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REFLECTIONS ON THE FUTURE OF THE FERROALLOY INDUSTRY IN WESTERN EUROPE

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ABSTRACT

After briefly presenting the start for the ferroalloy industry in Western Europe the development leading up to the present situation is described. Approximate production figures for silicon, manganese and chromium alloys are given.

The present operating terms for the industry are discussed, and thoughts are given regarding the possible future development.

I am pleased to start this last plenary session of our INFACON7 Congress. According to the program I shall represent Europe. However, I will confine myself to Western Europe, i.e. the countries within the European Union together with Iceland, Turkey, Norway and what is left in the earlier Yugoslavia. With the companies in these countries we have had regular contact during the last 50 years and we know them well..

START AND EARLY DEVELOPMENT OF THE INDUSTRY.

When reflecting about the future it is often useful to start by looking back at what shaped the past: The West European ferroalloy industry as we see it today, dates back to the early part of this century. Basic foundations for our industry was:

- **Closeness to the market**. Until the start of World War II, our region had between 35 - 40% of the global steel production.
- **Abundant supply of Hydro Electric Power.** Actually, for the development of Hydro Power industrial applications like operation of metallurgical plants played a very important role.

Thus, in the Alp region of Europe as well as along the coast and rivers in Scandinavia, ferroalloy plants were erected to serve the growing steel industry of Western Europe. This also triggered an active technological development strengthening our position relative to possible newcomers in other regions of the world.

THE LAST 50 YEARS

After setbacks during and immediately following World War II our industry recovered within a couple of years and then entered a growth period lasting for 25 years, up to the first oil crisis occurring at the end of 1973. During this period the global steel production increased from about 150 to 700 mill. tons per year. The ferroalloy industry expanded accordingly. Many new plants were built. In Norway we erected six new plants. The electrical rating and capacity of the furnaces increased strongly, by a factor of 5. This is shown by the graph in FIG.1.

During these years we also saw a growing tendency to produce Ferroalloys further away from the market, notably in countries possessing the ores, i.e. countries like South Africa, India and Brazil. This development has continued through the last 20 years, a period in which we have had only a modest increase in the global steel production. During these years only two new alloy plants have been built in Western Europe: The Dunkirk plant of Pechiney and the Ferrosilicon plant built by Icelandic Alloys. In the other West European countries a few new furnaces have been built or converted to the production of ferroalloys. Simultaneously some of the less competitive furnaces and plants have been closed.

PRESENT STATUS

The location of the present West European plants for silicon, manganese and chromium alloys are shown in FIG 2. The total production of these alloys in 1994 was in round figures:

TABLE 1. **Ferroalloy production in Western Europe 1994 and 1974**

1000 tonnes gross weight		
Silicon alloys (75% Si)	Manganese alloys	Chromium alloys
700	1100	680
(900)	(2200)	(600)

The numbers in brackets refer to 1974, that is the first year after the oil crisis and the year marking the end of the continuos increase in steel production after World War II.

Table 1 shows that the West European production of ferrosilicon and manganese alloys fell strongly during the last 20 years, 25% and 45% respectively. On the other hand, the production of chromium alloys shows a small increase. For the individual countries the following figures can be quoted:

Ferrosilicon

In 1994 Norway had more than 60% of the West European production whereas EC-12 (The European Union without Austria, Finland and Sweden) represented just 20%, down from 50% in 1974.

Manganese alloys

In 1994 France and Norway had each 35% + of the total production within the region. EC-12's share fell from 75% in 1974 to 60% in 1994.

Chromium alloys

In 1994 the Nordic countries Finland, Sweden and Norway had 70% of the production within the region whereas EC-12 (Italy) represented just 10%.

Balance with the consumption

For ferrosilicon and manganese alloys the production match the consumption within 5-10%. For chromium alloys the production corresponds to about 50% of the West European consumption.

Silicon Metal

Turning to silicon metal I will just mention that the production in 1994 was appr. 210.000 t, 105.000 t from EC-12, 95.000 t from Norway and the balance from Macedonian.

PRESENT AND FUTURE OPERATING TERMS FOR THE INDUSTRY

Market contact - quality standards. As in its early days our industry also today has the benefit of a close contact with the European steel industry. Although its share of the world market has decreased this industry still operate in the fore-front with respect to quality standards and technology regarding the use of ferroalloys. A close supplier / customer relationship has been developed between ferroalloy producers and European steel works - a model which we successfully have applied also with steel makers in other parts of the world.

Energy base. The price of energy is of major importance for the ferroalloys industry. The ability of European plants to compete is therefore highly dependent on the relationship between energy price developments in Europe, and price developments for competitors outside of Europe.

Generally, one can say that the real price of electrical energy has been in decline the last decade. However, increasing consumer demand coupled with increased awareness of global environmental challenges mean that we cannot count on the fact that the real price of energy will continue to fall. There is little reason to expect that competitors of European ferroalloy industries, for example, those in China, Brazil, and the CIS countries, will, in the long run, experience lower price developments for energy than those experienced in Europe.

If we look more specifically at Norway, which is a major player in this area, the picture is strongly influenced by Norway's ample supply of energy and high production of hydroelectric power. Most ferroalloy plants in Norway are located very near a source of hydroelectric power. And as there are significant costs associated with transport of electrical energy to (producers in) alternative markets, it is reasonable to assume that our position will continue to be strong.

To remain in business with future power contracts our industry will need high- productive furnaces and access to first class production technology enabling the plant management to make efficient use of the raw materials and the energy. This focus the attention on "energy recovery" which has been adapted at several plants as was reported during the first technical session of our congress.

Highly efficient process performance. The core of any metallurgical ferroalloy production is to develop processes characterised by consistent and efficient furnace performance, flexible and reliable refining techniques, high yield in all process steps and short lead time from raw materials to delivered finished products.

Key elements in achieving world class performance are:

- Long term reliable sources of quality raw materials and knowledge of various raw materials characteristics.
- Optimal furnace design as well as refining and casting equipment.
- World class maintenance system and reliable monitoring system for critical equipment.
- Trained and educated multi skilled work force operating under good working practices and an important resource for continuous technology development.
- Process control systems based on reliable and detailed instrumentation, process modelling, process operation experience all linked together by a comprehensive IT system.
- IT systems to control the material flow from raw materials to finished products in order to improve consistency, increase yield of in grade products and reduce cycle time.

In summary, world class performance will for the overall business process lead to:

- **Effectiveness,** products and services that meet the needs and the expectations of the customers.
- **Efficiency,** high productivity and elimination of waste.
- **Adaptability,** the ferroalloy producers' capability to handle future, changing customer expectations and special customer requirements.

Environmental Standards. Efforts to improve the environment around our ferroalloy plants started early. Thus, Elkem installed the first experimental filters already in the early 1950s, more than 20 years before filters became mandatory. Now, we have taken this capital burden which eventually all ferroalloy producers in the world will meet. However, we have to realise that the environmental standards are not set once for all. The technical development and aspirations from our society will reflect upon the standards our industry is expected to meet. An example: When filters were required in the 70ies, the particle content in the cleaned gas had to be less than one hundred milligram per Nm3. The filters are not allowed to be out of operation more than 4 % of the total furnace time with power on. We have to be prepared to accept tougher limits in the future.

An other issue coming up is the emission of sulphur dioxide. For the eight Elkem plants the total emission is approx. 5.000 tonnes per year. We may have to reduce this emission which could be achieved by selection of other raw materials, new filtering techniques or by plant closures. We certainly hope that this last remedy shall not become necessary.

The examples I have given above refer to Elkem plants. The situation is more or less the same for the other ferroalloy producers in Western Europe.

FUTURE ROLE OF THE EUROPEAN FERROALLOY INDUSTRY.

Taking into account the operating terms discussed above, it is my conviction that the ferroalloy industry in Western Europe will sustain and continue to develop its position as an important and reliable supplier of quality products to the global markets.

The basis for such industrial development is:

- Most producers have a competitive long term energy base
- Well positioned to major markets and close long term relations with customers, both commercial and technical co-operation, to jointly improve cost effectiveness and product quality of our customers' process as well as for the ferroalloy producer.
- There is still a huge potential to improve our technology and operational practices to improve our processes, leading to cost improvements, higher consistency and productivity.
- Close co-operation between R&D institutions, universities and the producers has been developed in order to speed up the technology process.

The European industry is well positioned to take a leading role in this development. The main barrier for such development is not the access to available technology and equipment but the successfactor will be our capabilities to develop the peoples' knowledge and skills and organisational development in order to apply available technology.

Regarding the expectations and priorities within the producing countries and communities there is not one clear cut picture. For the more densely populated countries in Europe the ferroalloy industry may not mean much beyond the strategic importance for the steel industry and the other customer groups. For the Nordic countries - and possibly some areas in Continental Europe - there is a definite interest in maintaining the ferroalloy industry. For Norway this is obvious when we consider the location of our ferroalloy plants along the coast of the country. Together with our 6 aluminium smelters these 12-13 ferroalloy plants play an important role in maintaining employment and settlement in the many remote communities. The employment effect is not limited to just those working at the plant. Extra services and merchandise supplied by local firms multiply the employment effect of just the ferroalloy plant by a factor of 3. - As an alternative to produce and market ferroalloys we do, of course, have the possibility of exporting power to other countries. This is already taking place to some extent. However, we have to realise that compared with the export of power, production and marketing of ferroalloys does represent a higher net revenue for the country, how much depends on where we are in the business cycle.

CONCLUSION

To conclude I will state that also in the foreseeable future our ferroalloy industry will play an important role for our customers and for our society. But our industry must be able to operate profitably. This could mean adjustments in the structure of the industry, within each producing country as well as between the various countries. This is an important task for the producers in contact with the national and European authorities.

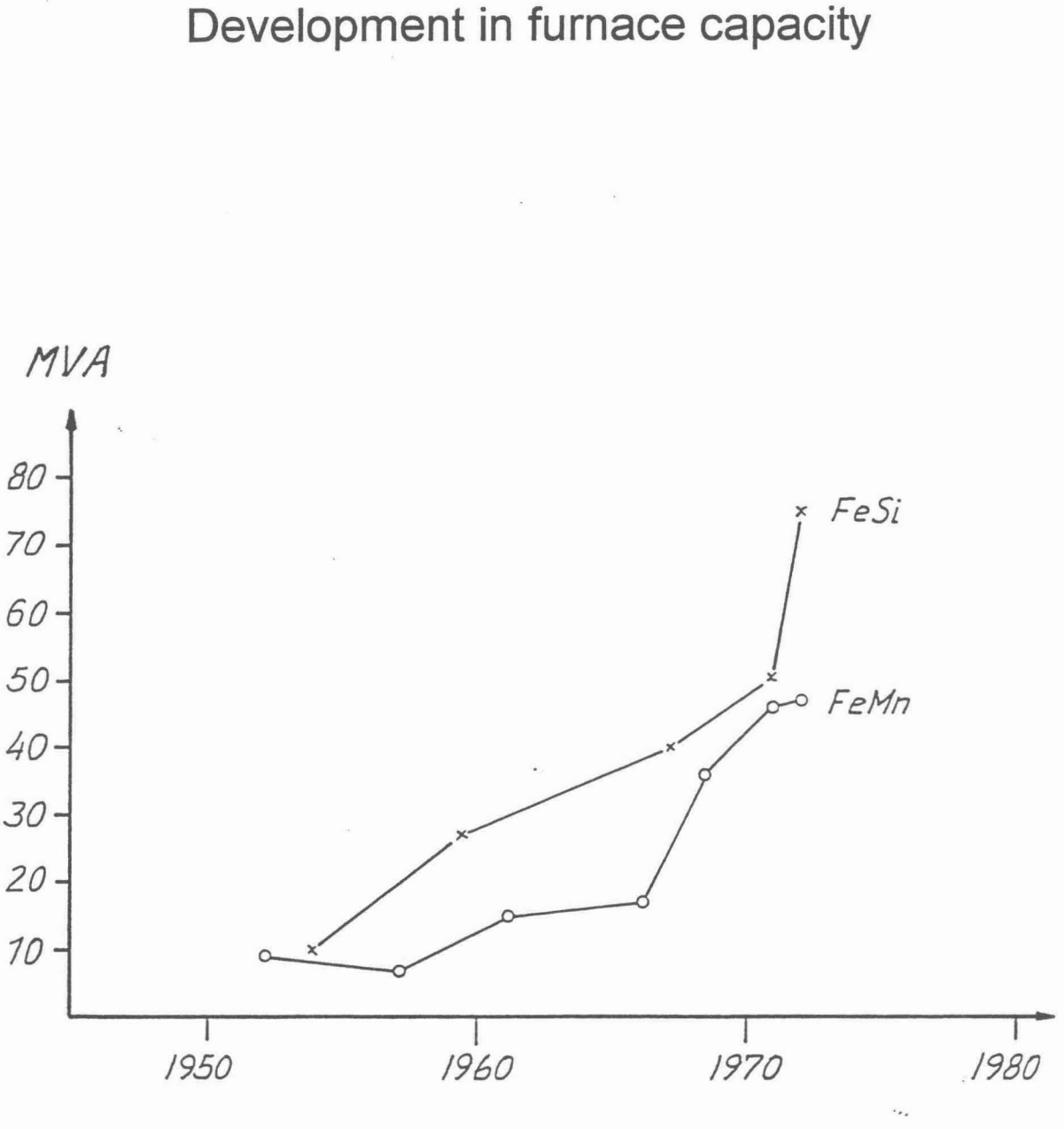
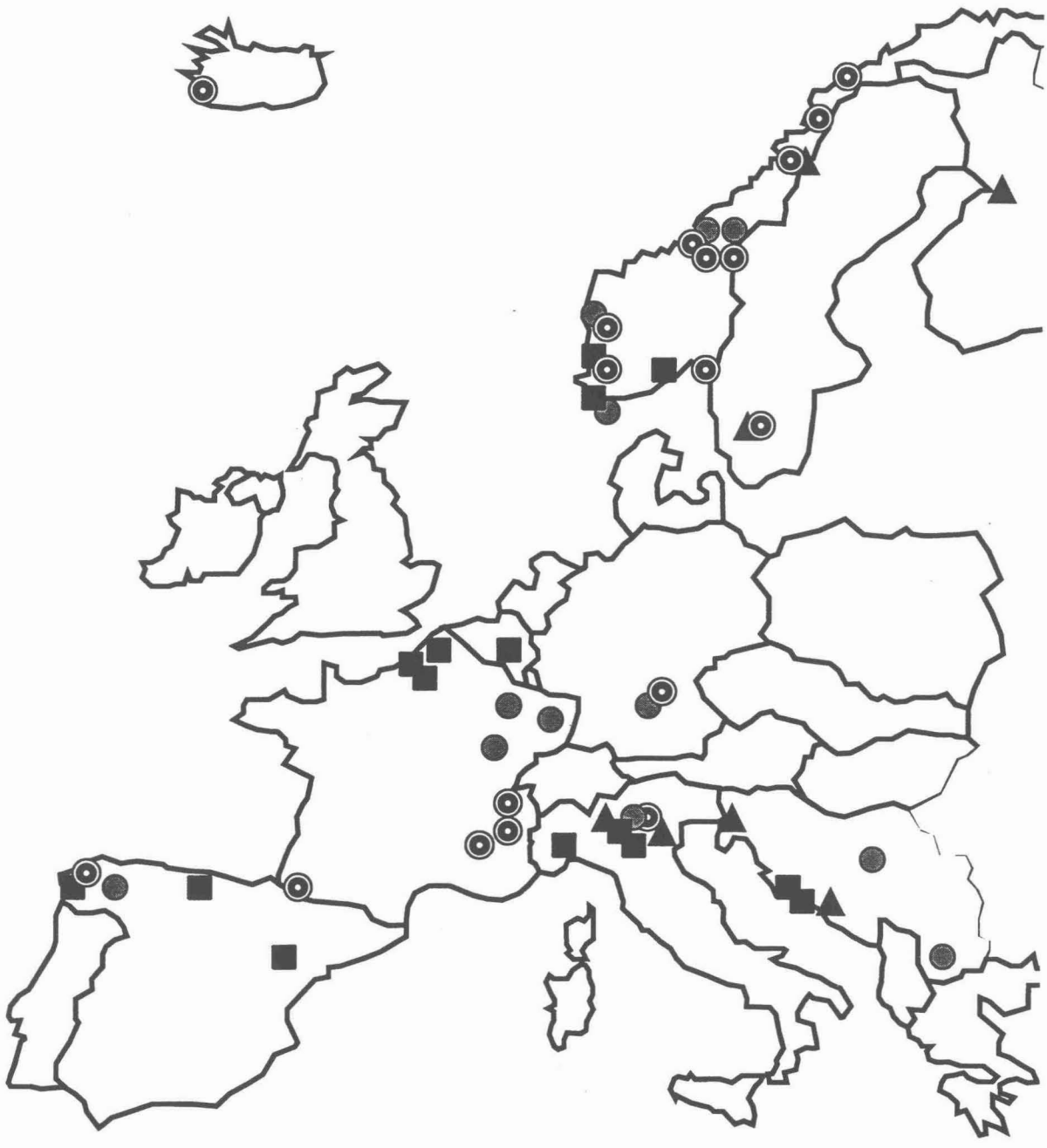


FIG. 1. Electrical rating of the biggest ferroalloy furnaces supplied by Elkem Technology between 1952 and 1972.

The Ferroalloy and Silicon Metal industry in Western Europe



■ Manganese Plants
● Silicon Metal Plants
◎ Ferrosilicon Plants
▲ Ferrochrome Plants