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Annual Report 2001
Komax links you to the world

komax

About the illustrations

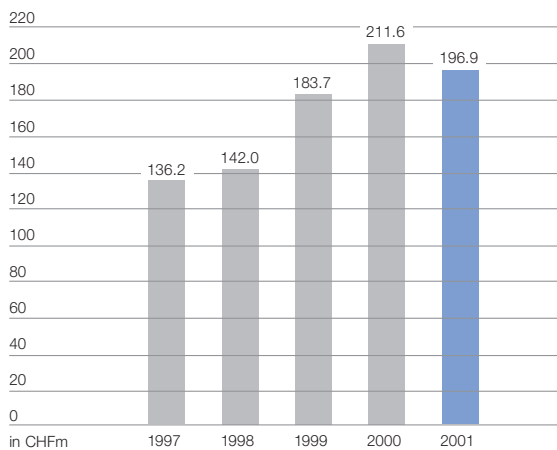
Our environment is governed by continual change. At the same time, the need to deal with many different technologies shapes our daily life to an increasing extent. In order to exist under these conditions, networking and communication are of great importance. Both interpersonal interactions and data exchange between people and machines (or between one machine and another) play a key role. We are your companion in this changing world – behind the scenes, reliable. Komax machines produce the products that make daily communication possible. Komax links you to the world.

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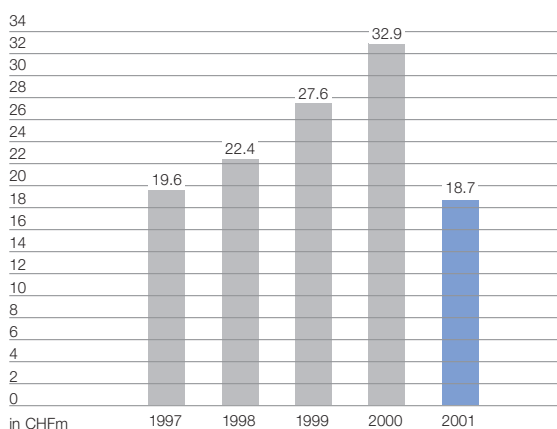
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Highlights

Net sales of the Komax Group



Operating profit (EBIT) of the Komax Group



Key figures of the Komax Group

in CHFm	2001	2000	+/- in % ²⁾
Net sales	196.9	211.6	-7.0
Operating profit (EBIT)	18.7	32.9	-43.3
Group profit after taxes (EAT)	13.9	26.3	-46.9
Research & development	16.5	15.8	+4.6
Free cash flow	-8.2	0.2	-
Investments in fixed assets	19.6	14.1	+39.1
Net investments in participations	11.1	8.4	+31.4
Net cash (+) / net indebtedness (-)	-26.9	-9.2	-
Shareholders' equity	118.8	110.7	+7.2
Total number of employees (as of 31.12.)	698	691	+1.0
Net sales per employee	0.276	0.320	-13.8
Basic earnings per share	CHF 4.47	8.49	-47.3
Equity per share	CHF 38.10	35.80	+6.4
Dividend per share	CHF 1.00 ¹⁾	1.80	-44.4
Price high	CHF 163.-	176.-	-
Price low	CHF 59.-	102.60	-

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

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

Komax – Professionals in Advanced Automation

Komax made significant progress during the past fiscal year in implementing its vision and strategy. By acquiring Prime Automation Inc. in the U.S., it was able to expand its market position in the assembly automation business. The Komax Group also launched a large number of innovative new products in November of last year. Both the new wire-processing machines and the systems for producing complex wire harnesses and for processing new connection technologies were very well received in the

marketplace. This was an important factor in strengthening our strategic positioning, even in a difficult economic environment. Thus the conditions have been created for taking greater advantage of existing market opportunities and meeting future challenges successfully.

Our Strategy



Expansion of system business

Strengthen market position in North America and Asia

Enhance activities in business fields with over-proportional growth potential

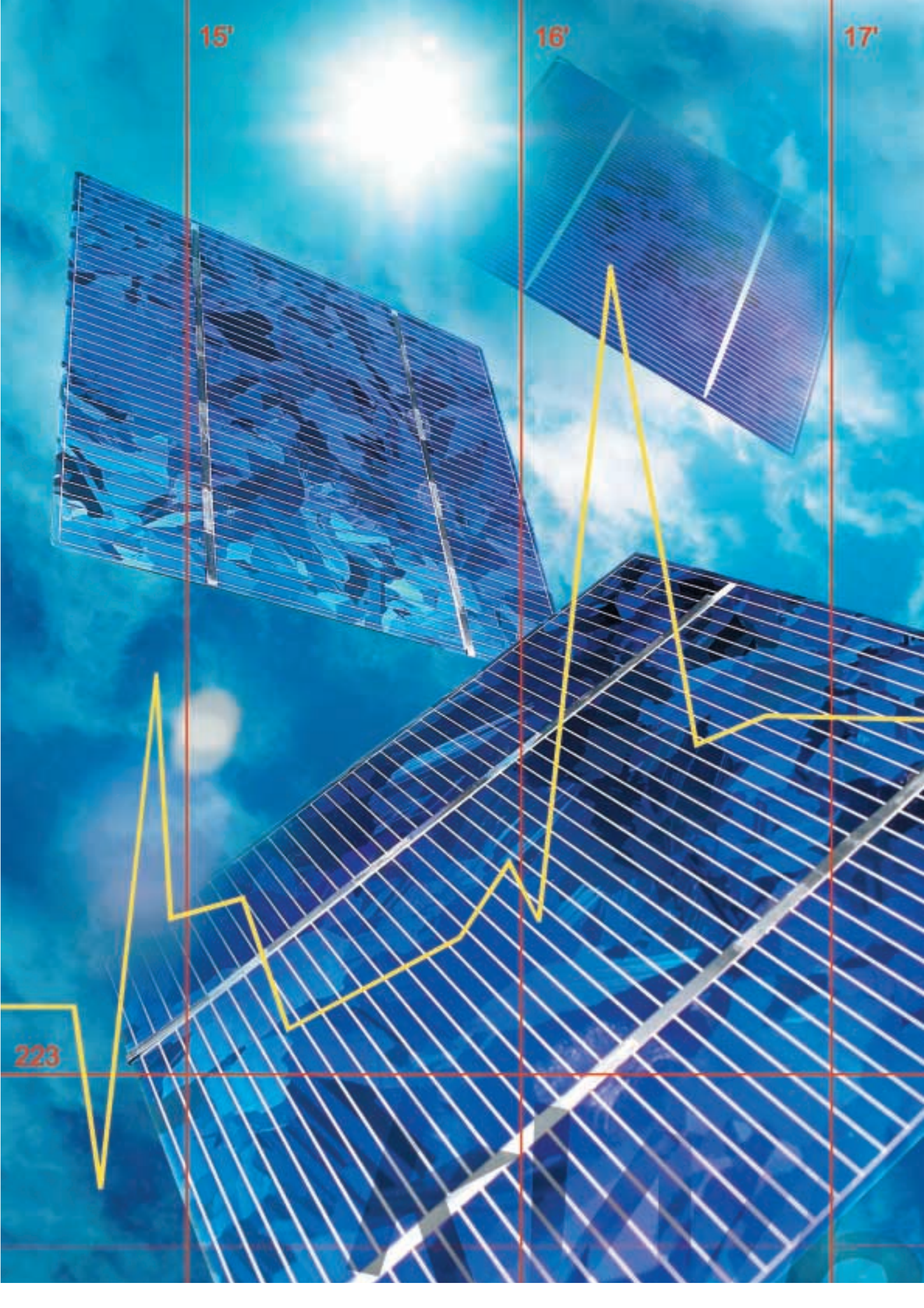
Secure leadership in technology

Keep high earning-power

15'

16'

17'



223

Report of the Board of Directors

Dear Shareholders

2001 was a challenging year for Komax. The primary goal was operational implementation of the strategy that had been decided on in 2000. By launching innovative new products and acquiring yet another company, we succeeded in gaining new market share in the wire-processing machine sector and expanding our system business.



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

At the same time, the Komax Group was confronted by difficult economic conditions. Both the North American wire-processing market, in particular, and the assembly automation market in Europe experienced a business slowdown. This is accordingly reflected in the company's financial result.

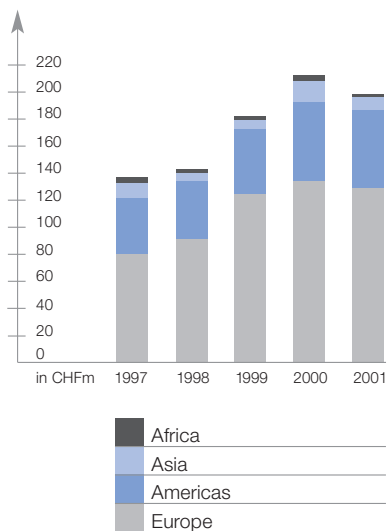
Sales – uneven development

Sales declined 7.0% to CHF 196.9 million (2000: CHF 211.6 million). When adjusted for acquisitions – Sibos Ascor Inc. (October 2000) and Sibos Prime Inc. (January 2001) – the decline in sales totaled 9.3%. This was due, first of all, to the slowdown in the wire-processing machine business in the U.S. Although there was a sizable gain in market share in the household appliance sector, it was not sufficient to offset the slump in the automotive sector. The assembly automation business in Europe also experienced a cyclical downturn. On the other hand, business was up at Sibos Ascor Inc. in the U.S., where the order value was twice as high as in the previous year. The system business in the wire-processing sector (fully automatic block loading and production of complex wire harnesses) also posted an increase in orders received. On the whole, orders received totaled CHF 214 million and definitely exceeded sales. The effect of foreign currencies was approximately -1%.

Profit – operating cash flow of 13%

In spite of the difficult economic environment, the company was able to maintain its price level. At the same time, there was a further reduction in production costs. This resulted in a slightly higher gross profit margin than in the previous year. Cash flow from operating activities (EBITDA) totaled CHF 26.4 million or 13.4% of sales (2000: CHF 38.9 million and 18.4%, respectively). Operating profit declined 43.3% to CHF 18.7 million (previous year: CHF 32.9 million). The operating profit (EBIT) margin was 9.5%.

**Komax Group
Sales by region**



The drop in EBIT was due primarily to the lower sales revenues. Komax has optimized its production structures to adjust to the business slowdown and has strengthened cost management. However, since the prospects for growth are still intact, it was decided deliberately not to adjust the cost structures to the fullest extent possible. Komax also increased expenditures for basic engineering. Group earnings after taxes (EAT) totaled CHF 13.9 million (previous year: CHF 26.3 million).

Dividends – profit-linked

Komax follows a dividend policy based on general business development. It strives for a payout rate of 20% to 25% of net earnings. In view of the results for 2001, the Board of Directors will propose to the Annual General Meeting (AGM) a dividend of CHF 1.00 per share (previous year: CHF 1.80).

Changes in the Board of Directors

Michael Funk will retire from the Board of Directors as of the date of the next AGM. On behalf of the Board, the shareholders, and the employees of the Komax Group, we thank him for his dedication and his valuable contribution. The Board of Directors will ask the AGM to elect Bernhard Schöning to the Board of Directors of Komax Holding AG.

Assembly automation – growth strategy

A strategically important step in expanding the assembly automation business was the acquisition of Prime Automation Inc. (based in Rockford, Illinois, USA), which was renamed Sibos Prime Inc. Prime develops and produces advanced automatic assembly systems for the telecommunications, medical technology, and automotive components sectors. With this acquisition, Komax opened up new markets, both geographically and technologically.

More acquisitions are planned in order to capitalize on the strong growth opportunities in the assembly automation sector. It is our goal to further extend geographic coverage and to systematically increase our existing expertise.

Innovation – expanded technology leadership

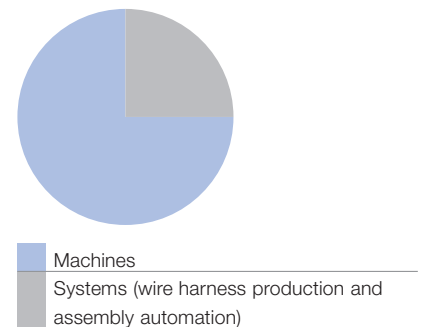
We also achieved significant success in implementing the strategy in the wire-processing business. At last year's Productronica, the leading international trade show in the area of production automation, Komax introduced a number of innovative new products. For example, a new robotics generation for fully automated processing of complex cables and wire harnesses was introduced. We also presented solutions for handling fiber-optic cable, flat laminated cable, and flexible printed circuit boards. Completely different machine concepts are needed for processing these new connection technologies. In this area, the degree of automation is significantly higher than in the manufacture of conventional wire harnesses, which are still produced predominantly by hand.

Outlook – prospects for growth are good

The trend toward more electronics continues without letup. This is leading to growing demand for wires, connectors, sensors, and actuators. At the same time, process automation continues to expand – the result of ever higher quality and productivity standards and increasing miniaturization. While new connection technologies are becoming more important in the wire-processing sector, we are witnessing a shift in the assembly automation sector from in-house engineering of assembly and testing systems to the awarding of contracts to specialized firms.

Reliable forecasts are not possible, given the present international economic environment. The first half of 2002, in particular, will continue to be very challenging. However, Komax is optimistic about the future. Komax customers are working on many interesting projects. There is also a certain amount of pent-up demand due to the investment restraint resulting from last year's economic situation. At the same time, the Komax Group has strengthened its strategic positioning by increasing its market share and expanding its product range. This, together with the company's extremely solid balance sheet, puts Komax in a better-than-average position to benefit from an upswing in the economy. We remain confident that we will achieve our five-year target of doubling sales and profits – although with a certain delay.

Sales system and machine business in 2001



Thanks – to our partners

It is our goal to create benefits for our customers, in spite of a very competitive environment. We can only achieve this with efficient management of all our resources. And with the support of committed and motivated employees who are working together for the success of the Komax Group. We take this occasion to express to them our heartfelt gratitude, since fiscal 2001 required great dedication and flexibility from everyone.

We are also grateful to our customers and business partners for their trust in us and for their effective collaboration.

And we thank you, our esteemed shareholders, for the loyalty that you have shown to our company, even in difficult economic times. We will make every effort to attain our goals and to continue to meet your expectations in the future.

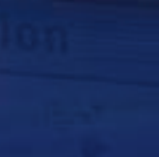
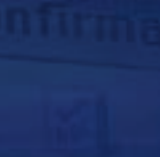
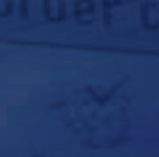


Melk M. Lehner
Chairman of the Board
Komax Holding AG



Leo Steiner
Chief Executive Officer
Komax Holding AG

... order confirmation



To: michael.douglas@komax.com

Subject: Order confirmation

Priority: Normal

Mr Douglas

We hereby confirm your order no. KOM 3020_01_2002
and we are sure to carry out this order for you and we'd like to thank you for the confidence you have placed in us. We'll do everything in our power to make ourselves worthy of it.

Yours sincerely

Komax AG

Joel Zumbstein
Head Marketing & Sales



Prime Automation – markets with great potential

A key feature of Komax's strategy is to expand its activities in the assembly automation sector. This market, with its large volumes and double-digit growth rates, offers interesting opportunities that Komax can now take advantage of more effectively, thanks to the acquisition of Prime Automation Inc.



The management team at Sibos Prime Inc. (from l. to r.): standing: Steve Rowland, Sherri Shirley, John Romonouski, seated: Bill Hoff, Gary Acaley.

The assembly automation business has an estimated global market potential of approximately US\$ 20 billion, and the volume is increasing by as much as 10% to 15% per year, on average. Growth is being driven by miniaturization, higher quality standards and labor costs, and by increasing integration of production and testing operations in the assembly process. About half of all assembly systems today are still produced in-house by large companies. However, because of the trend toward concentration on core competencies, more and more of these activities are being outsourced to specialized firms such as Sibos, Ascor, or Prime. The Sibos Group concentrates its activities on the manufacture of assembly lines for connectors, sensors, actuators, medical technology products, and solar panels. These markets have a volume of around US\$ 3–4 billion. Nearly half of this volume is concentrated in North America.

In order to create broad geographic support more quickly and thus to better exploit existing potential, Komax is carrying out an active acquisition policy. After establishing the Sibos Corporation in 1999, a U.S. company based in Chicago, Illinois, the Komax Group in 2000 acquired Ascor Inc., which is headquartered in Pennsylvania and is now known as Sibos Ascor Inc. By acquiring Prime Automation Inc., another Illinois-based U.S. company that is now called Sibos Prime Inc., Komax has succeeded in expanding its market position in the Midwest.

New markets – new technologies

With this acquisition, Komax opened up new markets, not only geographically but also technologically. Sibos Prime, which was founded in 1987 and employs about 25 people, generated CHF 5 million in sales in 2001. Prime develops and produces advanced automatic assembly systems for the following industries: telecommunications (test equipment for mobile phones), medical technology products (components for computer tomography and hearing aids), and automotive components. Its customers include primarily North American companies and those companies' branch locations in other parts of the world. Thanks to these customer relationships, the Komax Group is able to strengthen its presence in the U.S. and Canada. In addition, Prime has a great deal of expertise in high-resolution vision systems, testing systems, and solutions for demanding tasks in microtechnology.

Strategy – cross-fertilization

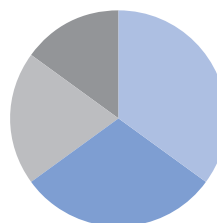
Sibos Prime will be an independent unit, both organizationally and legally, within the Komax Group, and will continue to be managed by the same team as before. The existing product lines will be expanded in accordance with the overall strategy of the Sibos Group (Sibos AG, Sibos Corp., Sibos Ascor Inc., and Sibos Prime Inc.) and will be sold worldwide through the Komax network. In return, Prime will utilize and market the technologies that exist within the Group. Reciprocal technology transfer and comprehensive training will ensure effective sales and service on a global scale. Thanks to the development of centers of excellence, synergies in engineering and production can also be utilized.



User-friendliness and network capability are crucial factors nowadays.

Shane Larson – software engineer at Sibos Prime.

Sibos Prime Inc.
Product and service mix in 2001



Consumer hardware
Automobile industry
Electronics
Medical technology



Optical controls are being increasingly used for quality assurance. Test robots for mobile phones at Sibos Prime.

There are promising opportunities, especially in the visual test system market, which is a new market for Komax. Quality assurance is of crucial importance in modern manufacturing, and integration of quality-related processes and process modules into assembly systems is increasing. Electronic, mechanical, and visual controls are being used to ensure quality in assembled parts and also low defect and failure rates. Sibos Prime produces standardized testing modules for electronic components that have been used successfully for checking mobile telephones. Recently Sibos began selling these modules as an integral part of its systems, and the first success stories have already been reported.



Komax
calling

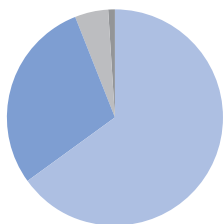


Report on operations

2001 – a challenging year

In the past fiscal year, Komax was confronted in some areas by a difficult business environment. This was reflected in the sales figures. Nonetheless, the Komax Group was able to strengthen its market position.

Komax Group
2001 sales by region



Europe	65%
Americas	29%
Asia	5%
Africa	1%

One of the high-priority goals in 2001 was to produce and launch a number of new products – in both the wire-processing machine business and in the system business. We also pressed ahead with the integration of Sibos Ascor Inc. and further expansion of assembly automation activities in North America. Thanks to these strategies, Komax continued to build market share in spite of declining sales.

Europe – a larger market share

In Europe, the Komax Group experienced uneven development in its business activities. On the one hand, we again increased the market share in the wire-processing sector, and sales were maintained at the previous year's level. Especially satisfying was the wide acceptance of the Komax Alpha 488 – a complex, fully automatic system for producing twisted pairs. The number of systems delivered shows clearly that this technology is being used more widely as a means for reducing electromagnetic interference. But the Komax Group also achieved further success in the area of processing systems for new connection technologies. Another positive development was the signing of a whole series of new global agreements with major customers. Relocation of production to countries with lower labor costs, generally countries outside the EU, continued. For example, sales in Slovakia, Poland, Hungary, and Russia increased significantly. But business was also good in EU countries such as Germany and France. On the other hand, Sibos, which specializes in assembly automation, was confronted by difficult market conditions. Because of the slowdown in the economy, some orders were postponed, and sales were below expectations.

On the whole, Europe accounted for CHF 128 million in Group sales (2000: CHF 133 million). Sales in the non-EU countries were up 25%, which places significantly greater demands on the Komax distribution and service network.

North America – difficult conditions

In the North American wire-processing business, there was little incentive to invest in new systems. Because of the weak economic situation, manufacturers exercised great restraint – especially the automotive suppliers. Some important orders were postponed to the current year. Mergers and restructuring by major customers also contributed to this trend. At the

same time, relocation of activities to Mexico and Central America continued. Komax responded to these changes by adjusting its production structures to the new conditions and expanding its branch in El Paso, Texas. In spite of declining sales, Komax was able to expand its market position, particularly in the household appliance sector.

While business in the automotive and telecommunications industries was also down at Sibos Corp. and Sibos Prime Inc., Sibos Ascor Inc. enjoyed healthy sales. This company, which specializes in medical technology and solar energy, reported a high number of orders received, especially for automatic assembly systems for solar panels.

As a result of acquisitions, sales in North America remained at the same level as in the previous year and accounted for 29% of the Group result.

Asia – uneven development

In Asia, business was uneven in the markets that are important for Komax. On the whole, sales declined 33% to CHF 10 million (2000: CHF 15 million). This decline was primarily the result of the weak economy and the resulting slump in sales in Korea and Malaysia. Conditions in Japan were also extremely difficult. In contrast, China experienced healthy growth. The expansion of Komax Singapore into a regional distribution center also produced some initial success.

Wire processing – innovative new products

Increasing cost pressures, rapid technology development, and smaller lot sizes are forcing the wire-processing industry to develop cost-efficient, flexible production processes. Maximum precision and process safety and short changeover times are the crucial success factors. Komax responded to these trends with eleven new products, which made their debut last fall.

The new generation of robotics attracted the most attention. Both the Komax Zeta 633 and the Komax Lambda 9100, which was developed in cooperation with Sibos, are distinguished by a better price-performance ratio – by a factor of two. This means that for the production of complex wire harnesses – which even today are still processed manually, for the most part – automated systems are becoming much more attractive. The potential applications for the new systems are therefore far greater.

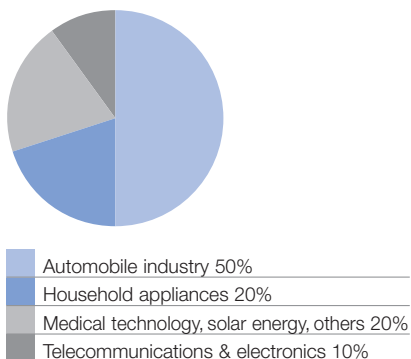


Communication and networking – decisive factors for success at Komax too. For instance, global presence locally with a professional sales and service network . . .



... or partnership-like delivery management in strategic procurement.

**Komax Group
2001 sales by application**



Two semi-automatic machines designed for the production of small lot sizes expand the product range in the area of new technologies. The Bench Top Twister Komax bt 188 is used in the fabrication of twisted pairs, while the Kappa POF, an automatic cutting and stripping system, was designed for efficient processing of optical fibers. In addition, Komax introduced a concept for processing flat laminated cables.

In the wire-processing systems business (block loading and production of complex wire harnesses), Komax presented a completely new solution for wiring based on the Insulation-Displacement technique. In addition, Komax introduced a system for processing temperature sensors, components that are used more and more frequently in car interiors and in building control.

The new products have been very well received by the market. The first orders were placed during the trade show itself.

Assembly automation – expansion of market position

Once Komax had acquired Sibos Ascor Inc. at the end of 2000, the acquisition of Sibos Prime Inc. was the next strategically important step in expanding our market presence in North America. The successful integration of the two companies was therefore also one of our primary goals in the past fiscal year. By relying on targeted technology transfer and training, the Komax Group made rapid progress in establishing a “cross selling” environment. For example, Sibos sold its first system in Spain – an Ascor assembly line for solar panels. Although the system is being produced in the U.S., the Komax network will oversee installation and maintenance. Working together with customers, Sibos also developed a concept where-by systems engineering will be handled in Switzerland and production in the U.S.

The Group had an important breakthrough in the area of new technologies. Sibos developed their first system for fully automatic processing of flat printed circuit boards (FPC) for a wire-harness manufacturer and its customers. The flexible PCB will replace the conventional wire harness in the roof liners of automobiles and will contribute significantly to reducing space requirements and weight. The system will be delivered this year. Other important orders for the automotive industry included an assembly and testing system for airbag igniters and a production line for anti-lock braking systems.

The drop in sales in the assembly automation business is due primarily to the worldwide slowdown in the production of connectors. Sales in the sensor and actuator sector increased, as did sales of the standard components Domino and Trimino.

Development and engineering – new processes and technologies

In the past fiscal year, Komax invested 8.4% of sales or CHF 16.5 million in development (2000: 7.5%). Cooperation between Sibos and ARA was intensified. The focus was on development of standardized platforms, new processes, and solutions for new technologies.

In the new generations of machines mentioned above, Komax used hardware platforms for real-time machine control and its own servo-axes for the first time. This made it possible to reduce production costs and meet stringent safety requirements.

Komax also expanded the core processes for processing flat conductors (flat laminated cables and flat printed circuit boards). Komax also developed new solutions for end-face processing of polymer optical fibers.

A completely new application is ink jet marking of special cables for the aerospace industry based on a UV curing process.

In systems engineering, expenditures for basic engineering were significantly increased. The goal was to increase the degree of standardization and thus reduce lead times and production costs.

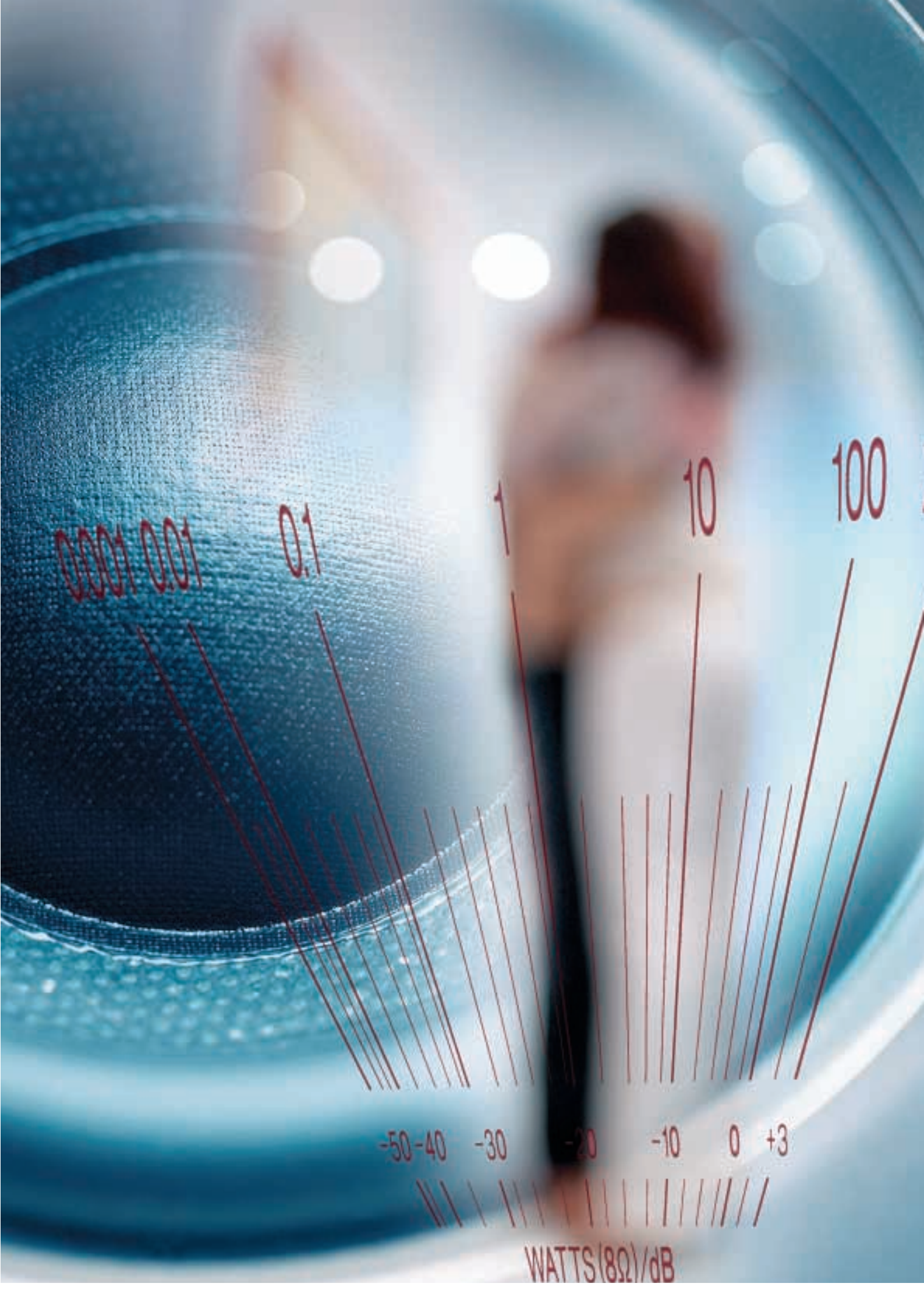
IT – purchasing by a click of the mouse

One of the main goals in the past year was to develop an Internet-based e-shop for spare parts and small machines. In the initial phase, the shop will be available to the Komax service and sales network. Sales representatives have 24-hour access to all relevant information and can place orders on the web. In-house costs will be significantly reduced, thanks to this feature.

The Komax website was also redesigned, and development of the Product Data Management System was completed. The PDM system ensures that documentation will be complete and allows different development locations to work together effectively. With this system, Komax has created an important basis for global operations.



Modern means of communication support smooth and efficient cooperation across departments and locations.



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Production – higher standards

The difficult economic situation also affected purchasing and production, and fluctuations in orders received required a great deal of flexibility.

The Komax Group met this need by further optimizing material flow and production processes and by investing in new systems. The high level of technology in the production machining area was further improved, and flexibility and productivity were again increased. These measures made it possible to reduce outsourcing of production orders and to lower production costs.

At the same time, Komax strengthened its procurement alliances, which resulted in lower purchasing costs. Cooperation with suppliers was expanded, with the goal of developing functionally superior, innovative, and competitive products and safeguarding strategic supply systems even under difficult economic conditions. Thanks to the high level of commitment of all participants, these measures also resulted in a more than 20% improvement in suppliers' compliance with quality and scheduling requirements.

Environment and safety – active risk management

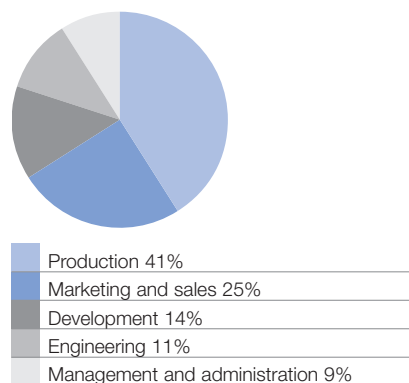
The Komax Group has been certified under ISO 9001 since 1994 and therefore has many years of experience in building and expanding a quality management system. Interim audits are carried out every six months in order to ensure that quality guidelines are being implemented and adhered to. Regular risk analyses are also performed in cooperation with insurers. The entire system is available in electronic form so that employees can get the information they need.

The environmental and safety areas are closely linked at Komax. The company's mission statement includes a pledge to produce at the highest possible safety levels and to prevent any adverse impact on the environment or on employees. In cooperation with SUVA, the agency that administers workers' compensation in Switzerland, Komax AG has implemented the recommendations of the Swiss Coordinating Committee for Occupational safety (EKAS Guideline 6508). To further enhance this new management system, an occupational safety manual was produced and training sessions were organized on the subject of accident prevention in the workplace.



But informal contacts are also important . . .

Komax Group
Employees by function in 2001



2002 – expanding strategic market position

The economic conditions will remain challenging, particularly in the first six months. Nonetheless, one of Komax's overriding goals is to continue to strengthen its market position. This will create the optimum conditions for taking full advantage of an upswing in the economy.

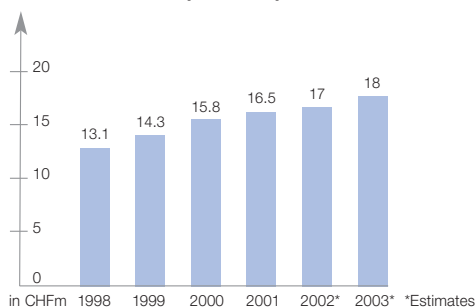
Successful launching of the new products and integration of the new companies will be key factors in attaining this objective. Komax will also press ahead with the development of standard components and solutions for new connection technologies. In all its efforts, Komax is focused on meeting the challenges of the present situation and being ready to capitalize on the expected economic upturn.

Markets – recovery in the second half of the year

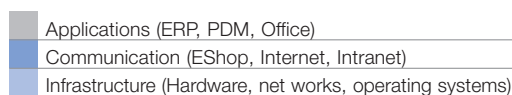
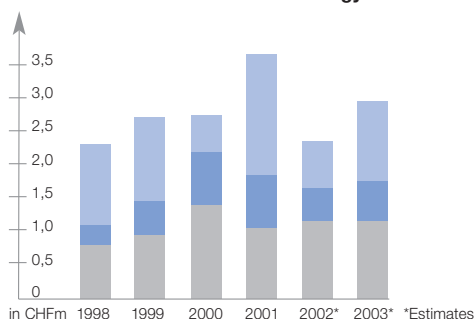
Reliable predictions are not possible, given the present economic situation. Based on general economic forecasts, however, we can expect economic recovery in the North American market in the last six months of the year. This will probably result in an increase in sales in the U.S. and stabilization of the European wire-processing business. Companies should also be more willing to invest in automated assembly systems. Komax is planning to continue expanding its operations in Asia, primarily in China and Japan.

Relocation of mass production to low-wage areas such as the African countries will continue in the current fiscal year. Morocco, in particular, is proving to be a desirable location for wire-harness production. Komax, with a local presence, will continue to profit from this development.

Research & development expenditure 1998–2003



Investment in information technology 1998–2003



Wire processing – implementation of new products

One of the main goals this year will be to successfully market the products that were launched at the end of 2001. This is based on two trends in today's wire-processing business. First, the increasing degree of automation in Europe and North America means more buoyant demand for reliability, complexity, and flexibility in machinery and systems. The use of fiber-optic cables or flat laminated cables continues to grow and Komax is anticipating these needs with its new robotics generation and with solutions for processing new connection technologies. The new automatic cutting and stripping machines and the fully automatic crimping machines are also geared to these developments.

Second, the demand for low-cost models and semi-automatic units is growing. These units are used primarily in countries with low labor costs and in the electronics market. The success of the new semi-automatic systems shows that Komax is on the right track with its product range. Further expansion in this sector is planned.

Assembly automation – integration of new companies

In the assembly automation area, the focus is on integration of the new companies and utilization of the resulting synergies. In order to reach this goal, the Sibos Group will increase technology transfer and marketing efforts in the current fiscal year.

Further development of the standard components Domino and Trimino will also be crucial. These products make it possible to increase productivity significantly. Therefore Sibos is enhancing the Trimino system with electronic presses. The components for processing flat printed circuit boards are also being standardized. Further optimization of material flow and production processes will be the objective when the company moves into its new building in Rotkreuz/Zug in early summer of this year. The first construction phase involves two production floors and three floors of office space on an area of about 6,000 sq. meters, so that the Sibos Group can meet its growth objectives.



The interaction between man and machine in manufacturing is becoming increasingly important.



Development – remaining a technology leader

In the wire-processing machine business, the primary focus is on basic research and further development of existing products (both software and hardware). For example, several innovations are planned for the line of fully automatic crimping machines.

In the area of wire processing systems, efforts will be concentrated on completing and launching the Komax Zeta 655 system. This extremely versatile and high-tech assembly robot was developed in close cooperation with ARA (Applied Robotics and Automation), a Komax subsidiary. The module will be an integral component of every assembly system in the future. Another area of concentration is the development of new process modules for processing optical fibers and flat laminated cables.

Production – expanding serial production

One of the main tasks in the current year is to begin serial production of the new machines. This requires setting up appropriate work stations with integrated testing systems and developing the complete production logistics and procurement chain. In addition, Komax is planning to make its production more flexible and to expand the strategic procurement system.

In part of its environmental management efforts, the Komax Group has set itself the goal of improving its environmental impact with a focus on sustainability. This will mean reducing consumption of heating oil, power, and water by 5% to 15%.



With Komax exporting over 90% of its output, logistics and global networks are of crucial significance.



Communication in the vehicle of tomorrow

There are many forms of communication: language, writing, signals, to name a few – supported by appropriate tools such as the telephone, newspapers, the Internet, radio, etc. But there are also forms of communication that are not so obvious – the interaction between human beings and machines or the exchange of data between one machine and another. An interview with Claudio Meisser, Head of Development at Komax AG in Dierikon.



Claudio Meisser, CTO, Komax Group, Dierikon/Switzerland.

Whether we're on the telephone, at work, or driving our car . . . we interact on a daily basis with automatic systems that make our lives easier. However, these technologies can only function when communication with the operator is simple and easy and when there is smooth data transfer between subsystems. Driven by comfort and safety considerations, the demand for "smart" electrical components is constantly growing. At the same time, the amounts of data that need to be exchanged are continually expanding, and the components needed to support that flow (like cable connectors and plugs) are becoming more and more numerous. The consequences of this development become obvious when we consider a modern vehicle. The design of the related communications structures and electrical systems involves new challenges for the auto makers and wire harness manufacturers.

Mr. Meisser, what does the term "communication" include when applied to today's automobiles?

It includes the familiar communication hardware that we have direct contact with, for example instruments like the speedometer or the fuel gauge, radio, CD player, and speakers. If we go one step further, or to the next higher price category, we find rain sensors, navigation systems, Internet connections, and screens displaying lots of different information.

However, there is also an exchange of information between numerous control devices in the vehicle that the driver is not aware of. This involves, for example, all functions in the area of engine management and transmission control, reduction of emissions and fuel consumption, passenger safety, power management, and all interfaces with the outside world for diagnosis and downloads. To name just a few.

And what exactly do we mean by "on-board electrical systems"?

First of all a vehicle electrical system includes all data buses needed for interconnecting the control units. On the other hand, it also includes control and scanning wires for all the actuators and sensors. For example, as many as eight servomotors are required just to adjust the driver's seat. And then transmission links and electronic components are needed for power management.

Let's go back to the data buses . . .

When we speak of bus systems, we're usually talking about the telecommunications industry. But this technology has also been used in luxury cars for quite a while now – and even more so in the last few years. Different systems and protocols are used, depending on the size of the data streams and the requirements relating to the reliability of communications. In the latest generation of the BMW 7 series, for example, fiber-optic buses are used to interconnect not only the information and communications systems but also the safety modules. Navigation devices, radio, or the switching center on the steering column communicate by means of digital light signals transmitted through optical fibers. I am certain that in the next few years data buses will be used in every vehicle. The main advantage of this technology is that it allows us to simplify and modularize the electrical system structures.

Why are simple structures and modular systems crucial?

In cars at the luxury end of the range the on-board electrical system consists of more than 1000 single wires with a total length of between 1500 and 2000 meters (including 30–70 meters of plastic optical fiber), and weighing between 40 and 80 kg! Together with 300–400 connectors it is necessary to ensure a reliable supply of electric current and information to each required location at all times. This problem can only be solved with well-structured on-board electrical systems.

A large proportion of vehicles today are equipped with customized wire harnesses: each wire harness is designed to support the exact features that the customer has ordered. The basic equipment such as the engine and transmission plays a role, but also the country in which the vehicle will be driven, and the optional equipment. There are a total of over 100 modules in modern cars which can, at least in theory, be combined in millions of different ways. In practice, therefore, no two vehicles contain the same wiring system. The only way to control this multitude of options, cut unit costs and reduce weight and space requirements is to use a modular concept.



The optical fibers processed on Komax systems are used to interconnect both information and communication systems and safety components.

Are there also limits to this multitude of options?

Because every wire harness is customized, it must be delivered to the assembly line as soon as possible before the vehicle is shipped. Depending on the manufacturer, the wire harness manufacturer has from one to five days between receipt of the order and installation of the harness. This results in extremely small batch sizes and some logistics “tours de force” in harness manufacturing.

Limits are imposed today primarily by volume and weight criteria. It gets harder and harder to find room in the vehicle body for the bulky harnesses. This problem is naturally alleviated by new technologies such as laminated or extruded flat cables or flexible prints (FPC) or fiber-optic cables. But here, too, we run into limits – namely in the processing of these products.

Why are the new connection technologies more difficult to process?

The manufacture of wire harnesses is broken down into three stages. In the preparation stage, the wires are measured, cut, and stripped, and the contacts or terminals are attached. Everywhere in the world these processes are for the most part fully automatic. In a second step, the preprocessed single wires go through a block loading, layout, and assembly stage to form harnesses – and even today most of this is done by hand. For optimum product quality, thorough testing is of key importance – and this is phase three. Testing is necessary because it is extremely expensive to correct faults once the harness is installed in the vehicle.

The big challenge today is the preprocessing of electrical and optical bus systems. A significant hurdle that until now has prevented more widespread use of fiber-optic cables has been their sensitivity to bending, mechanical impact and dirt. In addition, there was no manufacturing equipment suitable for mass production. Komax offers the first and only systems in the world that are fully automated and can cut optical fibers, finish the ends, attach the contact pieces and then test them optically.

How will the vehicle of tomorrow “communicate” with us?

Basically, more and more mechanical processes are being replaced by electrical systems. Especially in the areas of communication and safety, the trend towards an increase in electrical systems will continue – for example, brake and steering modules (steer-by-wire and brake-by-wire systems). This requires more interconnections and also the use of 42V systems. Thanks to them, it will be possible to increase comfort in vehicles significantly.

For on-board electrical systems, this means fitting more and more functions in the same volume of space. Some of the new models have over twice as many functions as the preceding ones.

The OEMs (original equipment manufacturers) are also making increased use of twisted pairs in order to prevent electromagnetic interference and to ensure that the electronic systems function perfectly. Today, these twisted pairs can be produced fully automatically on Komax machines with continuous process monitoring.

I assume that in the next few years the limiting factors will be human preferences rather than technological possibilities. Today, for example, we already have voice recognition and fully automatic cruise control, but who wants to ride in a driverless taxi?

Mr. Meisser, thank you very much for talking with us.



Corporate governance

The Board of Directors of Komax Holding AG defines strategic guidelines and oversees the overall activities of the Komax Group. In the fiscal year 2001, it concentrated primarily on the newly acquired businesses in the assembly automation sector.



The Board of Directors of Komax (from l. to r.): Bernhard Schönung*, Leo Steiner, Melk M. Lehner, Hans Caspar von der Crone, Max Koch.

* To be proposed to the Annual General Meeting as a candidate for election.

While the Group Executive Committee is responsible for implementing strategies and for business operations, the Board of Directors reviews the basic plans and objectives of the company, identifies external risks and opportunities, and initiates necessary action.

The members of the Board of Directors are elected by the Annual General Meeting for a maximum three-year term of office. Members can stand for re-election. The Chairman is appointed by the Board of Directors. Two standing committees support the Board of Directors in the areas of auditing and remuneration.

Audit Committee

Melk M. Lehner
Hans Caspar von der Crone

Remuneration Committee

Melk M. Lehner
Michael Funk
Max Koch

The powers and responsibilities of the Board of Directors and its committees are defined in detail. They are based on best practice in the area of corporate governance and, in the view of the Board of Directors, conform to international standards. They include the following aspects:

- far-reaching powers of supervision and review for the Board of Directors, with the direct support of the external auditors;
- a majority of independent non-executive directors;
- an Audit Committee composed of non-executive directors with extensive financial experience;
- a Remuneration Committee made up of experienced non-executive directors;
- a continuous and comprehensive flow of information to the Board of Directors.

The Board of Directors is committed to leading the company by adhering to the highest standards of integrity and transparency.

Changes in the Board of Directors

At the Annual General Meeting on May 15, 2001, Alexander Krebs retired from the Board. Michael Funk will retire from the Board as of the date of this year's AGM. The Board of Directors and the Executive Committee of the Komax Group again thank both gentlemen most warmly for their dedication and their valuable contribution. The Board of Directors will propose to the Annual General Meeting on May 15, 2002, that Max Koch be re-elected for another three-year term and that Bernhard Schönung be elected as a new member of the Board.

Melk M. Lehner*

Chairman

Dipl. Masch.-Ing. ETH Zurich

Other directorships:

Sihl, Zurich/Switzerland (Chairman)

Dyconex AG, Zurich/Switzerland

Studer Draht- und Kabelwerke AG, Däniken/Switzerland

Born: March 10, 1947

Nationality: Swiss

End of term: 2004

Leo Steiner

President & Group CEO

Dipl. Ing. ETH

Other directorships:**

Schaffner Holding Ltd., Luterbach/Switzerland

Born: April 21, 1943

Nationality: Swiss

End of term: 2003

Hans Caspar von der Crone*

Director

Professor at the University of Zurich and attorney-at-law

Other directorships:

SAIA Burgess Electronics Holding AG, Murten/Switzerland

Vontobel Holding AG, Zurich/Switzerland

Heineken Beverages AG, Chur/Switzerland

Born: January 18, 1957

Nationality: Swiss

End of term: 2003

Michael Funk*

Director

Dipl. El.-Ing. ETH

Other directorships:**

Industrieholding Cham AG, Cham/Switzerland (Vice Chairman)

Kardex AG, Zurich/Switzerland

Feintool Holding AG, Lyss/Switzerland (Vice Chairman)

Born: December 16, 1941

Nationality: Swiss

End of term: 2004

Michael Funk will retire from the Board of Directors at the General Meeting on May 15, 2002.

Max Koch*

Director

Dipl. El.-Ing. ETH

Other directorships:

Private Equity Holding AG, Zug/Switzerland

Pangas AG, Dagmersellen/Switzerland

LKS Kälte Schweiz AG, Pratteln/Switzerland

5E AG, Zug/Switzerland

Berger Lahr Positec AG, Rorschach/Switzerland

Born: May 15, 1949

Nationality: Swiss

End of term: 2002

The Board of Directors will ask the General Meeting on May 15, 2002, to elect Bernhard Schönung to the Board.

Bernhard Schönung*

Director

Dr. Ing.

Born: January 8, 1951

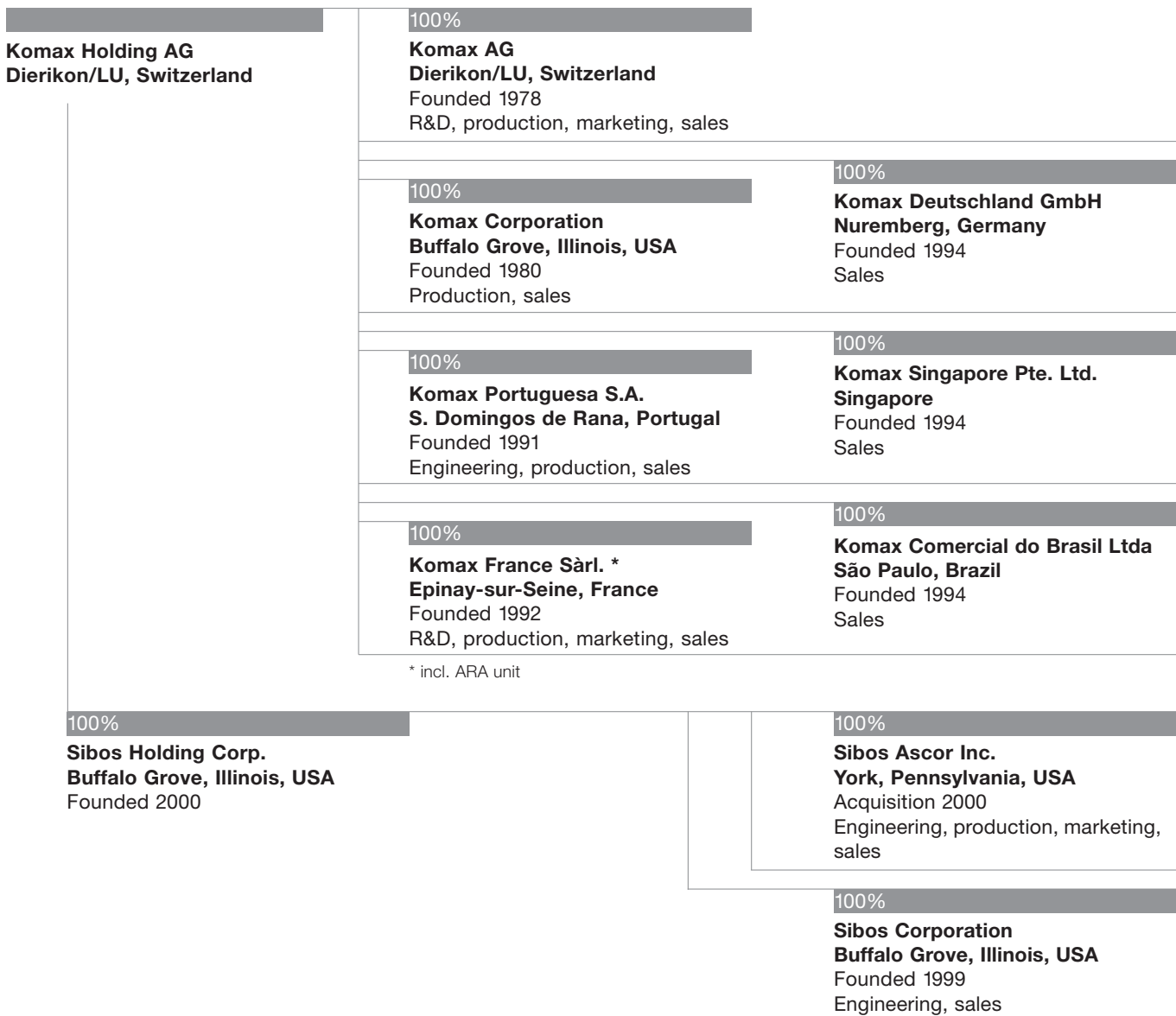
Nationality: German

* Non-executive directors

** Positions on boards of listed companies

The Group

Subsidiaries, status March 31, 2002



100%

Komax Japan K.K.
Tokyo, Japan
Founded 1995
Sales

100%

Sibos AG
Urdorf/Zurich, Switzerland
Acquisition 1998
Engineering, production, marketing,
sales

100%

Komax Maroc SARL
Casablanca, Morocco
Founded 2001
Sales

100%

Komax SA (PTY) LTD.
Port Elizabeth, South Africa
Founded 2001
Sales

100%

Sibos Prime Inc.
Rockford, Illinois, USA
Acquisition 2001
Engineering, production, marketing,
sales

Board of Directors of Komax Holding AG

Melk M. Lehner	Chairman	Term of office until	2004
Leo Steiner	CEO		2003
Michael Funk			2004
Max Koch			2002
Hans Caspar von der Crone			2003

Auditors

PricewaterhouseCoopers AG, Basel

Group Management

Leo Steiner	Group Chief Executive Officer
Claudio Meisser	Research & Development, Komax AG
Viktor Tobler	Operations, Komax AG
Andreas Wolfisberg	Finance & Accounting, CFO, Komax AG
Josef Zumstein	Marketing & Sales, Komax AG

Managing Directors of Subsidiaries

Paulo C. Araujo	Komax Comercial do Brasil Ltda
Marc Guitton	Komax France Sàrl.
Jiro Kataoka	Komax Japan K.K.
Matthias Klaus	Komax Deutschland GmbH
Miguel Peres	Komax Portuguesa S.A.
Jim Sopp	Komax Corporation, USA
Leo Steiner	Komax AG, Switzerland
Larry Wee	Komax Singapore Pte. Ltd.
Josef Zumstein	Komax Maroc SARL
Nick van Vuuren	Komax SA (PTY) LTD., South Africa
Christian Beer	Sibos AG, Switzerland
Christian Beer	Sibos Corporation, USA
Brian S. Micciche	Sibos Ascor Inc., USA
Bill Hoff	Sibos Prime Inc., USA

Glossary

Bus system	Transmission of multiple data via a single channel (e.g. via optical fiber) by means of a standardized protocol.
Crimping (terminal attachment)	Creating an electrical connection between wire (normally stranded wires) and terminal by mechanical deformation.
Crimp-to-crimp machine	Type of machine able to crimp terminals at both ends of a wire.
Cutting	Cutting a wire to the required length.
Flat laminated cables	Copper strips (conductors) laminated between two plastic sheets coated with adhesive.
Flexible prints (FPC)	Unlike conventional printed circuit boards, flexible printed circuit boards are made out of a thin and flexible substrate material and can serve as a substitute for small wire harnesses.
Fully automatic twisting machine	Type of machine that produces fully processed (measured, cut, stripped, crimped) twisted pairs from two single endless wires.
High-resolution vision systems	Test systems for the visual monitoring of assembly and production processes.
I.D.C. – Insulation Displacement Connection	Insulation Displacement Connection, or I.D.C., is a contacting technique in which the processes stripping, terminal attachment and insertion are eliminated and replaced by a single press-fit process.
Insertion	Inserting terminals into connectors.
Integrated systems suppliers	Instead of supplying individual parts (e.g. wire harnesses, instruments, plastic parts, etc.), integrated system suppliers provide a complete unit (e.g. an entire instrument panel).
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 and can no longer be processed manually.
On-board electrical systems	The term “on-board electrical system” refers to the complete wiring system in a car, including power management, bus lines, sensor and actuator connections, antenna connections and fuse systems.

Optical fibers	Fibers or fiber bunches made of glass or plastic, which can be used for transmitting data, images or lighting.
Stripping	Removing the insulation from wire.
System business Komax	Systems made to customer specification for the fully automatic assembly of special connectors (e.g. air bag plugs, sensors, etc.) and for the production of complete wire harnesses.
System business Sibos	Manufacturing and assembly automation; customized systems for machine manufacturing, assembly and testing of single components and entire assemblies.
Terminal	Plug component (male/female) formed by punching, turning and/or cold forming. The production of the terminal-wire connection is referred to as terminal attachment or crimping.
Twisted wires / 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 (see also “on-board electrical systems”).
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.

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Dieser Geschäftsbericht ist auch in deutscher
Sprache erhältlich.