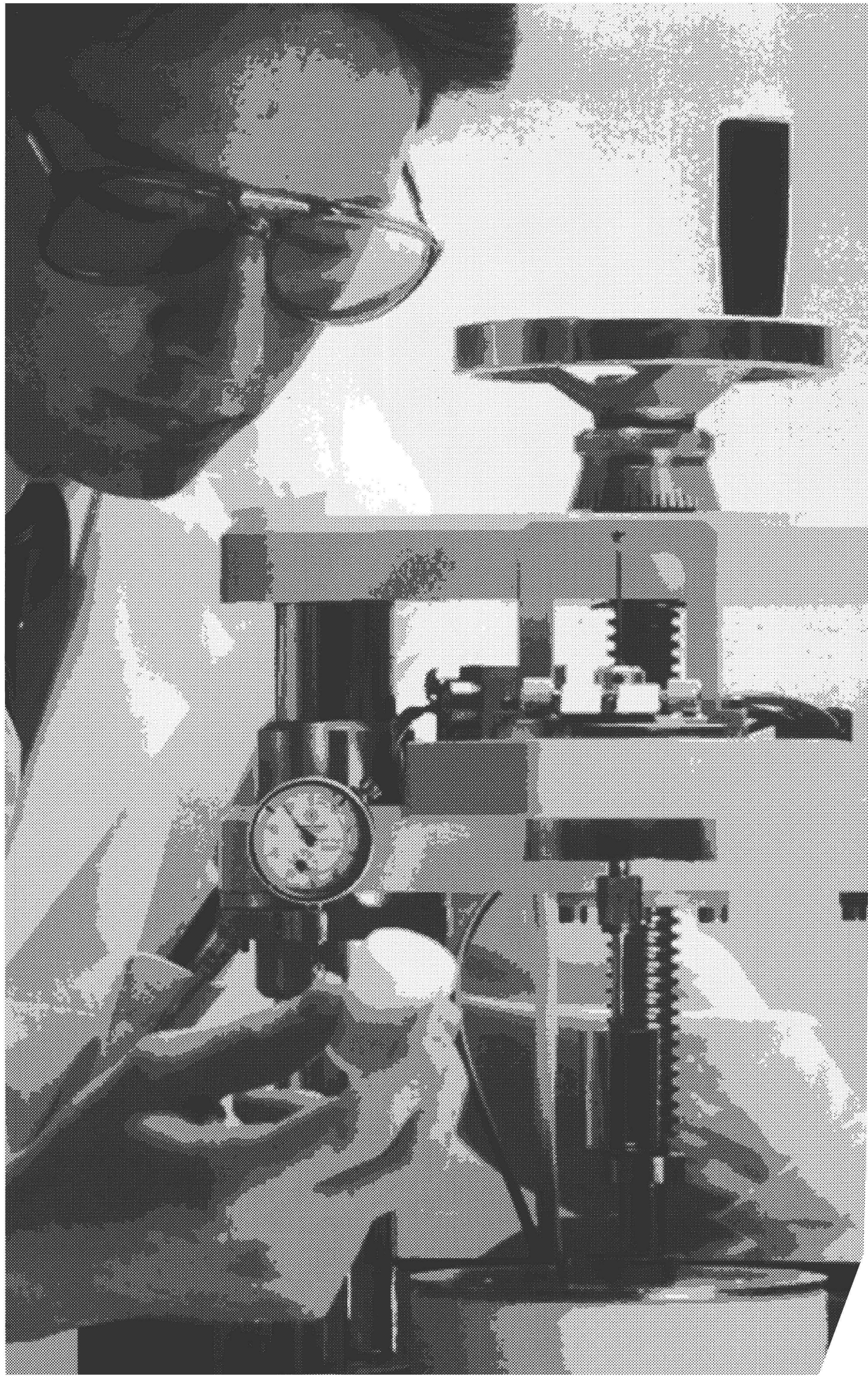


Instrument engineering



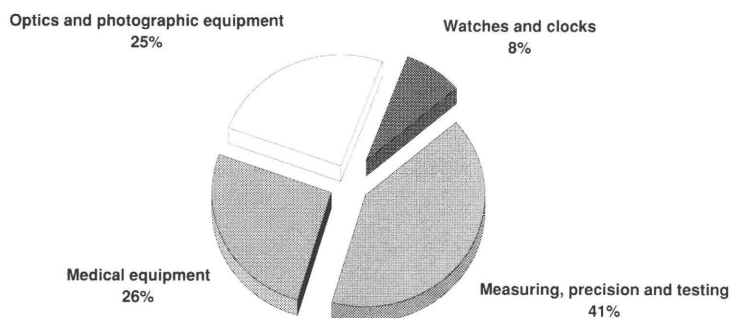
The instrument manufacturing industry which is also sometimes referred to as precision mechanics is an extremely diverse sector covering a wide range of activities. For the past fifteen years, this sector, whose applications are vital to industrial productivity, has been marked by the rapid growth of microtechniques, particularly microelectronics, increasingly combined with mechanics (mechatronics) and optics (optronics) which are the basic technologies of this industry.

At the same time, we are seeing a worldwide shift in the industry, in favour of South-East Asian countries, other Newly Industrialised Countries (Brazil, Mexico, India...) and more recently, the emergence of new competitors (Malaysia, Indonesia...). Within the EC itself, the Southern countries together with Ireland appear to be the most dynamic, thanks mainly to low labour costs. In addition, there are clear signs, with the build-up of trade, that the industry is becoming increasingly specialised worldwide.

In order to maintain and reinforce their position on a market where the overall outlook is good, EC firms must aim to specialise in top-of-the-range, capital-intensive products with high technological value added.

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Figure 1
Instrument manufacturing
Description of the industry



Source: BIPE

Description of the industry

The instrument manufacturing industry (NACE 37) comprises the following activities:

- the manufacture of measuring, precision and testing instruments (NACE 371);
- the manufacture of medico-surgical equipment and orthopaedic instruments (NACE 372);
- the manufacture of optical instruments and photographic equipment (NACE 373);
- the manufacture of watches, clocks and their spare parts (NACE 374).

Measuring, testing and precision instruments account for 41% of the sector, making this the leading sub-sector, well in front of medical equipment (26%) and optical and photographic equipment (25%). Finally, clocks and watches account for a mere 8% of the total.

The respective importance of the various

sub-sectors is mainly linked to the size of their outlets but also the extent of EC supply on the market. In the case of photographic equipment, for example, the main producers are in the United States and Japan.

NACE 37 encompasses a wide range of sectors. In spite of their diversity however, the constituent activities do have certain features in common, namely:

- the application of microtechniques, which were originally mechanical and which later became increasingly associated with electronics and computers,
- series and catalogue production of parts which distinguishes this sector's activities from other often related, sub-contracting activities (metal working being a prime example).

In addition, thanks to its sheer diversity, the instrument manufacturing industry is at the forefront of other industrial sectors

such as:

- the manufacture of professional electronic equipment (electronics for medical use, measuring, testing and electronic control)
- metal working (cutting, drawing, slicing, manufacture of springs...);
- the manufacture of precision instruments and equipment
- the manufacture of data processing equipment
- Machine tools (manufacture of machine tools, gears and transmission lines, tools for machines)

Current situation

Following the decline in the early 1980s, demand for instrument manufacturing has grown steadily - a sign of the upturn in industrial investment and the quest to become more competitive, through ever more frequent use of precision instruments and by monitoring the quality of the products. Production, which represented over 19 billion ECU in 1989, has also increased since 1984 but at a slower rate than that of the market, due to the increased, steady penetration of imports. Employment levels, meanwhile, in what was traditionally a labour-intensive industry, fell sharply until 1986 when they stabilised in favour of improved productivity.

Production and consumption

The new mood of confidence which has swept the economy in recent years and

Table 1
Instrument manufacturing
Main indicators

(millier ECUà)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ⁽²⁾
Production ⁽¹⁾	16 120	15 201	14 889	14 783	15 250	16 969	17 567	17 918	19 153	19 313	19 788
Net exports ⁽¹⁾	-787	-675	-434	-369	-1	-378	-480	-1 469	-2 111	-2 600 ⁽²⁾	N/A
Apparent consumption ⁽¹⁾	16 907	15 876	15 323	15 152	15 251	16 591	18 047	19 387	21 264	21 913 ⁽²⁾	N/A
Employment (in thousands)	376	354	330	311	307	322	324	320	318	322	320

⁽¹⁾ In milliers of Ecus at 1985 prices

⁽²⁾ Estimates

Source: Eurostat

the upturn in investment designed to prepare Europe for the 1992 deadline have had a positive effect on the instrument manufacturing market. As industry strives to cut costs, monitor and improve the quality of its products and make itself more competitive, demand for precision instruments grows, since it offers a way of attaining these objectives.

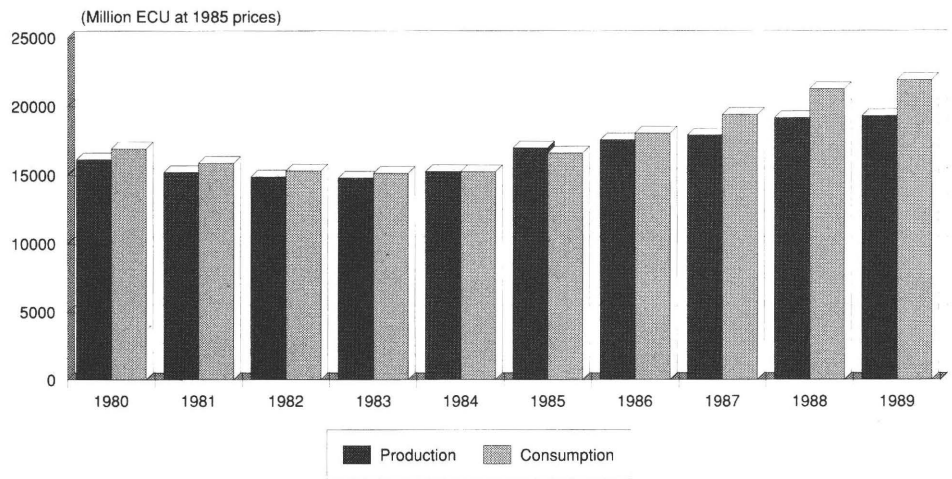
Between 1980 and 1989 the optics, medical equipment and precision instrument sectors witnessed positive developments in the market (+ 9.9%, + 9.6% and + 8.1% annual growth respectively, in terms of value) and production (+ 7.4%, + 8.4% and 6.8% annual growth respectively, in terms of volume).

The increase in health expenditure and new investments in productivity and environmental protection have boosted the activity of these various sectors.

Finally, in the clocks and watches sector, which is the most mature (together with the spectacle trade), the market contracted sharply between 1980 and 1985 under the two-fold effect of falling demand and imports from South-East Asia (bottom-of-the-range digital watches). In the same sector, however, the period from 1985 onwards saw a recovery in the market, linked to major marketing innovations and fashion-related factors which helped to slow down the ageing of these markets (as in the case of the spectacle trade).

Although EC production is also on the increase, it is actually declining in relation to demand. Over the past few years, EC manufacturers have derived fewer benefits from the growth of their market (particularly in the case of medical equipment, photographic equipment and clocks and watches) in favour of foreign competitors:

Figure 2
Instrument manufacturing
Production and consumption, 1980-1989



Source: Eurostat, BIPE CONSEIL

this loss of outlets has not been sufficiently offset by the increase in exports.

Trade

Since 1980, the flow of trade (imports and exports) has increased more rapidly in the instrument manufacturing sector than for manufactured products as a whole, with growth rates of 10% per year compared with an average of 3 to 4% for manufactured products.

From 1985 onwards, however, the EC's external trade steadily and rapidly deteriorated as the flow of trade intensified (exports and in particular, imports) and the industry became increasingly specialized worldwide.

Since the early 1980s, therefore, we have seen:

- the virtual disappearance of the EC's photographic equipment industry in favour of American, Japanese and South-East Asian manufacturers as well as manufacturers from Latin America (Brazil);
- a very high level of penetration of the EC market by bottom-of-the-range electronic watches, mainly from Hong Kong;
- the emergence and rise to prominence of new instrument-producing countries

(Brazil, Hong Kong, Mexico, Taiwan, South Korea, India, Philippines...) which has not only increased penetration of the EC market but also competition on the third markets of the United States and developing countries.

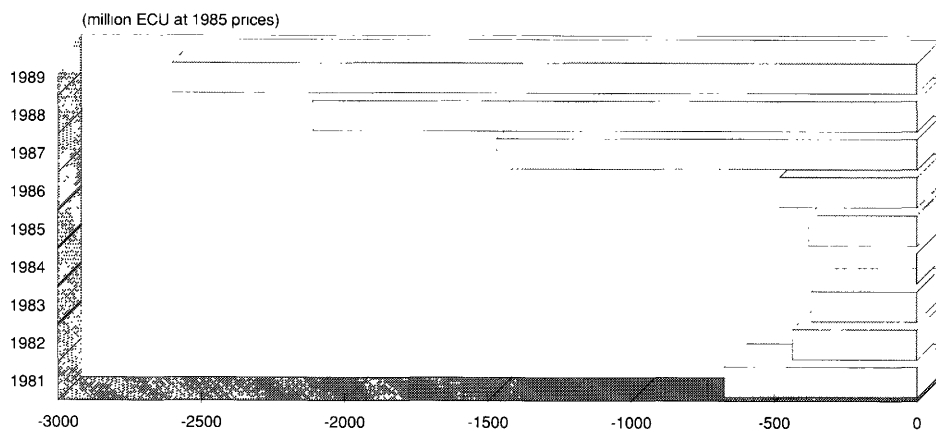
At present, we are seeing a new shift in production towards countries with cheaper labour (Malaysia, Indonesia, etc.).

All these factors have led to a recent and rapid decline in the EC's external trade over a three-year period. In addition, the current drop in the value of the dollar will inevitably reinforce the competitiveness of the EC's main non-European competitors. In 1989, the deficit stemmed mainly from the watches and clocks sector (- 1,353 million ECU), optical instruments and photographic equipment (- 1,506 million ECU), but also, to a lesser extent, medical equipment (- 94 million ECU). Only precision measuring and testing instruments continue to show a slight surplus (+ 463 million ECU).

The future trends for EC exports of measuring instruments are expected to be as follows:

- a rapid increase in exports of medical in-

Figure 3
Instrument manufacturing
Variation in the trade balance, 1981-1989



Source: BIPE

struments, due to growing demand from developing regions, and industrialised countries.

- an increase in trade with the countries of Eastern European, following the opening up of these markets.

Competition from Japanese producers on the clocks and watches market will be fierce, however, with Japan planning a major sales offensive in Eastern Europe. Finally, the growing interest in environmental protection in most of the industrialised countries will open up new prospects for the EC instrument manufacturing industry.

Employment

Whereas production increased by 20% in terms of volume between 1980 and 1989, the number of people employed fell by 15% over the same period, from 376,237 to 322, 350. The drop in employment levels was particularly severe between 1980 and 1984, when the sector and indeed industry in general, underwent large-scale restructuring. Between 1985 and 1989, employment levels stabilised while production increased significantly. Apparent labour productivity levels thus greatly improved over this period thanks

mainly to the extensive modernization of production facilities (investment grew by 200% between 1975 and 1985) and sharp cutbacks in the number of staff.

These changes in the use of the factors of production are vital to the sector's survival. On the one hand, clients' demands in terms of precision, quality and miniaturisation have forced certain professions (metrology, optics and precision engineering,...) to acquire increasingly sophisticated machines capable of achieving very high levels of precision. On the other hand, certain labour-intensive professions (clock and watch making, small-scale medico-surgical instruments...), faced with competition from newly industrialised Asian countries, have no choice but to improve their productivity in order to remain competitive. In the medium term, we must expect a further decline in the number of jobs and an increase in the sector's capital input.

Structure of the industry

The bulk of the instrument manufacturing sector is made up of small and medium-sized firms which are highly specialised in a particular area of activity (clockwork, dimensional measuring devices, micro-

scopes, dental equipment, prostheses, spectacles, meters, weighing devices...).

They normally have few rivals on a national scale and the real competition tends to arise at a European or even worldwide level. Alongside these small and medium-sized firms (many of which still employ less than 20 people), one finds large-scale international companies (Mettler Toledo, Bizerba, Zeiss, Essilor...) which can offer a whole range of products within a single sector. One rarely comes across firms, however, which operate in several sectors of instrument manufacturing, with the possible exception of Essilor which has spectacle-manufacturing and optics divisions or the large electronics specialists like Siemens and Philips which deal in optics and medico-surgical equipment and even metrology.

By contrast, many companies from border sectors have only a marginal presence in the field of instrument manufacturing. Such is the case, for example, in the process testing of automation specialists or computer manufacturers (HoneyWell, Elsag, Babcock and Wilcox, Gec-Alsthom...). In time, as the electronics industry continues to make further inroads, the importance of these companies within the sector will increase.

From a technological point of view, small and medium-sized firms in the sector are increasingly focusing on specialist areas connected with their basic profession (micro-mechanics, micro-assembling) while sub-contracting the electronic part of their work to specialist firms.

The practice of integrating the various stages of production is becoming increasingly rare and is now confined to a few large groups.

Table 2
Instrument manufacturing
Production at 1985 prices

(millions of ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Belgique/België	123	105	99	126	160	166	134	(¹)116	115	124
Danmark	146	144	163	226	246	272	280	282	294	243
BR Deutschland	7 502	7 345	6 647	6 254	6 206	7 039	7 166	7 266	7 570	7 568
Hellas	14	20	22	2	16	12	(¹) 9	(¹) 8	8	7
España	315	284	261	289	284	313	329	(¹)406	374	455
France	2 346	2 176	2 260	2 257	2 329	2 769	2 977	2 862	3 008	3 064
Ireland	143	215	271	388	517	542	558	709	807	856
Italia	1 585	1 592	1 403	1 839	1 929	1 936	2 067	2 057	2 382	2 287
Nederland	462	454	455	369	373	398	451	473	504	500
Portugal	49	52	70	57	49	(¹) 47	(¹) 46	(¹) 43	(43	43
United Kingdom	3 435	2 816	3 238	2 975	3 142	3 476	3 550	3 696	4 048	4 165

(¹) Estimates
Source: Eurostat

Geographical characteristics

West Germany dominates the instrument manufacturing industry with 39% of EC production and most of the large firms in the sector are of West German origin.

The United Kingdom ranks second (21% of the total production) and is particularly prominent in the field of measuring and testing instruments. Next comes France (15%) with a large output of watches, clocks and spectacles, followed by Italy (12%) with dimensional metrology and spectacle manufacturing.

Over the past two years, production levels in the Northern countries of the EC (Belgium, the Netherlands, West Germany) have tended to stabilise with a new upsurge in activity in France and, most notably, Italy and Spain who seem to be weathering the price war imposed by the South-East Asian countries rather better than most. Finally, Ireland has experienced truly exponential growth in its EC production because of a delocalisation policy of several EC producers with the cheapest workforce.

Prospects

Investment in medical and surgical equipment depends both on government expen-

diture and demographic factors such as the ageing of the population. Even though government expenditure may well be reduced, the fact that we have an ageing population will have the opposite effect on demand for medical expenditure and the result of these combined effects should produce positive growth, albeit very slight. Industrial measuring instruments should fare somewhat better thanks to the increasing automation of industrial production processes, which in turn creates new needs for testing and measuring apparatus. EC producers have suffered substantial losses on the photographic equipment and clocks and watches market in favour of Far Eastern manufacturers. In the latter sector, however, the emergence of new products augurs well for the future.

Finally, thanks to a new worldwide awareness of environmental problems, there is a strong likelihood of an increase in demand for pollution measuring and testing apparatus (water, air, noise).

On a product by product basis, the differences in terms of prospects for growth are similar, except in the field of medical equipment (particularly small-scale medical instruments) which has to contend with cutbacks in health expenditure in the indus-

trialised countries. The outlook for the other sectors (watches and clocks, measuring, optics) is more encouraging thanks to the development of new products and the emergence of new outlets (luxury mechanical watches, instruments for the environment, laboratory weighing).

As regards exports, we can expect to see:

- fairly sustained growth potential for medical equipment exports thanks to growing demand on the part of the Third World but hampered by solvency problems on the demand side;
- growth in trade with Eastern countries which will be the scene of intense competition, particularly with Japanese and East Asian producers;
- an increase in exports in the field of reserve and ambient testing instruments where the EC has a number of large companies (Siemens, Philips, Bruel and Kjaer...).

As regards imports, the penetration of the EC market by Asian manufacturers, currently reaping the benefit of a weak dollar, will continue, particularly on volume markets (watches, spectacles).

Given these circumstances, production should increase by approximately 3% per year between now and 1994.

At the same time, in the face of increased specialisation and international competition, EC industry must continue to restructure. Firstly by concentrating the sector in order to achieve critical mass (important moves involving mergers have recently been noted in the weighing, instruments and clockwork sectors). And secondly by fully integrating electronic and mechatronic technologies, which will eventually come to replace purely mechanical applications.

Table 3
Instrument manufacturing
Forecasts

	Production in millions ECU 1989		Annual average growth rate % in volume		
	1989	1990	91/90	91/92	94/89
Watches and clocks	1 652	1 735	+ 3.5	+ 3.5	+ 4.0
Optics	5 358	5 523	+ 4.0	+ 4.5	+ 4.3
Precision	8 617	8 875	+ 3.0	+ 3.5	+ 3.2
Medical equipment	5 545	5 573	+ 1.0	+ 1.0	+ 0.8
Total	21 172	21 706	+ 2.8	+ 3.1	+ 2.9

Source: BIPE

Written by: BIPE

Over the last decade, some measuring, precision and control instruments have lost ground to instruments equipped with electronic components. The recent upturn in this sector is, for the most part, the result of important investment made during the last few years within the EC. In 1989, the sector employed 131,037 people, while production amounted to 8,617 million ECU. During the 1980s, developments have been essentially in trade between the Member States.

The trade balance of the EC declined, although it remained positive throughout. The evolution of demand and international competition point to movements involving concentration within the sector.

Description of the sector

The manufacture of measuring, precision and control instruments (NACE 371) corresponds to the following products:

- ❖ gas meters, water meters and other liquid supply meters;
- ❖ measuring, control and regulating instruments and appliances;
- ❖ navigational instruments and hydrological, geophysical and meteorological instruments;
- ❖ drawing instruments and mathematical calculating instruments;
- ❖ dimensional precision measuring instruments;
- ❖ precision balances, laboratory apparatus and teaching equipment;
- ❖ other precision instruments and appliances.

Current situation

Until the 1970s, measuring, precision and control instruments were essentially mechanical. Since then, three fundamental developments have modified the technology in the sector:

- ❖ the use of sensors;
- ❖ the introduction of electronics;
- ❖ the combining of peripheral equipment (such as data processing systems).

These new technologies have stimulated the development of a series of new products with multiple applications, particularly in industrial processes. These include automation and the use of informatics, allowing the statistical processing of data and readjustments to filling, dosing and conditioning processes. Similarly, the introduction of electronics has reduced the share

Table 1
Measuring, precision and control instruments - Main Indicators, 1980-90

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988 ⁽¹⁾	1989 ⁽¹⁾	1990 ⁽¹⁾
Apparent consumption ⁽²⁾	4 028	4 103	4 176	4 480	5 107	6 122	6 667	6 786	7 375	8 153	8 353
Net exports ⁽²⁾	574	680	696	667	649	728	675	594	667	464	522
Production ⁽²⁾	4 602	4 783	4 872	5 147	5 756	6 850	7 342	7 380	8 042	8 617	8 875
Employment (number)	147 893	139 078	125 764	122 720	118 684	128 333	130 338	128 795	127 983	131 037	130 213

(¹) Estimated

(²) 1980 EC9; 1981-85 EC10

Source: Eurostat (Inde, Comext)

of mechanical technologies.

Thus, in the weighing industry alone, the proportion of mechanical machines has fallen to under 10%. Manufacturers have had to adapt to this new situation, where they are no longer in a position to manufacture all the components of their instruments themselves.

There is a strong tendency towards subcontracting, particularly in electronics.

Production and consumption

Since the beginning of the 1980s, European production in this sector has risen constantly, while that of the United States fell during the second half of the decade, after a strong increase between 1980 and 1985.

Japanese production of these types of in-

strument outstripped European production in 1988, and average annual growth rates of 15.6% point to this country's potential as a serious competitor with European producers.

In weighing, Japanese manufacturers such as TEC and ISHIDA are already exporting to the EC. They also have operations in some EC countries (chiefly the United Kingdom), where they are buying up local companies.

Their arrival constitutes a threat to certain European producers, insofar as they are seeking to penetrate the weighing instrument market for the retail trade, which represents one-third of the weighing instrument market in Europe.

After industry stagnation in 1987, EC production has increased at an annual rate of

8%, with trends varying according to the activity concerned. In 1989, it reached 8,617 million ECU. While there is net growth in dimensional measurement, firms in the weighing and counting industries have experienced some stagnation in their activity during the last few years.

Consumption increased at a more sustained rate of 11% in 1989, which can be explained by a considerable demand to replace products whose performance is evolving more rapidly than in the past.

Technical product sophistication has also led to a rise in prices, while the increase in internal demand since 1980 has produced a rise in imports.

In the environment, under the regulatory impulse in Europe, there is a strong demand for pollution measuring and control

Table 2
Measuring, precision and control instruments - Production and value added

(Million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ⁽²⁾
Production in current prices											
EC Index	4 745.1 67.7	4 908.4 70.0	5 000.2 71.4	5 294.7 75.6	5 898.2 84.2	7 007.9 100.0	7 341.5 104.8	7 380.1 105.3	8 041.8 114.8	8 617.1 123.0	8 875 126.0
USA ⁽¹⁾ Index	7 046.9 39.2	9 668.0 53.8	11 824.4 65.8	13 158.6 73.2	16 173.6 90.0	17 964.5 100.0	14 147.3 78.8	12 682.1 70.6	13 720.5 76.4	N/A N/A	N/A N/A
Japan ⁽¹⁾ Index	2 391 36.2	3 486 52.9	3 439 52.1	4 514 68.4	5 855 88.8	6 596 100.0	7 404 112.2	7 339 111.3	8 469 128.4	8 815 133.6	N/A N/A
EC											
Production at constant prices Index	6 471 92.3	6 119 87.3	5 745 82.0	5 751 82.1	6 120 87.3	7 008 100.0	7 226 103.1	7 157 102.1	7 528 107.4	7 659 109.3	N/A N/A
Value added at constant prices Index	3 381 101.1	3 170 94.8	2 983 89.2	2 897 86.6	2 986 89.3	3 344 100.0	3 420 102.3	3 429 102.5	3 503 104.8	3 575 106.9	N/A N/A
Productivity ⁽²⁾ Index	22.9 87.7	22.8 87.5	23.7 91.0	23.6 90.6	25.2 96.6	26.1 100.0	26.2 100.7	26.6 102.2	27.4 105.0	27.3 104.7	N/A N/A

(¹) Census of Manufacturers and Eurostat estimates.

(²) Million ECU/thousand employees

(³) Estimated

Source: Eurostat(Inde)

Table 3
Measuring, precision and control instruments - EC Trade in current value

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990(*)
Exports extra-EC Index(1)	1 187 63.2	1 256 72.6	1 354 78.2	1 407 81.2	1 539 88.8	1 731 100	1 644 93.8	1 593 90.9	2 537 144.7	2 747 156.7	2 836 164.0
Imports extra-EC Index(1)	464 53.4	543 62.5	633 72.7	688 79	818 94	919 100	914 99.5	873 95	1 864 202.8	2 200 239.4	2 314 252
X/M	2.3	2.3	2.2	2	1.9	1.9	1.8	1.8	1.4	1.2	1.2
Trade intra-EC Index(1)	868 65.7	897 67.9	1 001 75.7	1 036 78.3	1 134 85.8	1 323 100	1 636 118.6	1 673 121.3	2 572 186.5	2 869 208.1	N/A N/A
Share of total %	45.1	42.3	43.2	43.1	43.1	44	49.4	51.2	50.3	51.1	N/A

(1) Taking into account changes in EC membership.
(*) Estimated
Source: Eurostat (Comext)

appliances (ph-meters, flow meters, probes, gas analyzers, spectrometers, sound level meters, metal detectors, dose rate meters).

Trends in trade

The dynamism of foreign trade, seen especially at the end of the 1980s, was caused by two things:

- ❖ The first was a real increase in trade. This phenomenon can be detected in weighing especially;
- ❖ The second was a change in trade classification made in 1988. As a result, average annual growth levels lost their significance, and it is necessary to make a separate analysis of developments between 1980 and 1987 and growth from 1988 to 1989.

In extra EC trade, there was real growth between 1980 and 1985 (+10% a year). After 1985, EC imports and exports declined. Recently, an upturn in extra EC

trade has been observed. However, the EC trade surplus, which was positive throughout the 1980s, is at present tending to fall.

This may be due to a loss of competitiveness by EC manufacturers, who offer products which are less technologically advanced than those of their Japanese competitors, and who export to markets with low growth levels. Trade between Member States underwent a steady progression during the 1980s: +10% a year between 1980 and 1987, and +11.5% between 1988 and 1989.

The countries which export most to other EC countries are the Federal Republic of Germany (39% of trade between Member States), the United Kingdom (16%) and France (14%).

The chief recipients of trade between Member States are France (21%), the Federal

Republic of Germany (19%), Italy, the United Kingdom and the Netherlands (each representing 13% of imports from within the EC). The technical standardisation of machinery within the EC and corporate partnerships in different EC countries have made this development in trade possible. This is set to continue in the future.

Indeed, the prospect of 1992 is bringing a certain dynamism to the sector, with trading subsidiaries of European countries developing outside their national bases.

Employment

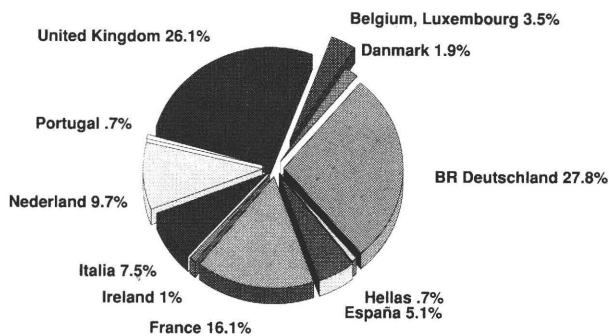
During the 1980s, the level of employment in the EC for this industry fell on average by 1.2% a year, due to sizable cutbacks in the workforce between 1980 and 1984: 18,300 jobs in the Federal Republic of Germany, which employs 40% of the sector's workforce, and 7,000 jobs in the United Kingdom.

Table 4
Measuring, precision and control instruments - Production by country (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988(*)	1989(*)
Belgique/België	N/A	77	75	102	134	137	105	94	94	103
Danmark	21	21	23	53	52	64	55	49	46	48
BR Deutschland	2 266	2 378	2 261	2 229	2 452	2 856	3 223	3 298	3 355	3 354
Hellas	5	5	6	N/A	8	6	6	5	6	6
España	127	114	116	129	130	143	153	189	181	242
France	207	222	222	226	253	515	524	375	417	430
Italia	541	582	459	695	710	697	822	844	934	996
Nederland	139	165	172	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	N/A	N/A	12	12	12	15	16	16	18	20
United Kingdom	1 269	1 231	1 538	1 583	1 839	2 223	2 101	2 176	2 627	2 839

(1) Estimated
(*) Data for Ireland is not available
Source: Eurostat (Inde)

Figure 1
Measuring, precision and control instruments
Imports Extra-EC in 1989 (2200 million ECU)



Source: Eurostat (Comext)

Since 1985, the level of employment has been virtually stable.

This can be explained by the fact that the rises in production observed since then were accompanied by productivity improvements on the part of the workforce.

In 1989, the measuring, precision and control instrument manufacturing sector employed 131,000 people. Under the effect of new techniques arising from electronics, proficiency levels have developed, moving from purely mechanical know-how to training in mechatronics.

At the same time, the manufacturers of measuring, precision and control instruments have been turning more to sub-con-

tracting, often limiting their activity to the design and assembly of products.

This has led to a transfer of know-how from instrument manufacturers to their subcontractors, who are subject to very high precision and quality demands.

Structure of the sector

The diverse activities of the measuring, precision and control instrument sector are structured differently, possessing specific characteristics as far as the number of manufacturers, their size, methods of distribution and nature of their markets are concerned.

The weighing industry is, for example, made up of over 400 firms employing

22,000 people.

The trade and industry sector represents the main market, with about 35% of sales. Distribution is handled either by distribution subsidiaries, or by "pendulums" which offer a variety of makes and offer after-sales service. As regards the size of these firms, while some employ only a few people, the biggest can have up to 6,000 employees. Some firms specialise in the manufacture of one or two products, while others produce a broad range of appliances. Nevertheless, competition for market shares and in prices remains severe.

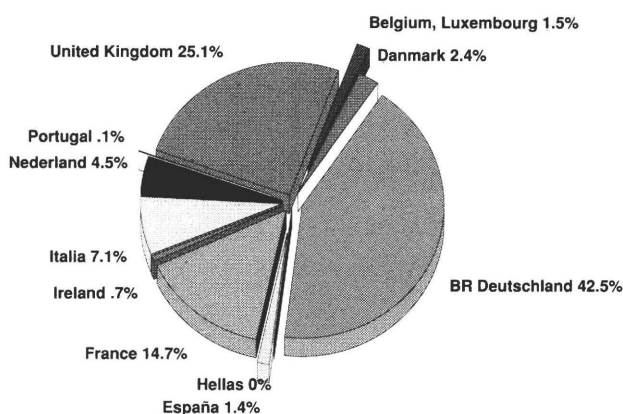
The EC Directive, which will come into force in 1993, ought in principle to remove the non-tariff barriers within the EC which the metrological regulations in each EC country still represent. This should alter this sector's trading landscape considerably.

Within this perspective, important regroupings have been carried out through the takeover of companies whose weighing activities become complementary, so making broader market sector coverage possible. Thus, after Mettler took over Toledo and GRC Avery, Berkell, known as Tesgut in France, in addition to taking over Trayvoy (industrial weighing), also bought Lutrana, a company specializing in weighing for the retail trade. Similarly, the Precia company bought Pesage Volumetrie in 1990.

The counting industry, on the contrary, is made up of a limited number of medium or large manufacturing firms. Given the fact that the number of customers is small, these firms distribute their products directly.

Demand changes little, and technological

Figure 2
Measuring, precision and control instruments
Exports Extra-EC in 1989 (2747 million ECU)



Source: Eurostat (Comext)

Table 5
Measuring, precision and control instruments - Employment by country

	1980	1981	1982	1983	1984	1985	1986	1987	1988(?)	1989(?)
Belgique/België ⁽³⁾	N/A	1 725	1 576	1 271	1 541	1 309	1 631	1 429	1 416	1 442
Danmark	680	603	580	981	1 027	1 204	954	863	793	956
BR Deutschland	67 215	65 071	56 417	49 275	48 892	52 958	54 533	54 114	52 241	52 994
Hellas ⁽⁴⁾	318	246	383	405	392	381	398	398	381	387
España ⁽³⁾	4 942	4 612	4 375	4 540	3 782	3 094	3 481	3 482	3 335	3 383
France	5 052	4 526	4 421	4 070	4 019	7 125	6 953	4 936	4 410	4 968
Italia	13 964	14 088	10 512	15 421	12 991	12 255	11 988	11 953	11 642	11 810
Nederland ⁽⁴⁾	3 254	3 148	3 025	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	N/A	N/A	843	820	820	N/A	N/A	N/A	N/A	N/A
United Kingdom	47 534	42 038	41 624	40 922	40 450	44 071	44 344	45 862	47 583	49 186

(¹) Data for Ireland is not available

(²) Estimated

(³) 1987 estimated

(⁴) 1983,87 estimated

Source: Eurostat (Index)

changes effect improvements to products already in existence.

At present, this sector is already highly structured, which is why few new firms enter the sector. Here again, the trend is towards the concentration of supply.

Similarly, the sector of control and three-dimensional measuring machines is fairly concentrated, with only 80 suppliers counted in the world. In Europe, the main producers are the French Renault Automation, the Germans Zeiss, the Italians Dea, and the French Tri Mesures. In industrial processes control, changes have occurred recently, with the takeover of Foxboro by the British firm Siebe, which has thus become the world's second largest manufacturer of these types of instrument behind Honeywell. At the beginning of 1990, the Italians Elsag, after selling Bailey Controls to the American Babcock Wilcox group, took over the Sereg division of Schlumberger. In 1989, Cgee-Alsthom took over the industrial control operations of the British GEC.

In pollution measurement and control, there are a considerable number of highly specialized small companies, alongside the large German and Danish general operators

(Siemens, Hartmann and Braun, Briel and Kjaer...).

These small companies have specific specialist know-how which often allies acoustic, physical and chemical engineering with mechanics and electronics.

Geographical characteristics

The Federal Republic of Germany, the United Kingdom and Italy produce over 80% of measuring, precision and control instruments. France is the fourth largest EC producer with 5% of total production. Among the three main manufacturers, the United Kingdom recorded the best production growth rates between 1980 and 1989. The Federal Republic of Germany, the United Kingdom and France were behind the strong rise in exports witnessed between 1987 and 1989.

The same countries also saw a growth in their imports, with the Federal Republic of Germany, the United Kingdom and Denmark today being the only countries still to

have a trade surplus.

Prospects

Prospects are good for some products such as navigational instruments and aeronautical equipment, given the expected growth in the aircraft industry at a time when a first generation of airliners needs replacing, and when air transport services are continually evolving.

A boom is also forecast in the dimensional measuring sector, under the influence of increased demand for control methods and the appearance of new technologies, ranging from purely mechanical instruments to automated control machines, by way of devices which join mechanics, electronic counting and computer processing of measurement. Sub-contractors represent a new customer group for the manufacturers of dimensional measuring instruments, because of the high degree of precision which their products need to possess.

In the non-automatic weighing instrument industry, an EC directive is laying down

Table 6
Measuring, precision and control instruments - Forecasts

(million ECU)	1989	1990	91/90 % Var	92/91 % Var	94/89 % Var
Production in current prices	8 617	8 875	+3	+3.5	+3.2

Source: BIPE

the demands which these instruments will have to meet to be able to circulate freely in the EC.

In this way, a large market will be opened up to all non-EC manufacturers, while their home countries keep their own norms. This may weaken some EC manufacturers. Within this perspective, they have begun to regroup. Lastly, pollution measurement (water, air, waste, noise) most certainly constitutes the most buoyant

market segment in the medium term and is sparking the diversification and redeployment of many measuring and control firms into these applications.

Written by: BIPE

**This sector is represented at EC level by CECIP:
European Committee of Weighing Instrument
Manufacturers**

**Address: 36, avenue Hoche, F-75008 Paris,
tel.: (33 1)45 61 18 51; fax: (33 1) 45 63 59 86**

The improvement of health care techniques together with the ageing of the population in industrialised countries are producing a strong expansion in spending on health around the world.

This is why the world market in medical technology has such strong prospects for growth (around 10% a year). The Community manufacturers have seen their share of world production fall during the last decade, to the benefit of American producers.

During the 1980s, EC production in the medical and orthopaedic material and instruments sector rose constantly to reach 5 545 million ECU in 1989.

Employment in the EC has been rising since 1983 and stood at 92 000 people in 1989.

The global dimension of this sector has led EC manufacturers to export a large part of their production. In order to stay competitive, they will have to continue their efforts in making technical improvements to products.

Description of the sector

The medical and orthopaedic material and instruments manufacturing sector includes the following activities:

- ❖ manufacture of diagnostic medical equipment;
- ❖ manufacture of surgical and veterinary equipment;
- ❖ manufacture of instruments and devices for dentistry;
- ❖ manufacture of prosthesis and orthopaedic devices.

This sector does not include electrical medical equipment (i.e. medical imagery, heart pacemakers, monitoring, etc.) found

in NACE category 344, alongside telecommunications equipment, measuring counters and devices, as well as single use articles which are still called "consumables" which belong to categories as diverse as the textile, rubber, plastics processing and paper and cardboard processing industries.

Once the limits of the sector have been defined, it is noticeable that it in fact comprises a variety of firms involving themselves in micro-markets, that is to say not in direct competition with each other.

Nevertheless, despite the great diversity of product applications, there is an important common technological link between the

Table 1
Medical apparatus and instruments and orthopaedic appliances
Main Indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988 ⁽¹⁾	1989 ⁽¹⁾
Apparent consumption ⁽²⁾	2 465	1 874	2 770	3 138	3 482	3 754	4 135	4 512	5 435	5 639
Net exports ⁽²⁾	175	175	219	308	290	585	489	306	92	- 94
Production ⁽²⁾	2 640	2 049	2 989	3 446	3 772	4 335	4 624	4 818	5 527	5 545
Employment (number)	88 715	85 941	82 673	85 198	86 989	91 343	92 156	91 006	91 193	92 008

⁽¹⁾ Estimated
⁽²⁾ 1980 EC9; 1981-85 EC10
Source: Eurostat (Inde, Comext)

firms in the sector, with the developments seen in different markets often similar in many cases. In all spheres, bio-compatibility has become a priority objective: this has involved the use of new materials, greater sterilisation of all instruments, increases in demand for disposable instruments, both in small instrumentation, dental equipment and prostheses. In addition, all of these firms are subject to the same constraints from their particular environment: the health sector. On national markets, demand for these products is greatly influenced by policies on refunds for care and, more generally, by health and economic policies.

Exports are of vital importance to these firms who often specialise in a single product or several which are closely-related. The national markets for these markets are often not big enough to allow firms to continue without exporting.

Current situation

Current development in demand for health services and the ensuing technical advances have an influence on the medical equipment and orthopaedic devices sector. Two developments characterise the current situation:

1) The first essentially concerns small instrumentation: there is a noticeable increase in demand for single-use instruments and for sterilised instruments.

2) The second is a trend towards technical sophistication in large instruments which are now equipped with devices for the collection and processing of information. Moreover, the appearance of new technology is favouring the development of mobile and home treatments.

Because of this, the price of these devices is tending to increase, with investment in these costing far more than in traditional equipment.

Nevertheless, when in use, these devices enable substantial savings to be made in costs: staff needs are reduced because of automation, certain hospital cases can be avoided, and, as a result, the number of people able to benefit from these techniques will increase.

Production and consumption

In 1989, total EC production stood at 5 545 million ECU which amounted to around 30% of United States production and slightly more than Japanese production. Analysis of the evolution of world production between 1980 and 1989 reveals a sharp drop for the EC in the world total (it can be assumed that the total for the Rest of the World is negligible).

Over the period 1980-89, EC production rose on average by 8.4% a year, although this percentage was higher at 14% in Japan and the United States, which can be

explained by the size of the markets within these countries. At the same time, consumption of medical equipment and orthopaedic devices rose by 9.6% a year in the EC. Technological improvements to products and incessant product replacement requirements were the main reasons for this. Budget limitations in hospitals and policies on refunding treatment have nevertheless tended to slow down this consumption, with purchasers of large equipment wary about prices.

External trade

The amount which EC firms export represents a large part of their production: indeed, the size of national markets in Europe and, above all, the fact that the United States accounts for the largest world market share, means that firms are obliged to adopt strategies that are no longer national or Community-directed but worldwide. This explains why exports more than doubled over the period 1980-85. The rhythm of exports then slowed: growth over the period 1985-89 was 33%, i.e. far less than previously.

It should be noted that development has come essentially in trade between Member States, a process undoubtedly helped by technical standardisation within the Community and the more rapid sanctioning of products.

This may explain the decline in the EC

Table 2
Medical apparatus and instruments and orthopaedic appliances
Production, value added and investment

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC	2 685	2 906	3 045	3 504	3 832	4 402	4 624	4 818	5 527	5 545
Index	61	66	69	80	87	100	105	109	126	126
USA (1)	5 609	8 246	11 088	12 923	16 425	18 612	15 196	15 087	16 531	19 377
Index	30	44	60	69	88	100	82	81	89	104
Japan (2)	1 230	1 818	1 938	2 134	2 576	2 902	3 213	3 403	3 876	4 048
Index	42	63	67	74	89	100	111	117	134	139
EC										
Production in constant prices	3 709	3 690	3 507	3 774	4 005	4 402	4 520	4 621	5 184	5 065
Index	84	84	80	86	91	100	103	105	118	115
Value added in current prices	1 482	1 668	1 698	1 968	2 086	2 379	2 474	2 535	2 984	2 991
Index	62	70	71	83	88	100	104	107	125	126
Productivity (3)	22.8	24.6	23.6	25.0	25.0	26.0	26.3	26.7	30.7	29.8
Index	88	95	91	96	96	100	101	103	118	115
Investment in current prices(4)	100	108	105	131	147	207	221	237	N/A	N/A
Index	48	52	51	63	71	100	107	114	N/A	N/A

(1) 1980-86 Census of Manufactures and Eurostat estimates; 1987-89 US Industrial Outlook 1990

(2) Census of Manufactures and Eurostat estimates

(3) Million ECU/thousands employees

(4) Deutschland, France, Italy and United Kingdom

Source: Eurostat (Inde)

trade balance seen since 1985: after rising during the first half of the 1980s, the EC trade surplus, which stood at 585 million ECU in 1985, fell progressively during the second half of the decade to finish with a slight deficit.

This development is due mainly to the sharp rise in imports from outside the Community. It can be explained by more intense competition from large groups, especially American, who pursue very ag-

gressive export policies.

In 1989, EC imports stood at a level of 1 943 million ECU. The slowdown in exports is due to the fact that Community manufacturers are encountering difficulties in exporting: the procedures for sanctioning a product in the United States and Japan are often lengthy and therefore costly. Even within the EC itself, there are barriers to the free movement of products: a Community directive lays down the char-

acteristics which EC products have to show in order to be able to move around freely. However, the United States, for reasons of safety concerning their design, may ban the free movement of some products.

Employment

Over the period 1980-89, employment grew by an annual average of 0.4%. In 1989, total employment in the sector stood at 92 000 people in the EC.

Figure 1
Distribution of world production in the medical and orthopaedic material and equipment sector, 1980 and 1989



Source: BIPE

Table 3
Medical apparatus and instruments and orthopaedic appliances
EC trade in current value

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 (*)
Exports extra-EC	672	803	946	1 113	1 282	1 729	1 766	1 685	1 781	1 953	2 153
Index (1)	36	46	55	64	74	100	102	97	103	113	124
Imports extra-EC	475	612	712	827	990	1 144	1 228	1 332	1 606	1 943	2 095
Index (1)	42	54	62	72	87	100	107	116	140	170	183
X/M	1.4	1.3	1.3	1.3	1.3	1.5	1.4	1.3	1.1	1.0	1.0
Trade intra-EC	459	516	614	726	863	1 039	1 243	1 384	1 537	1 727	N/A
Index (1)	44	50	59	70	83	100	119	132	147	165	N/A
Share of total (%)	40.6	39.1	39.4	39.5	40.2	37.5	41.3	45.1	46.3	46.9	N/A

(1) Taking into account changes in EC membership

(*) Estimates

Source: Eurostat (Comext)

Employment levels in the medical equipment and orthopaedic devices sector fell sharply between 1980 and 1982, due to major staff reductions in the Federal Republic of Germany (2 500 people) and the United Kingdom (1 300 people). Since 1983, there has been a slight rise in employment caused by the upturn in activity. However, since 1980 barely 3 000 jobs have been created in this sector. Over the same period, production at constant prices increased by 3.5% a year, while added value also rose. Therefore, there was an annual improvement rate of 3% in work productivity.

Structure of the sector

The fact that the manufacturers of medical equipment and orthopaedic devices address themselves to narrow customer bands nationally has produced some scattering in this sector: today still, a large number of smaller firms are involved in this market. In France, for example, 189 out of 356 manufacturers employed fewer than 10 people in 1980, while only 28 companies had a workforce of over 100 people. At present, the international dimension of this market has led to company regroupings and firms increasing their size. This is allowing them to reach a sufficient scale

of production for export purposes. Alongside this general trend, the characteristics of firms are a function of the technological intensity of their products and international competition. In the area of so-called "heavy" equipment, namely high-tech and research-intensive, a few large-scale companies are to be found. They compete with American groups, for which this activity may constitute a form of diversification. In the area of so-called "traditional" products, namely ones which evolve slowly in technological terms, firms are not subject to strong international competition and often retail on their national market. This chiefly allows them to serve very specific needs and adapt the characteristics of their products to the demands of users. Within this context, a determinant factor in the success of all these firms today appears to be their distribution. Many firms have until now concentrated their efforts on products rather than towards their clientele. Due to their small size, they often have embryonic distribution networks. Predictably, firms will be required to listen more to their customers and to develop their distribution and after-sales service.

Geographical characteristics

The Federal Republic of Germany is the chief producer country for medical equipment and orthopaedic devices in the EC, with 51% of total production. France and the United Kingdom each produce 16% of the total in the Community, followed by Italy (11% of the EC total). The Federal Republic of Germany has a very dynamic domestic market which is favoured by the policy of refunding treatment. For example, it is estimated that equipment for dental practices is renewed twice as often as in France. There are a few companies to be found in the Federal Republic of Germany with a high capacity for research, such as the medical division of Siemens, whose products range from equipment for dentist practices to medical imagery. French firms in this sector have a great capacity for technical innovation. However, their image abroad is a bad one, due to a lack of distribution networks and the poor quality of their after-sales service. Italian manufacturers export in the area of surgical instrumentation and compete with other European manufacturers by keeping their prices highly competitive. The distribu-

tion of world demand for medical technologies shows how important exports are for European manufacturers, with the United States and Japan accounting for two-thirds of the world market.

The concept of "medical technology" does not cover simply medical equipment, but also includes electronic medical products. The global distribution pattern for medical equipment alone is not known.

Forecasts

In 1989, the EC trade balance in the area of medical equipment and orthopaedic devices showed a deficit for the first time.

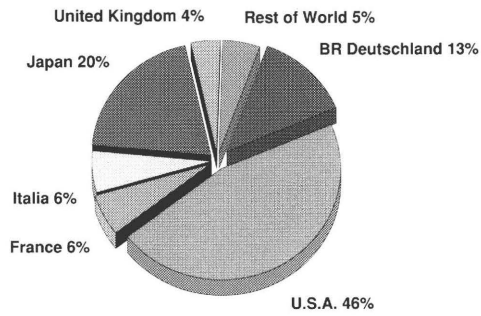
What we are actually witnessing is the intensification of competition worldwide, linked closely to changes in exchange rates (chiefly the dollar rate).

However, a continued growth in business is predicted for firms in the Community, who, to be competitive technically, will have to pursue their efforts to improve products in the areas of automation and information transfer.

This effort will have to be accompanied by a strengthening of product distribution.

"Bio-equipment" is the most buoyant sector of this market: it is used essentially for

Figure 2
Medical apparatus and instruments and orthopaedic appliances
Medical technology world market shares



Source: BIPE

Table 4
Medical apparatus and instruments and orthopaedic appliances
Forecasts

(million ECU)	1989	1990	91/90 % var	92/91 % var	94/89 % var
Production incurrent prices	5 545	5 573	+1	+1	+0.8

Source: BIPE

prostheses, which is currently tending to develop due to a growing number of cases involving surgery.

As far as research and the design of new products are concerned, the keys to suc-

cess are official approval, cost and co-operation between teams of surgeons and industrialists.

Written by: BIPE

Optical instruments and photographic equipment

The EC has a relatively small share of world production in optical instruments and photo equipment, with total production in 1989 of 5 358 million ECU. The real world leaders in this sector are the United States and Japan.

At present, the EC is improving its position in this field, since it is the only region in the world to have registered positive growth rates in this area of business since 1985. This growth in production has come with the development of trade between Member States. Firms in this sector have in fact ceased to address their national markets alone, the sizes of which are in places insufficient, and most have become strongly export-orientated.

Description of the sector

The optical instruments and photo equipment manufacturing sector includes the following activities:

- ❖ manufacture of spectacle glasses and frames, spectacles and optical precision instruments
- ❖ manufacture of optical precision instruments
- ❖ manufacture of photo and cinematographic equipment. These activities show different production and demand characteristics in different parts of the EC, which is why they will be examined separately as far as possible.

Current situation

Demand placed on the optical instruments and photographic equipment sector is determined by different elements; In the ocular optics field, demand is dependent on the number of people wearing correc-

tive glasses (around two out of five persons in EC countries), and also on refund policies practiced by social security systems.

Due to the growth in the number of people wearing spectacles, demand for these products has developed strongly. As a result, there has been a strong increase in sales of glasses and spectacle frames. This has produced diversification in the spectacles offered. These are no longer simply tools for seeing with, but are now fashion accessories. The differentiation in these products has, therefore, led to higher prices, and this explains the market's current intense dynamism. In the optical instrument field, demand stems from the need to renew installations and acquire more efficient means of testing than those used in the past, which is where optics technology comes in. Some optical instru-

Table 1
Optical instruments and photo equipment
Photo equipment rate in private
households in different countries

	%
USA	90
Japan	85
BR Deutschland	81
France	73
United Kingdom	73
Italia	73

Source: Syndicat Français des Industries Photographiques et Cinématographiques

ments have taken the place of traditional techniques. Thus, in industrial controls, certain optical instruments are capable of taking precise measurements without making contact with the object.

Lasers are now used for soldering and automated sheet cutting in the car industry, aerospace sector and telecommunications. Lastly, in the medical field, optics today are making it possible to perform endoscopic surgery.

In photo and cinematographic equipment, price variations play a determinant role, chiefly as choosing between products made in the EC or in South-East Asia is concerned.

Statistics such as photo equipment rates in private households are another way of explaining demand characteristics, which differ according to country. Thus, for a long time, American and Japanese producers experienced strong business growth which was tied to the strong do-

mestic markets in those countries. At present, demand for photo equipment in these countries is tending to slow down as photo equipment rates are very high.

The Community industry's main presence is to be found in ophthalmic optics and optical instruments. In photo equipment, there are few EC manufacturers still in existence.

Production and consumption

Compared to the growing demand for this type of product, EC production has evolved relatively slowly. This might be explained by the difficulties encountered by Community industry, chiefly in photo equipment manufacturing, where it faces strong competition from Japanese and American manufacturers who account for the lion's share of world production.

In optical instruments, several firms in the Community using state-of-the-art technology export a large share of their production, essentially to industrialised countries.

In the manufacture of these products, the American market is a vital outlet, and Community firms face strong competition from national manufacturers. In other fields where needs and technology are relatively stable, manufacturers' growth perspectives are slowed down by slow product replacement. Lastly, Community manufacturers are number one in the world in spec-

tacles; brands produced by firms, chiefly French and Italian, enjoy an excellent image abroad and are exported strongly. World comparisons reveal that United States production is twice that of the EC and Japan combined. Thus, EC production accounted for only 20% of American production in 1988.

Analysis of how world production has evolved reveals that Japanese and American production experienced growth rates higher than those in the EC between 1980 and 1985. After 1985, however, Community production continued to grow, whereas production by current prices in the United States and Japan fell, which is explained by the maturity of the markets in these two countries. However, this development in the EC has not brought about a slowdown in imports. There is actually little manufacture of certain imported instruments, and EC firms face stiff competition from Japanese and American manufacturers.

Trade

For four years, growth rates in optical instruments and photo equipment consumption have exceeded those in EC production. This explains why the EC balance of payments deficit in this field has deepened. Since 1985, it has tripled to reach 1 307 million ECU in 1989.

Whereas the first half of the 1990s had

Table 2
Optical instruments and photo equipment
Main Indicators, 1980-90⁽¹⁾

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988 ⁽²⁾	1989 ⁽²⁾	1990 ⁽⁴⁾
Apparent consumption ⁽³⁾	2 822	3 049	3 271	3 430	3 822	4 400	4 904	5 442	6 076	6 623	6 873
Net exports ⁽³⁾	- 93	- 415	- 258	- 394	- 334	- 350	- 568	- 753	- 965	- 1 265	- 1 350
Production ⁽³⁾	2 729	2 634	3 013	3 036	3 488	4 050	4 336	4 689	5 111	5 358	5 523
Employment (number)	82 615	77 376	73 799	72 813	74 794	77 449	77 566	76 820	76 007	76 104	N/A

⁽¹⁾ Excluding Belgium and Luxemburg
⁽²⁾ Estimated. Production and employment.
⁽³⁾ 1980: EC9; 1981-85: EC10
⁽⁴⁾ Estimated.
Source: Eurostat (Inde, Comext).

been marked by a sharp increase in trade with countries outside the Community, the second half of the decade has been characterised by a growth in trade between Member States.

It was actually the specialised nature of firms which led these to increase their trade with other EC countries, because the national market for some products was too small, given the technological intensity of this activity and the critical size at which these firms could return profits. Thus, trade between Member States has developed rapidly, with some countries becoming advanced specialists, such as France and Italy in spectacles and Germany and the United Kingdom in precision optics.

However, the Community's balance of payments deficit still rose sharply between 1980 and 1989, moving from 180 million ECU to 1307 million ECU. Competition from Japan (cameras, optical instruments) and Asia in general (spectacles) are the main factors behind this evolution. The Japanese possess the biggest companies,

allowing them to attain critical size and compete with Community producers in terms of quality/price ratios.

In photography and/or microscopy especially, firms such as Canon, Nikon and Olympus are extremely efficient at exporting, and their size allows them to spend large amounts on marketing and research and development while staying very competitive in price terms.

In spectacles, Japanese competition is also tending to increase (competition from South-East Asia is more concerned with novelty spectacles and appears to be less fundamental). MITI in Japan have made ophthalmic glasses one of their research and development priorities, in view of the rapidly ageing population.

Employment

Employment levels in the optical instruments and photographic equipment sector have remained virtually the same since 1981: over the period 1980-1989, the number of people employed fell by around 0.9% a year.

The main reduction in worker numbers

was made between 1980 and 1983: in three years, the number of people employed fell from 82,615 to 72,813.

For this reason, workforce productivity in this sector increased significantly by 3.5% a year. At the present time, optics firms are seeking to recruit specialist labour for skills levels from worker up to engineer. In France, for example, the development possibilities in this sector are being hampered by a skills shortage.

Technological developments

The optical instruments and photo equipment sector is expanding strongly, due to an increase in required volumes and technical improvements to products, mainly via the association of optics with electronics, informatics and chemistry. In ophthalmic optics, for example, we have seen a multiple increase in products offered with the development of progressive and organic glasses, and the appearance of new materials for glasses and the formulation of carbon fibre composite materials for frames. Similarly, in photo equipment,

Table 3
Optical instruments and photo equipment and investment

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Production in current prices											
EC ⁽¹⁾ Index	2 817 67.5	2 734 65.5	3 107 74.4	3 158 75.7	3 589 86.0	4 174 100.0	4 336 103.9	4 689 112.3	5 111 122.4	5 358 128.4	5 713 136.9
USA ⁽²⁾ Index	14 237 44.4	19 072 59.5	22 525 70.2	25 643 79.9	31 457 98.1	32 080 100.0	25 345 79.0	22 976 71.6	24 809 77.3	22 322 69.6	N/A N/A
Japan ⁽²⁾ Index	4 233 47.7	6 101 68.8	5 748 64.8	6 674 75.3	7 870 88.8	8 867 100.0	9 346 105.4	8 629 97.3	8 042 90.7	8 289 93.5	N/A N/A
EC ⁽¹⁾											
Production at constant prices Index	3 559 85.3	3 215 77.0	3 431 82.2	3 396 81.4	3 733 89.4	4 174 100.0	4 162 99.7	4 413 105.7	4 707 112.8	4 766 114.2	4 913 117.7
Value added at current pr. Index	1 355 68.3	1 275 64.3	1 487 74.9	1 527 77.0	1 743 87.9	1 984 100.0	2 017 101.7	2 210 111.4	2 397 120.8	2 509 126.5	N/A N/A
Productivity ⁽²⁾ Index	20.9 81.6	19.9 77.7	22.6 88.3	22.7 88.7	24.3 94.9	25.6 100.0	24.6 96.1	26.4 103.1	28.4 110.9	28.6 111.7	N/A N/A

(1) Excluding Belgium and Luxembourg

(2) Census of Manufacturers and Eurostat estimates.

(3) Million ECU/thousand employees

Source: Eurostat(Inde)

Table 4
Optical instruments and photo equipment
Extra-EC trade in current value

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ^(*)
Exports extra-EC	1 471	1 594	1 814	2 040	2 499	2 706	2 504	2 408	2 632	3 076	2 962
Index ⁽¹⁾	54.4	58.9	67	75.3	92.4	100	92.4	88.8	97.1	113.6	109.5
Imports extra-EC	1 651	2 064	2 137	2 451	2 853	3 121	3 225	3 373	3 801	4 383	4 314
Index ⁽¹⁾	53.1	66.1	68.5	78.5	91.4	100	102.4	107.1	120.6	139	138
X/M	0.9	0.8	0.8	0.8	0.9	0.9	0.8	0.7	0.7	0.7	0.7
Trade intra-EC	1 644	1 667	1 822	1 957	2 368	2 491	2 992	3 466	3 579	4 261	N/A
Index ⁽¹⁾	66	66.9	73.1	78.6	95.1	100	118.2	136.9	141.4	168.3	N/A
Share of total %	52.8	51.1	50.1	50	48.7	47.9	54.4	59	56.8	57.3	N/A

(¹) Taking into account changes in EC membership

(²) Estimated

Source: Eurostat (Comext)

there are now cameras which are capable of reacting to change; they store data in their memory and are thus able to compare old data with new. When analysing distance and light, they modify the speed/aperture interface themselves. At present, the first magnetic cameras are appearing on the market; which use a disk instead of a film. It is thus possible to look at photos on a viewing screen, edit them onto a printer and transmit them to recipients using a telephone line. Lastly, in optical instruments, new techniques are to be found, such as the stereo lithograph, which enables mock-ups to be produced via CAO object definition and the use of laser technology.

Structure of the industry

In the European Community, there has

traditionally been a great deal of activity in the manufacture of optical instruments and photo equipment: a large number of modern firms have been in the optics sector since the last century. These firms were often small and have regrouped, since modern technology demanded that production scales be increased. At the present time, their size is tending to increase, with some dependent on large groups, for whom this activity offers an interesting chance to diversify.

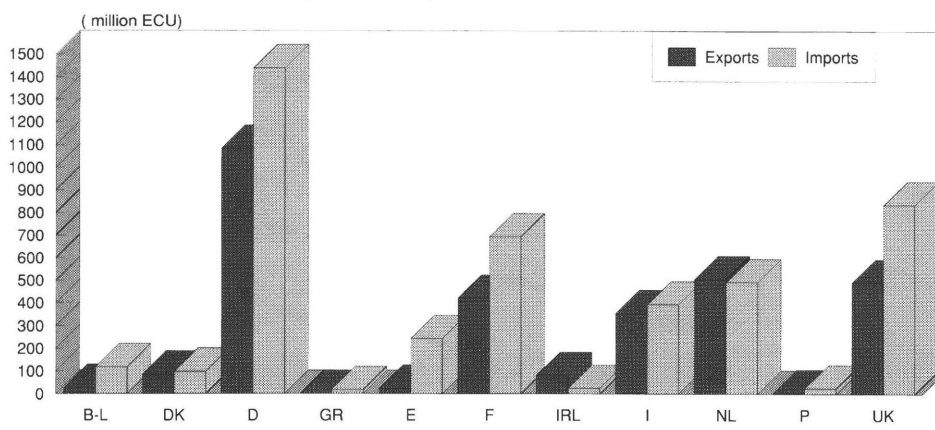
Within the framework of the development of the Internal Market, EC manufacturers are being caused to regroup in order to confront Japanese firms on national markets; in April 1989, the British firm, Cambridge Instruments, and the Swiss firm, Wild Leitz, merged to form a new group,

Leica, specialised in optical instruments and with a turnover of 5.5 thousand million francs. In 1988, Wild Leitz had already taken over one of its main competitors, Kern. This means that Leica (Switzerland / Great Britain) and Zeiss (FRG) are now world leaders in the sector, behind the Japanese firm, Nikon. The French Essilor group is the world number one in ophthalmic optics. Lastly, in the field of cameras, there are few large Community manufacturers. Those that do exist are often highly specialised, such as Angenieux, a French manufacturer of lenses. These large manufacturers are strong exporters, mainly to the Asian market, after establishing themselves in Europe and Asia through production and marketing subsidiaries.

Geographical characteristics

Four countries account for 90% of production: the Federal Republic of Germany (37%), France (25%), Italy (16%) and the United Kingdom (14%). The production figures for the Netherlands are unknown, although this country accounts for a sizable portion of EC trade. In 1989, growth in production was strongest in Spain (up 33%) and in France (up 11%), whereas it fell in

Figure 1
Optical instruments and photo equipment
Exports and imports outside the EC 1989



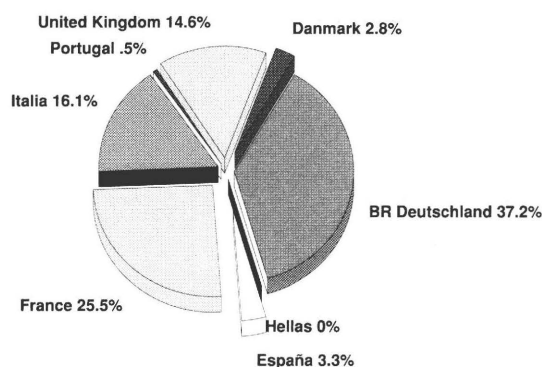
Source: Eurostat

Table 5
Optical instruments and photo equipment
Employment by country

	1980	1981	1982	1983	1984	1985	1986	1987	1988 ⁽¹⁾	1989 ⁽¹⁾
Danmark	1 176	1 249	1 218	1 284	1 447	1 452	1 639	1 747	1 840	1 872
BR Deutschland	32 558	32 193	29 537	27 208	27 479	28 685	29 143	29 461	28 788	28 520
Hellas ⁽²⁾	159	138	134	131	103	88	91	91	89	88
España ⁽³⁾	2 355	2 498	1 884	1 637	1 517	2 615	2 354	2 352	2 298	2 277
France	19 164	16 596	17 296	17 191	18 631	19 014	18 605	18 010	18 096	18 493
Italia	7 514	6 975	6 878	10 193	10 674	10 594	10 820	11 023	10 695	10 596
Portugal	1 175	1 286	1 200	1 163	1 192	1 145	1 184	1 072	1 104	1 094
United Kingdom	15 258	13 266	12 432	10 613	10 368	10 495	10 333	9 684	9 725	9 628

(¹) Estimated
(²) 1986-87 estimated
(³) 1987 estimated
Source: Eurostat (Inde)

Figure 2
Optical instruments and photo equipment
Production by country - Total: 5 358 million ECU



Nederland: N/A
Source: Eurostat (Inde).

Table 6
Optical instruments and photo equipment
Forecasts

(million ECU)	1989	1990	1991/90 % Var	1992/91 % Var	1994/89 % Var
Production in current prices	5 358	5 523	+ 4.0	+ 4.5	+ 4.3

Source: BIPE

Italy. At EC level, specialisation can be observed internationally. While the Federal Republic of Germany manufactures a large volume of optical and photo instruments, France and Italy are producers in ocular optics, mainly spectacle frames. The most important countries in trade outside the EC are the Federal Republic of Germany, the United Kingdom, France and the Netherlands.

Outlook

Firms in the optical instruments and photographic equipment sector are at present facing greater demand from services ranging from "one-hour service" offered by opticians to the adaptation of instruments for certain industries, with user training and after-sales service. As a result, manufacturers are having to confront and adapt to this new situation, at times by setting up

their own distribution networks.

Although a high proportion of firms already export to EC countries and appear well-prepared for 1992, Eastern countries also offer very considerable market potential which the Japanese already have their eyes on, chiefly in spectacles and cameras. Moreover, Eastern countries may constitute interesting industrial partners for other EC producers, due to the low local labour costs.

To sum up, the outlook for growth in EC production is fairly good (+4% annual growth between now and 1994), both in the internal market and exports, due to the renewal of product ranges and the evolutions in optronic technology which regularly widen this industry's outlets.

Written by: BIPE

The industry is represented at European level by: EUROM: European Federation of Precision Mechanical and Optical Industries,
Address: 22-26 Caroline House, Dingwall Road, GB - Croydon CRO 9XF, UK;
tel: (44 81) 681 16 00, fax: (44 81) 681 21 34

Since 1988, EC production of clocks and watches has risen constantly.

This improvement follows a period of stagnation in production and decline in demand by value. This was due to the fall in the average price of watches purchased, as a result of the development of electronic watches.

At the present time, the development of "fashion" watches and the return to more traditional watches explain the good performances in the last two years. The intensification of competition from Asia and Switzerland is set, however, to rapidly alter the structure of the sector inside the Community.

Description of the sector

NACE category 374 includes watches and clocks, instrument panel clocks and time recorders, as well as their components.

This sector includes mechanical, electrical and electronic watches.

These will be examined separately, since trends in price, production and demand vary significantly at times.

Current situation

The time-pieces sector is characterised by a high degree of international specialisation; South-East Asia is an important region in the production of electronic watches at very low prices, while Switzerland is pursuing its specialisation in the field of top-of-the-range mechanical watches.

Table 1
Clocks and watches
Main indicators, 1980-90 (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990(2)
Apparent consumption	2 478.2	2 423.2	2 521.2	2 336.5	2 012.1	2 038.3	2 309.4	2 356.7	2 583.4	2 876.7	3 140.3
Net exports (2)	- 593.7	- 606.8	- 553.5	- 650.1	- 679.5	- 650.8	- 814.3	- 862.6	- 1 055.7	- 1 224.9	- 1 405.3
Production (2)	1 884.5	1 816.4	1 967.7	1 686.4	1 332.6	1 387.5	1 495.1	1 494.1	1 527.7	1 651.8	1 735
Employment (thousands) (2)	55.6	50.9	45.2	33.5	25.1	24.3	24.2	22.7	21.7	22.1	228

(1) Excluding Belgium, Denmark, Luxembourg, and Portugal.

(2) 1980 Greece estimated; 1980-85 Spain estimated.

(2) 1988 and 1989 estimated.

(2) estimated

Source: Eurostat (Inde, Comext)

The EC's own position lies between the two, essentially manufacturing mid-range watches. Given the fact that technical changes in the watches and clocks sector are few, innovations essentially concern the exterior design of watches. The fast-changing world of fashion demands that watch manufacturers constantly adapt to and have a sound understanding of customer tastes. This factor may constitute a disadvantage for EC manufacturers, who are often small in size compared to their competitors. For example, Swiss manufacturers are of international size and operate accordingly, thus allowing themselves better access to this type of information. Thus, the European horological industry faces strong competition from imports which account for over half of European consumption. In electronics, the extent to

which European manufacturers are trailing behind is growing, to the benefit of Japan and Hong Kong, who now achieve 65% of world production by volume in the sector. However, European production continued to increase in 1989 and forecasts for 1990 are optimistic.

Production and consumption

The level of Japanese production (nearly seven times the production value of all the EC countries) can be explained by the large volume of watches sold at low prices, while the value of Swiss production is closely tied to the price of mechanical watches. On this market, with its relatively stable levels of demand, variations in demand can be explained by the characteristics of products purchased in terms of price. Thus, the second half of the 1980s saw growing success for top-of-the-range

watches, after a period of strong demand for digital watches at very low prices. The development of production in constant prices reveals two clearly distinct periods during the 1980s. The first ran from 1980 to 1984, when EC production fell by 13%. The biggest falls were seen in the United Kingdom, Italy and the Federal Republic of Germany. Since 1984, Community production in constant prices has risen at an average annual rate of 1.9%. This upturn is due essentially to the good results registered by France (+ 3.9% a year) and the United Kingdom (+ 7.4% a year). In the same vein, there was an upturn in the consumption of watches and clocks from 1985, after four years of decline. In 1989, Community production rose to 1,652 million ECU but remained below its

Table 2
Clocks and watches
Production

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988(1)	1989(1)
BR Deutschland	918.6	870.2	919.8	949.5	544.0	617.1	640.2	591.2	534.7	564.4
Hellas (2)	1.8	1.7	1.8	1.5	1.2	1.2	1.4	1.3	1.4	1.5
España (2)	25.8	24.1	16.3	15.2	14.5	10.8	11.3	14.8	14.2	19.0
France	468.2	452.5	455.6	457.7	464.1	455.2	517.6	560.5	581.2	623.7
Italia	203.6	183.1	190.8	68.7	109.1	110.5	121.4	110.4	146.5	177.0
United Kingdom	186.0	187.0	268.5	85.7	88.1	85.7	95.1	99.4	119.8	129.5
Total	1 804.0	1 723.6	1 852.8	1 578.3	1 221.0	1 280.5	1 387.0	1 377.6	1 397.8	1 515.1
USA (2)	1 086.0	1 270.0	1 212.0	1 200.0	1 387.0	1 195.0	1 167.0	1 017.0	887.0	N/A
Japan (2)	3 000.0	4 091.0	3 674.0	4 531.0	5 001.0	5 635.0	6 663.0	6 846.0	9 334.0	N/A

(1) Estimated

(2) 1980, 1983-88 Greece estimated; 1986-88 Spain estimated.

(2) Census of Manufactures and Eurostat estimates

Source: Eurostat (Inde)

1983 level; the horological industry in the Community is emerging from the slump, but is facing strong price competition. The price of electronic watches actually fell still further in 1989, due to the fall in the value of the Yen and to the increase in the stocks of the Japanese manufacturers Hattori-Seiko and Citizen, who consequently sought to clear their surplus production.

These phenomena may explain the efforts made by EC producers in terms of quality and brand policy.

Trade

Given its unique position in the horological industry, Switzerland has been incorporated into our analysis. Switzerland actually supplied around 40% of European exports in this sector.

EC imports from Switzerland have more than doubled since 1980, moving from 421 million ECU in 1980 to 1,089 million ECU in 1989.

At the present time, Swiss groups are strengthening their presence on EC markets by charging very competitive prices for product lines in places where they are in direct competition with European manufacturers. Thus, the Société Microtechnique et d'Horlogerie (the manufacturers chiefly of the makes Swatch, Omega, Longines and Tissot) are experiencing mounting success. Hong Kong and Japan are also large suppliers to the EC, together accounting for 33% of imports.

Under the effects of growth in demand and falls in EC production, the trade balance, which was already negative in 1980, has worsened greatly.

Today, net imports represent around half of consumption by value and probably more by volume.

The products which are imported and exported are actually quite different.

This is the case in France which, in 1988, exported 4,468,595 watches at a unit price of 222 Francs, whereas it imported 35,942,944 watches at a unit price of 43 Francs.

The main exporting countries are the Federal Republic of Germany, Italy, France and the United Kingdom.

The share of trade between EC countries has risen since 1980 and stood at around 22% of total EC imports in 1989.

The Federal Republic of Germany largely dominates trade between EC countries, specialising traditionally in the production of mass-produced movements.

In addition, the Federal Republic of Germany has specialised in mid-range products, that is to say those which face the least competition from Asia (low-range) and Switzerland (top-of-the-range).

Lastly, as well as a few movement specialists (watch movements for Porta Micromecanique, clock movements for UTS), the large German manufacturers (Dunghens, Kienzle) are continuing to integrate the various production stages (outlines + movements + assembly), a phenomenon which is tending to disappear in other Community countries, notably in France.

The Italians, finally, who are also large exporters within the Community, appear to specialise in the manufacture of luxury watches (chiefly gold watches).

Employment

The growth in production seen for some years now has led to a slight upturn in employment. However, total employment in the horological sector only accounted for 41% of its 1980 level in 1989, i.e. a 1989 workforce of 22,100 people.

The most tangible falls were seen in Italy (- 77% in nine years), Great Britain (- 73%) and the FRG (- 70%). In contrast, France's workforce fell by only 30% over the period 1980-89. Whilst far-reaching restructuring of the production apparatus was observed by the main EC manufacturers from 1980, based on the growing modernisation of equipment and an increase in apparent working productivity (achieved mainly via redundancies), this development has actually been slower in France. Today, in the face of mounting pressure from low labour cost Asian competition, firms in France are experiencing major difficulties, having delayed this necessary restructuring. At the present time, France's major firms are announcing large cutbacks in employment.

Alongside the movement towards the middle and top ranges (where Switzerland holds the dominant position), the future of European watch and clock production actually lies in the greater rationalisation of its production costs and in substituting the work factor with the capital factor.

Structure of the sector

The horological sector has for a long time comprised a large number of small firms. The intensifying of competition, due to the strong presence of Swiss manufacturers, but especially to the arrival of competitors from Japan and Hong Kong, has placed some European manufacturers in difficulty. Recently, the cost economies made possible by the greater use of sub-contractors, chiefly for movements, have led certain watch manufacturers to modernise their production methods and often abandon totally the production of parts in order to limit themselves to the work of designing products, assembling and retailing to

Table 3
Clocks and watches
EC imports (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Origin										
Extra-EC	1 081.2	1 164.1	1 097.6	1 171.5	1 433.3	1 502.5	1 677.9	1 717.8	2 061.3	2 284.0
USA	15.4	21.0	21.9	18.8	19.2	19.7	17.8	20.8	22.1	27.0
Japan	222.2	261.5	244.7	298.3	360.6	370.5	364.8	283.7	330.6	320.1
Switzerland	420.6	482.0	488.7	498.5	631.8	701.7	782.3	831.5	948.9	1 089.1
Hong Kong	311.5	291.9	243.9	246.5	287.1	280.4	363.9	380.0	451.4	456.1
Intra-EC	344.5	354.3	367.5	388.8	442.7	465.1	514.1	525.9	581.9	626.4
Belgique/België, Luxembourg	11.7	16.9	16.2	21.0	30.3	26.7	35.0	32.7	36.5	44.0
Danmark	1.6	2.4	2.1	1.9	1.3	1.3	1.6	2.3	2.7	3.4
BR Deutschland	163.2	172.9	187.4	197.3	217.7	241.0	265.0	270.7	294.8	298.4
Hellas	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
España	2.3	2.2	2.2	3.2	3.8	3.9	4.3	4.9	11.2	16.8
France	77.4	74.5	65.1	64.5	74.5	84.9	94.8	105.1	117.9	118.5
Ireland	5.5	6.4	5.8	4.9	5.8	8.4	4.6	2.3	1.8	2.8
Italia	30.7	25.3	25.5	26.4	30.4	31.8	39.0	42.4	48.6	51.3
Portugal	1.2	1.4	1.6	1.4	1.5	2.0	2.5	2.1	2.7	3.2
United Kingdom	26.6	23.9	30.1	23.7	29.2	28.6	30.0	29.7	28.7	33.7

(1) 1980 EC9; 1981-83 EC10*
Source: Eurostat (Comext)

Table 4
Clocks and watches
EC Exports (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Destination											
Extra-EC	481.5	559.4	531.8	526.8	669.7	753.7	749.2	733.1	875.5	958.0	984.0
USA	71.3	101.4	86.0	79.4	124.1	165.7	142.9	117.5	117.4	132.2	
Japan	5.8	10.0	8.8	11.9	19.4	18.7	14.9	19.5	24.7	37.0	
Switzerland	128.9	147.5	153.6	174.9	203.0	229.8	224.6	208.9	239.5	267.8	
Hong Kong	32.3	41.8	28.0	31.9	37.4	49.4	61.6	83.6	124.5	126.0	
EC											
Belgique/België, Luxembourg	35.2	33.9	33.9	45.0	44.6	42.9	46.1	46.1	41.7	43.8	
Danmark	12.3	10.4	9.3	10.3	11.3	12.6	12.5	11.6	10.8	11.7	
BR Deutschland	65.1	55.5	55.9	64.5	62.9	68.0	73.8	77.7	88.2	101.5	
Hellas	4.8	6.3	6.7	6.9	7.2	8.3	6.8	5.9	8.5	15.0	
España	25.0	22.4	25.2	23.5	23.1	24.1	30.6	35.4	40.6	44.0	
France	71.3	83.9	104.5	89.3	96.9	91.4	109.7	120.2	104.9	116.7	
Ireland	7.9	8.5	6.9	7.3	7.9	10.5	8.7	7.4	10.3	11.2	
Italia	54.4	48.5	51.5	53.3	61.7	70.2	74.4	81.3	83.2	82.6	
Portugal	6.7	7.3	7.0	5.6	5.6	6.4	8.6	11.4	13.2	17.2	
United Kingdom	62.4	75.0	77.8	86.6	95.4	98.0	100.5	94.5	106.5	99.3	

(1) 1980 EC9; 1981-83 EC10*
Source: Eurostat (Comext)

Table 5
Clocks and watches
Employment

	1980	1981	1982	1983	1984	1985	1986	1987	1988(1)	1989(1)
BR Deutschland	24 851	22 586	20 337	18 618	9 854	10 303	10 062	8 972	8 282	8 461
Hellas (2)	44	43	48	52	52	54	54	37	32	34
España (2)	815	681	590	585	469	280	322	315	276	288
France	13 087	11 616	10 448	9 999	10 046	9 058	9 353	9 015	8 970	9 075
Italia	7 798	7 179	5 521	1 588	2 274	2 129	2 024	1 946	1 738	1 813
United Kingdom	9 032	8 225	8 290	2 704	2 475	2 464	2 383	2 452	2 462	2 438
Total	55 627	50 330	45 234	33 546	25 170	24 288	24 198	22 737	21 760	22 109
USA (3)	23 000	20 500	16 800	14 600	13 400	11 800	11 800	11 800	10 817	N/A

(1) Estimated
(2) 1980, 1983-88 Greece estimated; 1986-88 Spain estimated.
(3) Census of Manufactures and Eurostat estimates
Source: Eurostat (Inde)

jewellers.

Thus, in 1989, the last French firm producing watches, the Cattin company, closed its doors.

Generally, the industry remains the sum of a large number of small firms and a few large companies (that is to say employing a maximum of 700 people), chiefly in the field of mass-produced rough-hewings and movements.

Foreign competition for low-range watches has considerably undermined small firms located in this market who cannot produce on a scale sufficient to make meaningful economies.

Firms manufacturing mid-range products have suffered less at the hands of foreign competition. Constant renewing of product lines and maintaining the quality of watches have allowed them to retain their place in a market where demand is constant and competition low.

Upstream from watch manufacturers, the makers of movements have suffered greatly from the fall in prices which began in 1980. Thus, there are no manufacturers of rough-hewings left in France.

Competitors come mainly from Switzerland.

Faced with the 1992 deadline and the stakes of the Community market, Japanese and Swiss groups have invested in the EC. Thus, the Compagnie Générale Horlogère, a subsidiary of the Hattori-Seiko group, has expanded its presence in France by making large investments.

Japanese and Swiss competition (implantation, price cuts) have become all the more intense with the approaching completion of the Internal Market.

For Community manufacturers, who have nonetheless already greatly internationalised their operations, the future con-

tinues to lie in consolidation. Although clock manufacturers ultimately face little danger, the manufacturers of low-range and, ultimately, mid-range watches will have no alternative other than to join forces in order to compete with manufacturers from Asia.

Thus, France Ebauches, the Community's leading manufacturer of rough-hewings, is, in the face of its current difficulties, seeking alliances with other EC manufacturers.

With the same idea in mind, the Swiss company SMH is taking over the rough-hewing manufacturing part of the German firm Porta, which, like France Ebauches, is experiencing immense difficulties. SMH also intends to pursue its rationalisation of movements production around its 14 factories in Switzerland and France.

In this respect, moreover, it can be envisaged that the restructuring required in the Community watches industry (mainly the manufacture of rough-hewings and movements) will be spearheaded by the principal player from outside the Community, Switzerland.

Geographical characteristics

The production structure per country has undergone great change during the 1980s. From 1980 to 1989, France's share of production in the sector rose from 25% to 41%, whilst the Federal Republic of Germany reduced its production, dropping

from 50% to 37% of the total for Europe.

In France, the horological industry has continued to grow by making considerable efforts in investment. However, it remains exposed to the slump that is even affecting the largest manufacturers like France Ebauches, a company with over 700 employees, which saw a drop in turnover in 1989. Furthermore, several bankruptcies and company takeovers have been observed. In spite of these difficulties, France overtook the Federal Republic of Germany in 1988 to become the main producer in the European Community. The main Community producer countries in the horological sector are: France, the Federal Republic of Germany, Italy and the United Kingdom.

Outlook

The impact of 1992 will be relatively small on the firms in the sector, in as much as some already export strongly to fellow EC countries, whilst others feel that their size prevents them from winning shares of export markets. In the area of trade restrictions, which are generally almost absent in the sector, the forthcoming directive on gold watches should, nevertheless, facilitate trade in these products, since major restrictions still exist in France, Great Britain, the Netherlands, Ireland and the Iberian Peninsula. At the same time, it appears that export opportunities to eastern Europe will be fairly limited over the next

Table 6
Clocks and watches
Forecasts

	1989	1990	91/90 % Var	92/91 % Var	94/89 % Var
Production in constant prices (in million ecus 1989)	1 652	1 735	+ 3.5	+ 3.5	+ 4

Source: Bipe

two years. In the first instance, these markets will open up to those German manufacturers who agree to sell their products at relatively low prices.

Some firms are today experiencing difficulties linked to their smallness of size and to their lack of trained personnel. The inadequacy of distribution, which often involves manufacturers selling directly to jewellers, may act as a brake on the development of small manufacturers, and efforts still have to be made in this field. Consequently, the structure of this sector will probably change in the medium term.

The watches and clocks manufacturing sector is in a phase of dynamic maturity, that is to say a phase in which basic demand is stable and mature, but in which marketing (and at times technological) innovation is re-energising demand around a few products ("fashion" watches, top-range mechanical watches, genuinely precious objects, etc).

Within a context of intense competition, the prospects for growth are rather favourable. Thus, production is set to increase, at constant prices, by around 3.5% to 4% a year between now and 1994.

Written by: BIPE.

The sector is represented at EC level by:

CIBJO: International Confederation of Jewellery, Silverware, Diamonds, Pearls and Stones.

Address: St. Dunstan's House, Carey Lane, London EC2V 8AB, U.K.

CPHE: Permanent Committee of European Watch and Clock Makers Secretariat:

French Chamber of Watch and Clock Makers and Micro-technology.

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