Chairman's Summary—1st Session, Section 3

by P.E. STREICHER*

The first paper, which was delivered by Mr Franke, you will all admit was most interesting. It was on the production of medium-carbon and low-carbon ferrochromium in a newly developed process. This is the first application, to our knowledge, of a bottom-blowing converter for medium-carbon ferrochromium production. The new process involves the use of oxygen in a new bottom-blowing technique in the converter, and it is most interesting to note how many variations and oxygen-blowing processes have come to the front since the AOD process. In this instance, the interesting part is the fact that hydrocarbons are being used as coolants in the process. It shows us how a number of variations can follow from a single idea. It is our opinion that medium- and low-carbon ferrochromium have a future in the production of stainless steel, in view of the anticipated saving in production costs. As I see it, it is due to the fact that the stainless-steel producers require the ferro-alloy producers to do part of their work and thus to share part of the steel producers' problems. Our object as ferro-alloy producers is not only to produce ferro-alloys, but also to make money for our shareholders in the process. This is a point we always have to remember, and I must say that I sometimes have problems in persuading our young technical people to accept this attitude, because to them the new techniques and new processes are the main interest.

In the production of medium- and low-carbon ferrochromium, the lining life of the vessel and the loss in chromium in the slag appear to be the major limiting factors in the development of the process. However, the improvement in lining life caused by the addition of lime is noted, and it is also noted that, by changing the type of lining, improvements could be achieved.

As regards this process, a very interesting possible development is that it could be used for the production of medium-carbon ferromanganese. It is my opinion that this application might have a greater future than the production of medium-carbon ferrochromium. I believe that our friends at G.f.E. are working along these lines, and no doubt, some time in the future, we may have a paper on this particular subject. As you know, there are a few patents in this regard, but the process bristles with problems when one tries to blow the carbon out of high-carbon ferromanganese.

In this country, we as ferrosilicon producers—and I am referring particularly to Ferrometals in the Amcor Group and Rand Carbide—have persuaded our customers to get away from 50 per cent ferrosilicon. To my knowledge, there is only one major consumer of this left in South Africa. The reason why we have persuaded our consumers to use 70 to 75 per cent and 75 to 80 per cent ferrosilicon is the fact that, with such a small demand, when you use one furnace only for production, the change-over from 45 to 50 per cent ferrosilicon to 70 to 75 per cent causes serious problems. Another very interesting aspect is that you have decrepitation of the ferrosilicon if you are not very careful, and therefore a most interesting point is noticed here: it is claimed by Mr Hosoi that in this instance they have no decrepitation of the 50 per cent ferrosilicon.

In our experience in South Africa, it is necessary, in order to prevent decrepitation, for the silicon content to be as close as possible to 45 per cent in the metal.

Another interesting point is the very low aluminium content of the ferrosilicon. In this instance, it is 0,75 per cent. In our country, once again, we have a problem with aluminium content, which is not coming from the quartzite but from the ash of the reducing agent.

The standard grade of ferrosilicon in this country is 2 to 3 per cent aluminium, and this is used most successfully by all the steel-makers in South Africa. I suggest that our friends in other parts of the world should try to persuade the Americans, among others, to use a higher-grade ferrosilicon, and then we South Africans might be competitive in the American market.

Mr Hosoi's paper explains the development of the technique in the making of 50 per cent ferrosilicon by the ore-smelting process. Great care was taken in the design and development of the furnace in order to obtain a stabilized furnace operation. To solve the gas-cleaning problem, and at the same time to use a closed furnace to produce a product of the correct quality, is an achievement.

We note that several patents are held, based on the experience gained in this venture. No doubt, these will be of interest to other producers in this field. Something worth noting is a special feature built into the design of the furnace in order to secure proper control and operating conditions and to ensure the corrective measures at an early stage of detection.

In the chromium field, one of the biggest disturbing factors in the demand for alloys is the availability of scrap. This also relates to ferrosilicon. In this instance, no scrap is required.

The other point I have already referred to is the matter of suitability of the product. This might be the process of the future in places where an abundance of high-silica iron ore is obtainable. Once again, our problem in this country, which makes it most unlikely that we will use this process, is the aluminium content of the iron ores found in South Africa. Generally, the ratio between silica and alumina is 2:1. In this case, if you look for a higher-silica iron ore, you will run into problems with the aluminium content.

Pollution control on ferrosilicon furnaces has become a serious problem – it has always been a serious problem – but it is in the last few years that people have really noticed this. Mr Boegman is the person responsible for air-pollution control in South Africa, and, like all people in this position, he has rather specific ideas about controlling pollution. He has travelled very widely, and I am sure that he will find the papers from our Japanese friends very interesting.

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Now, while silicon producers in general favour a semiclosed furnace with bag-filter arrangement, Joetsu Electric Furnace Industry converted an existing carbide furnace into a closed ferrosilicon furnace with a single-stage venturi scrubber for gas cleaning. There are two aspects, I believe.

First of all, with an open furnace you have no option but to use bag filters. But, if you can operate a closed ferrosilicon furnace successfully – and those gentlemen claim that they do – then you can use a venturi scrubber. In South Africa, of course, we have a problem in so far as we have limited water resources and do not have only the problem of pollution control.

The special features to note from the experience of the Joetsu Company in operating this furnace is the feeding system in order to achieve stabilized furnace operation. The graph indicates the measure of success achieved. What struck me was how they got all these tubes into the furnace, since it actually bristles with feeding tubes. I hesitate to think about all the controls necessary to get an even distribution in such a furnace. No doubt, our friends know what it is all about and have proved that this furnace works, and we must congratulate them on their achievement.

Most interesting are the chemical and mechanical differences between dust particles from an open and from a closed furnace. It appears that the successful way in which the single-stage venturi scrubber deals with the dust load is largely due to this difference in the dust particles. One would expect that, owing to the higher carbon content of the furnace dust in the closed furnace, which is tied up not only with the SiO_2—SiO combination but also with the carbon content.

It will be interesting to know whether the Joetsu Company also considers bigger furnaces on the same basis, and in this instance I am thinking of furnaces of about 50 to 60 MVA.