

学部青葉記念会館において開催の運びとなった。シンポジウム当日は講師の方々が、それぞれ担当された分野の現状や、今後21世紀に向かって予想される情勢変化に対して日本の鉄鋼業界がどのような技術でブレイクスルーしようとしているのかということ、豊富なデータに基づいて分かりやすく話しをして下さり、1時間の持ち時間がまたたく間に過ぎてしまった。また、エネルギー関連のいろいろな鉄鋼材料についての最先端情報をまとめて勉強する機会に接し、大変有意義であったというのが大多数の聴衆のご意見であった。

この様にシンポジウムは大成功であったが、翻ってみるとこれだけの講師を揃えたシンポジウムを東北地区だけで

聞きっぱなしにするのは余りにももったいなく、『鉄と鋼』誌上で全国の会員の方にも知って頂きたいという想いが募ってきた。そこでシンポジウム予稿の内容をさらに充実させた記事の掲載を編集委員会にお願いしたところ快く解説記事として取り上げて頂けることに決まった次第である。誌上をお借りして編集委員会、ならびに筆者の勝手な希望に添えて頂いた執筆者の皆様に篤くお礼申し上げる。

なお、鉄鋼材料軽視の風潮はひとり東北地区だけの問題ではないであろう。全国の有志の皆様とともにこのような草の根活動を地道に続けて行きたいと念願している。

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## The 5th Japan-Nordic Countries Joint Symposium on Science and Technology of Process Metallurgy

Lauri Holappa / Helsinki University of Technology

The 5th Japan-Nordic Countries Joint Symposium on Science and Technology of Process Metallurgy was held on 14-15 September 1992 in Innopoli building, Espoo, Helsinki Area, Finland.

The symposium was organized by Jernkontoret (the Scandinavian Ironmasters Society) and The Iron and Steel Institute of Japan. The practical arrangements were done by the Helsinki University of Technology in cooperation with Jernkontoret. The Japanese delegation totally 18 persons from universities and steel industries was led by Mr. Toshimasa Ando from ISIJ and Professor Minoru Sasabe from Chiba Institute of Technology. Nordic delegation consisted of participants from Sweden, Finland and Norway, totally about 60 persons.

In two days symposium 14 papers from both sides were presented concerning new blast furnace technologies esp. coal powder injection and slag chemistry, refining of ferroalloys and steel, energy saving in heating and rolling, AI-systems and sensors for iron and steelmaking, formation and recycling of dust from EAF and progresses in casting technologies.

The symposium was opened by Mr. Berg, Chairman of the Nordic Countries Organizing Committee. He pointed out the importance of contacts between researchers from universities and institutes and the steel industry as well as the fruitful symposium tradition between Japan and Nordic countries.

Prof. Sasabe, in his opening lecture, gave an introduction to studies on iron- and steelmaking done in Japan by different research organizations. He concluded that the Japanese steel industry has gone through its main growth period and it has, in the future to focus on precise control

of steel quality and cost-cutting measures.

The blast furnace process is now under very active development, injection of coal and other additions, combined with oxygen enrichment as well as further improvements in the BF burden, are gradually changing the traditional image of the BF as a black box and converting it to a dynamic, controllable and flexible reactor.



Director Bertil Berg, Jernkontoret opened the symposium.

Growing demands for production of extra clean steel grades are as driving force for developing new refining methods for complex raw materials and high alloyed melts. Valuable results on removal of phosphorus and other impurities from Cr-containing melts were reported includ-

ing basic thermodynamic and reduction mechanism studies on Cr-containing slags, description of an integrated production route for clean steel as well as upgrading method for ferrous scrap.

Energy saving by direct linking between casting and rolling has been realized in many plants and results were reported. Natural gas as a potential energy source for steel industry was reviewed.

Intelligent systems are coming to iron- and steelmaking, blast furnace control, management and guidance. Examples of the latest development in Japan and Nordic countries were given.

Fluid flow analysis for DC arc furnace, new sensor for gas analysis and a comprehensive study on EAF emissions carried out by Jernkontoret were as well reported.

Better quality has been the main aim in recent development in continuous casting process. Studies on solidification structure, quality prediction and process control were reported as means to get better quality in continuous casting. Problems and solutions in novel casting techniques for direct strip production were also shown.

After the symposium the delegations had an opportunity to visit steel plants in Finland (Rautaruukki Raahen Steelworks, Outokumpu Polarit Stainless Steelworks in Tornio) and in Sweden (Mefos Research Center in Luleå, Sandvik Steelworks, SSAB Oxelösund Steelworks) as well as technical universities in Stockholm (Royal Institute of Technology) and in Helsinki.

In general, the symposium gave an extensive and comprehensive picture of the recent development in science and technology of process metallurgy, mostly related to



Prof. Iwase/Kyoto Univ. at fish market accompanied by Prof. Holappa and Mr. Heikinheimo/Helsinki and Mr. Yamaguchi and Prof. Sasabe/Chiba Inst. Tech.

iron- and steelmaking. Although neither every plant nor institute were represented in this symposium it surely gave a very good overview of the activities going on both in Japan and Nordic countries.

The schedule allowed enough time for fruitful discussions both in the symposium and during the excursions and free time program.

On behalf of all the organizers I dare to say the symposium was very successful thanks to the response of all the participants and the brisk early autumn weather we enjoyed. Best regards, Näkemiin, Sayonara!

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## アーヘン工科大学留学記

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1990年9月より1年9ヶ月間、ドイツ、アーヘン工科大学理論冶金学科のNeuschütz教授の許に留学する機会を得た。

当大学は、ドイツ最大の工科大学であり、学生数4万人は町の人口の10%以上に相当する。大学の町としては、日本でもよく知られているところであるが、実は、観光の町としても有名である。古くは、ローマ時代に温泉が発見され(ラテン語でアーヘンは泉を表す)、今でも、町の中心には公衆浴場がある。その後、カール大帝によりフランク王国の首都として栄え、その戴冠式が行われた教会はドイツ国内でも2番目に古いものとなっている。また、オランダ、ベルギーとの3国国境の町としても有名である。小生は、

当初、アーヘン市内にアパートを見つけることができず、2ヶ月間をオランダの隣町ファールスで暮らすこととなり、毎日国境を越えて通学するという、決して日本ではできない体験を得ることができた。ただし、毎日不審な東洋人が国境を行き来していると思われたのであろうか、何度か警備員に呼び止められ、車のトランクの中まで調べられたのには少し不愉快な思いをした。

小生が滞在していた理論冶金学科は、教授2名、研究スタッフ19名、テクニシャン11名という陣容であり、外国からの留学生も多い。学科には“理論”という名前がついてはいるが、決して机に向かっただけの研究ではない。もちろん、計算熱力学や表面解析のような基礎的な研究も行わ