Another project is the implementation of a comprehensive knowledge management system. This is essential for safeguarding the company's know-how and as a way of making it available to all employees concerned.



Automation in block loading (above) and in the processing of insulation displacement connections (IDC) continues to increase thanks to state-of-the-art technology



Potential for alternative energy sources

Alternative energy sources such as solar energy, hydro and wind power, biomass or geothermal have gained in significance in recent years. In future, these technologies will become increasingly important with efforts to conserve the earth's natural resources. Some current studies assume that solar and wind energy will account for roughly 40% of global power requirements by the year 2100.



Dr. Martin Sommer, module production manager, RWE SCHOTT Solar GmbH, Alzenau, Germany

Komax has been active in the solar energy market for several years with its subsidiary Sibos Ascor Inc. – a business with attractive growth potential. For example, the photovoltaic (PV) sector has grown by roughly 40% per annum in recent years. The globally installed area of solar thermal collectors has increased by an average of 13% per annum since the 1990s. Especially in the PV sector, state support programs have contributed decisively to this growth, particularly in Japan and Germany. In contrast, growth in the USA is still lagging somewhat.

With 56% of the global installed collector area, China dominates in solar thermal collectors, followed by Japan, Turkey, Germany, Greece and Austria. In contrast to China, support programs play an important role in Europe. The most competitive are solar thermal plants in areas with high insolation and high conventional energy costs.

RWE SCHOTT Solar GmbH (previously RWE Solar) is one of the ten largest manufacturers of solar cells in the PV sector. The entire photovoltaic value chain, from silicon to the finished solar module, is processed at various locations. For example, high-capacity cells are fabricated for automobile production, and thin-film solar cells for consumer products and architectural applications. The joint-venture partners of RWE Solutions and SCHOTT Glas (50% each) are also active in the solar industry. While RWE Solutions manufactures solar cells for space flight, Schott Glas produces thermal vacuum tube solar collectors and solar collectors for commercial solar power plants. A discussion with Dr. Martin Sommer, module production manager in Alzenau, Germany:

Dr. Sommer, what forms of solar energy do we know today?

The commercial sector of “solar energy” is subdivided in three application areas. **Solar thermal collectors** absorb the solar radiation and store the resulting heat energy (in a medium such as water). This energy can then in turn be used for specific applications such as generating hot water or for heating living spaces.

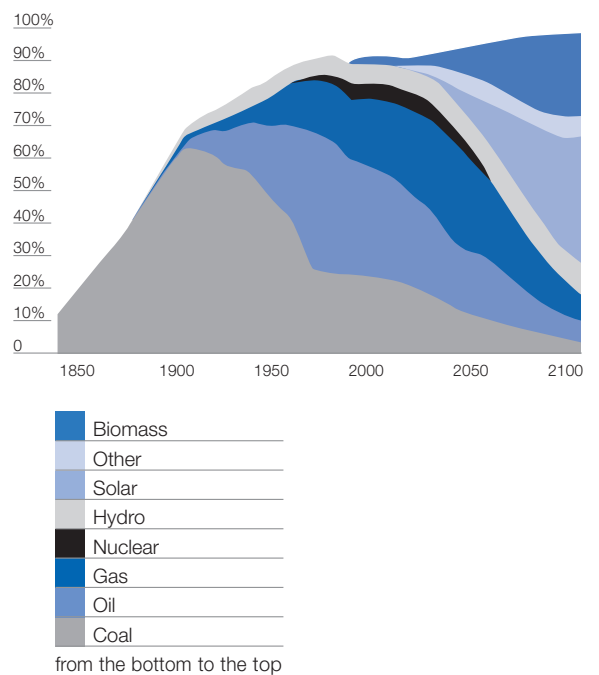
In **solar thermal power plants**, a suitable medium is also heated, but the heat energy is then used for electric power generation. One possibility here is the closed-cycle generation of superheated steam, which is then expanded in a steam turbine to generate electric power as in conventional power plants. The solar energy is, as it were, converted indirectly to electric power.

Photovoltaics is understood as the direct conversion of solar radiation to electrical energy, using the photovoltaic effect.

When is which technology used?

Hot water generation has found widespread application in private households, either for using the hot water itself or for heating living spaces. Currently used primarily in southern climates, this application will continue to be implemented here as well due to the good cost-benefit ratio. Commercial solar power plants naturally have the best payback in areas with high insolation. The large area required for the collectors predetermines installation sites with favorable land prices. As electric power generation cannot always be guaranteed due to the dependence on the weather, these plants are generally used for supplemental power generation. As a result of state support programs in Spain, plans to increase the fraction of renewable energy technologies in the USA as well as support programs for global climate protection, power plant projects with a combined capacity of more than 1,200 MW_{el} are currently in planning. The applications for photovoltaics cover an extremely wide spectrum. In countries with poor infrastructures, photovoltaics can constitute an alternative to a central power supply. High connection costs to a fixed grid can be similarly determining for remote loads. Common applications are solar-powered parking meters, traffic monitoring on highway bridges or autonomous transmitters. Ecological motives, especially for consumer products, also play a role. Pocket calculators, wristwatches or even kitchen scales can be operated without batteries. Owing to their low maintenance requirements and mobility, photovoltaic modules are used to buffer the batteries on boats. The installation of a solar sliding roof enables the use of smaller batteries in cars. Common to all three solar technologies is that they contribute to the preservation of fossil or nuclear fuels. Their distribution is thus determined to a great extent by the availability and price of these fuels. As lower prices are highly unlikely, further applications are certain to develop in future.

Development of solar energy vs. other energy sources
IIASA/WEC Scenario C1 (with decreasing nuclear energy)





Let's stay with photovoltaics. To what extent is this technology competitive in comparison with other energy forms?

With regard to decentralized power generation, photovoltaic cells are frequently superior to alternative power generation methods. For example, they frequently represent the better solution for isolated configurations, which is why they are also spreading rapidly.

In contrast, if we're talking about industrial power generation, the current state of the art and the comparatively low procurement costs for conventionally generated electric power mean that their competitiveness is restricted. However, the lead enjoyed by conventional technologies will continue to decrease as procurement costs for conventional power rise and as photovoltaic technology develops.

How are these photovoltaic cells manufactured?

The value chain starts with the recovery of silicon suitable for solar cells. This is processed by the wafer manufacturers to silicon wafers, which in turn are further processed to photovoltaic cells by the solar cell manufacturers. The module manufacturers fabricate modules from the solar cells, which, combined with suitable electronics, storage and installation solutions, are offered on the market as a finished package by the system providers.

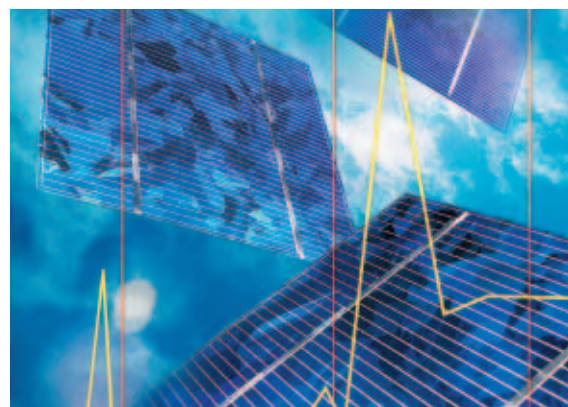
How high is the degree of automation in this process?

The degree of automation differs greatly between the various value-adding steps. In wafer fabrication, the growth process as well as further mechanical processing are essentially fully automated. Material transport between the individual fabrication steps as well as loading and unloading of the machines is generally manual.

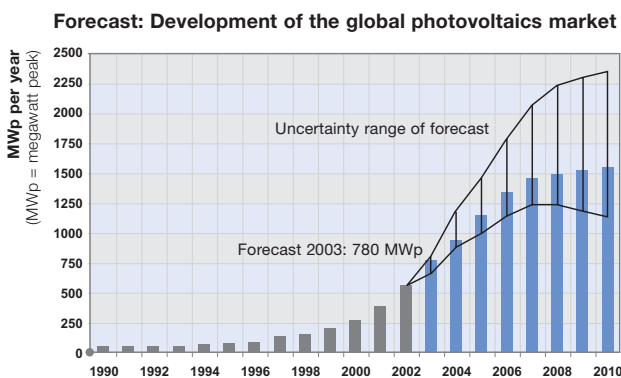
Efforts to reduce scrap rates in cell fabrication have quickly led to automated solutions. However, depending on the fabrication process, this area also includes batch processes which are charged manually.

From a global perspective, module fabrication covers a wide variety of techniques. The spectrum ranges from manual fabrication in Russia, India or China through to fully automated production lines in Germany. The key factors are the manufacturing costs and the formats and module designs to be produced. Backsheet technology modules with a weight of 12 to 17 kg and dimensions of approx. 1.3 m² can still be handled manually. In contrast, ergonomic considerations absolutely necessitate partial automation for larger double-glass technology modules.

Solar value chain



Sibos Ascor Inc. supports solar cell and module fabrication with its assembly lines.



The photovoltaics market is growing by 13.5% per annum on average.

What are your thoughts on the future of this technology?

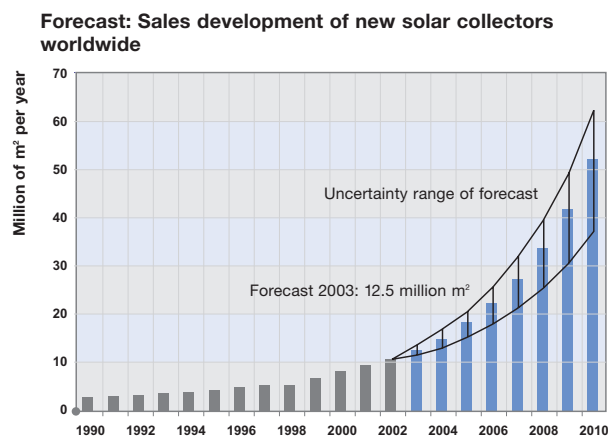
Increased automation and process optimization play a central role in manufacturing. In wafer production, the important factors are conservation of costly production equipment as well as optimum utilization of the machinery by reducing idle time. In the fabrication of solar cells, optimization measures tend towards higher cycle rates and further reduction of scrap rates. As module production is the last value-adding step, it is especially important to minimize scrap rate here. In addition, the fabrication processes must guarantee a module service life of at least 25 years. Process reliability is therefore very important.

The applications harbor great potential: "the sky's the limit". Take building control, for instance. Energy facades, i.e. walls or window fronts incorporating solar cells, are already technically possible today. Or mobile telephones that never have to be recharged, or flexible solar cells sewn into clothing, transforming a jacket to a battery charging station.

What are the driving forces for the growth of solar energy over the next few years?

In recent years, increasing energy prices and increased environmental awareness have promoted the implementation of photovoltaics and solar thermal energy. The construction industry, more favorable legislation, banks and manufacturers have simultaneously paved the way for private investors to easily integrate solar energy into their own homes. It has since become a standard to offer options such as solar thermal generation of hot water as well as photovoltaic power generation. Following the glass age, architects have now also discovered the high-tech material, silicon, as a construction material. Together with integral solar solutions, this results in completely new design possibilities in home construction. From a financial perspective, photovoltaics and solar thermal energy currently represent more medium-term investments. The driving force for the final user should therefore be the certainty of having made an investment in the future.

Thank you very much for your comments!



The market for solar collectors is growing by 22% per annum on average.

Source: Bank Sarasin & Cie AG



Glossary

Crimping (terminal attachment)	Creating an electrical connection (cold welding) between a wire (normally a stranded wire) and a terminal by mechanical deformation.
Cutting	Cutting a wire to the required length.
Flat cable	Generic term covering flexible flat cables (FFC) and flexible printed circuit boards (FPC).
FFC – laminated or extruded flat cable (FLC or ExFC)	Copper strips (conductors) laminated or extruded between two plastic films coated with adhesive.
FPC – flexible printed circuit board	Unlike conventional printed circuit boards, flexible printed circuit boards are made out of a thin and flexible substrate material.
Fully automatic crimping machine	Type of machine able to crimp terminals at both ends of a wire.
Fully automatic twisting machine	Type of machine that produces fully processed (measured, cut, stripped, crimped) twisted pairs from two single endless wires.
IDC – Insulation Displacement Connection	Insulation Displacement Connection is a contacting technique in which the usual individual crimping processes of stripping, terminal attachment and insertion are combined in one operation.
Insertion	Inserting crimped terminals into connectors.
Integrated systems suppliers	In wire processing this means that instead of supplying individual cables and wire harnesses, integrated system suppliers provide a complete unit (e.g. an entire instrument panel) already wired and assembled.
Machine business	Standardized machines for cutting wires to size and stripping them and for attaching terminals.
Miniaturization	The growing number of wires, connectors, housings, etc., combined with the limited space for them have meant that individual elements have to be made increasingly smaller.
Optical fibers	Fibers or fiber bunches made of glass (GOF – glass optical fiber) or plastic (POF – plastic optical fiber), which can be used for transmitting data or images or for lighting.

Spliced connections / splicing	Electrical connection of several cables without a connector within one wire harness. Splicing takes place mostly by means of ultrasound. Depending on the location of the splice, the connection is called a butt splice or a head-to-head splice.
Stripping	Removing the insulation from wire.
System business wire processing	Systems made to the customer's specification for the fully automatic block loading and production of complete wire harnesses.
System business assembly automation	Manufacturing and assembly automation; customized systems for machine manufacturing, assembly and testing of single components and entire assemblies.
Terminal (crimp)	Plug component (male/female) formed by punching, turning and/or cold forming.
Twisting / twisted pairs	When two wires are twisted together to reduce electromagnetic interference and to increase mechanical stability.
Wire harness	Assembly combining a number of individual wires and held together by plugs and wrapping elements.
Wire harness manufacturers	Companies which process wires and produce complete wire harnesses.

Forward-looking statements

Certain events may occur which may lead to a material difference between actual results and the forward-looking statements made in this Report. Investors are cautioned that all forward-looking statements are subject to risks and uncertainties beyond Komax's control. These risks and uncertainties include general economic factors such as exchange-rate fluctuations and macroeconomic trends as well as the market behavior of our competitors.

Your best connections

Komax Holding AG CH-6036 Dierikon / Luzern Phone 0041 - 41 455 0 455 Fax 0041 - 41 450 1 579 info@komax.ch		Komax Singapore Pte. Ltd. SG-368357 Singapore Phone 0065 - 6285 97 13 Fax 0065 - 6285 97 14 larry.wee@komax.com.sg	SG/ID	Gammeter Ou EE-76606 Keila Phone 0037 2 671 2251 Fax 0037 2 671 2253 info@gammeter.ee	EE/LV	JP International PL-02-743 Warszawa Phone 0048 - 22 843 35 66 Fax 0048 - 22 843 53 33 jjoint@it.com.pl	PL
Sibos Holding Corporation US-Buffalo Grove, IL 60089-4507 Phone 001 - 847 537 9063 Fax 001 - 847 537 9241		Komax Corporation US-Buffalo Grove, IL 60089-4507 Phone 001 - 847 537 6640 Fax 001 - 847 537 5751 info@komaxusa.com	US	Sigma Group EG-11777 Cairo Phone 0020 - 2 644 7245 Fax 0020 - 2 642 3604 info@sigma-g.com	EG	SC Thonauer Automatic S.R.L. RO-040151 Bucuresti Phone 0040 - 21 335 5654 Fax 0040 - 21 336 9534 gigi@thonauer.ro	RO
Komax AG Switzerland CH-6036 Dierikon / Luzern Phone 0041 - 41 455 0 455 Fax 0041 - 41 450 1 579 info@komax.ch		Komax Corporation US-EI Paso, TX 79936 Phone 001 - 915 591 4551 Fax 001 - 915 591 5868 rarmendariz@komaxusa.com		Estanflux S.A. ES-08027 Barcelona Phone 0034 - 9 3351 61 51 Fax 0034 - 9 3352 38 45 comercial@estanflux.es	ES	Connectors & Engineering RU-111116 Moscow Phone 007 - 095 967 15 60 Fax 007 - 095 967 15 61 info@faston.ru	RU
Komax Comercial do Brasil Ltda BR-05126-120 São Paulo SP Phone 0055 - 11 3902 3810 Fax 0055 - 11 3902 3811 pc.araujo@komax.com.br	BR	Sibos Ascor Inc. US-York, PA 17403 Phone 001 - 717 428 0994 Fax 001 - 717 428 9725 info@sibosascor.com		Gammeter Oy FI-33101 Tampere Phone 00358 - 3 380 22 11 Fax 00358 - 3 380 22 44 info@gammeter.fi	FI	AD-Contakt AB SE-17207 Sundbyberg Phone 0046 - 8 445 36 00 Fax 0046 - 8 445 36 10 info@ad-contakt.se	SE/NO
Sibos AG CH-6343 Rotkreuz Phone 0041 - 41 799 45 00 Fax 0041 - 41 799 45 01 info@sibos.ch	CH	Sibos Prime Inc. US-Rockford, IL 61109 Phone 001 - 815 229 3800 Fax 001 - 815 229 5491 info@sibosprime.com		Contax Ltd. GB-Hants PO 15 5SJ Phone 0044 - 1489 88 58 08 Fax 0044 - 1489 88 55 53 sales@contax.co.uk	GB	Mikom-Si d.o.o. SI-3320 Velenje Phone 00386 - 3 891 93 10 Fax 00386 - 3 891 93 11 mikom-si@siol.net	SI
Komax Shanghai Co. Ltd. CN-201108 Shanghai Phone 0086 21 5442 5262 Fax 0086 21 5442 5260 info@komax.com.cn	CN	Komax SA (Pty) Ltd. ZA-6055 Port Elizabeth Phone 0027 - 41 364 0667 Fax 0027 - 41 365 0138 info@komax.co.za	ZA/BW	Mikom d.o.o. HR-49247 Zlata Bistrica (Croatia) Phone 00385 - 49 462 034 Fax 00385 - 49 461 839 mikom@mikom.hr	HR	Thonauer Spol s.r.o. SK-81339 Bratislava Phone 00421 - 2 527 33664 Fax 00421 - 2 527 33665 info@thonauer.sk	SK
Komax Deutschland GmbH DE-90449 Nürnberg Phone 0049 - 911 32 49 5-0 Fax 0049 - 911 32 49 5-50 info@komax.de	DE/CZ	Our representative offices		Thonauer Kereskedelmi HU-1113 Budapest Phone 0036 - 1 372 7700 Fax 0036 - 1 372 7709 hungary@thonauer.net	HU	Diethelm & Co. Ltd. TH-10310 Bangkok Phone 0066 - 2 254 4900-13 Fax 0066 - 2 652 9417-19 wate@tech.diethelm.co.th	TH
Komax France FR-93806 Epinay-sur-Seine, Cedex Phone 0033 - 149 40 13 13 Fax 0033 - 149 40 13 29 info@komax.fr	FR	El Proveedor S.R.L. AR-Buenos Aires Phone 0054 - 11 476 136 07 Fax 0054 - 11 476 136 07 nmatus@elproveedor srl.com.ar	AR	Kinetic Electronics Ltd. IE-Offaly Phone 00353 - 506 20536 Fax 00353 - 506 20543 kinetic@tinet.ie	IE	Reemi TN-2000 Bardo Phone 00216 - 71 222 811 Fax 00216 - 71 220 481 reemi@planet.tn	TN
Division ARA FR-13106 Rousset, Cedex Phone 0033 - 442 291 200 Fax 0033 - 442 291 212 louis.soriano@komax.fr		Thonauer GmbH AT-1130 Wien Phone 0043 - 1 804 28 71 0 Fax 0043 - 1 804 28 71 10 th.info@thonauer.at	AT	Tamir Engineering & Development Ltd. IL-49170 Petach-Tiqva Phone 00972 - 3922 9422 Fax 00972 - 3922 9411 tamireng@netvision.net.il	IL	Unitek Elektrik TR-San. VE Tic. Ltd. STI TR-34852 Kucukyali-Maltepe / Istanbul Phone 0090 - 216 518 94 40 Fax 0090 - 216 518 94 36 info@unitek-elektrik.com	TR
Komax Murata KK JP-422-8071 Shizuoka-SHI Phone 0081 - 54 283 9050 Fax 0081 - 54 283 9051 info@komaxmurata.com	JP	Suba Engineering Ptv. Ltd. AU-2200 Bankstown N.S.W. Phone 0061 - 2 97 900 900 Fax 0061 - 2 9708 30 40 subasyd@suba.com.au	AU/NZ	Bergen Systems PVT. Ltd. IN-112 016 Haryana Phone 0091 - 124 500 28 88 Fax 0091 - 124 500 20 89 bergeng@vsnl.net	IN	Chain Year Industr. Corp. TW-221 Taipei Hsien Phone 00886 - 22 691 35 68 Fax 00886 - 22 691 35 86 chainart@ms19.hinet.net	TW
Komax Maroc MA-20000 Casablanca Phone 00212 - 2 330 5285 Fax 00212 - 2 330 5173 pierre.niol@komax.ch	MA	Smans N.V. BE-2300 Turnhout Phone 0032 - 14 42 44 01 Fax 0032 - 14 42 60 72 smans@smans.com	BE/NL/LU	Cofillimacchine S.R.L. IT-20046 Biassono (MI) Phone 0039 - 039 232 41 25 Fax 0039 - 039 232 21 45 info@cofillimacchine.it	IT	Diethelm & Co. Ltd. VN-Ho Chi Minh City Phone 0084 - 8 5121 334 Fax 0084 - 8 5121 335 info@tech-diethelmvn.com	VN
Komax KL MY-58000 Kuala Lumpur Phone 0060 - 3 7981 2662 Fax 0060 - 3 7987 8662 barron@pc.jaring.my	MY	AAT Aston GmbH DE-90257 Nürnberg Phone 0049 - 911 32 66 210 Fax 0049 - 911 32 66 299 info@aston.de	DE	Hansung Tech Co. Ltd. KR-ROK-463-828 Kyunggi-Do Phone 0082 - 31 781 3971-72 Fax 0082 - 31 781 3975 hiin@hansungtech.co.kr	KR	Diethelm & Co. Ltd. VN-Hanoi Phone 0084 - 4 9424 725 Fax 0084 - 4 9424 730 info@tech-diethelmvn.com	
Komax Portuguesa PT-2785-034 S. Domingos de Rana Phone 00351 - 21 444 84 80 Fax 00351 - 21 444 84 99 info@komax.pt	PT	Nikatek APS DK-3500 Vaerloose Phone 0045 - 44 48 32 11 Fax 0045 - 44 48 32 44 nikatek@nikatek.dk	DK	Neuftech Philippines Inc. PH-1605 Pasig City, Metro Manila 1605 Phone 0063 2 640 0622 Fax 0063 2 643 8097 jdcntech@info.com.ph	PH		

