SLOAN STEEL INDUSTRY STUDY

BENCHMARKING OF RESEARCH IN THE SPECIALTY STEEL INDUSTRY

R. J. Fruehan
A. T. Morales
Carnegie Mellon University
Pittsburgh, PA

Working Paper 051

December 1996
Introduction

Several years ago the Sloan Steel Industry Study at Carnegie Mellon benchmarked the status of research activity in the carbon steel industry both for US and major international companies. This survey proved useful to the industry in that companies could compare their research activities to others and it indicated where gaps in research existed, primarily for major future technologies. A similar, but more limited, study of the specialty steel producers was undertaken. All of the major US producers took part in the study. However, the response from non US companies was disappointing. If, and when, more responses are received this report will be revised, if necessary. All of the information with the exception of the percentage of sales spent on research, which is generally public information, was treated confidentially and the results for the different companies is coded or agglomerated.

Results and Discussion

One method of measuring research activity is percent of sales spent on research; this is given in Figure (1). It is difficult to assess POSCO and Lukens since these are primarily carbon steel producers and research on specialty steels may be misleading since research may be relevant and reported as carbon steel research. For example, POSCO has RIST and POSTECH which does general research and Lukens does generic research on melting refining and rolling which applies to both carbon and specialty steels.

Neglecting these two exceptions, research expenditures are typically between 0.5 to 1.0% which is more than 50% greater than carbon integrated producers and much greater than EAF based carbon producers who spend little on research. It appears that the more value added products produced by specialty steel producers require more technology or else these companies simply can spend more on research because on an average their economic performance has been better than for
carbon steel producers. Carpenter Technology spends the most as a percentage of sales but also produces more high value and specialty products than the others included in this survey. This supports the argument that higher value products generally require more technology and research even as a percentage of sales.

The number of research professionals for the specialty producers was also higher on a per tonne or even sales basis than carbon steel producers. Nearly all of the companies had a relatively large number of highly qualified professionals.

The funding of research was also, in general, different than for carbon steel producers. Nearly all of the funding for research for specialty producers was on a corporate level. Whereas for carbon steel producers it was split between corporate and plant funding. This could be a cultural or strategic difference or simply because for many of the specialty producers only have a single plant.

The distribution of effort between short and long term research is given in Figure (2) for the industry average and for individual companies in Figure (3). On average there is more short term research and problem solving than longer term research for the specialty producers. However, their percentage of long term research and development is greater than for the carbon steel industry. This could be the nature of the higher value product or else the funding mode. In general, when funding is coming from the plants it tends to be shorter term. Corporate research budgeting allows for more strategic and long term research without the need for an immediate payback.

The distribution of research by area (i.e., steel production, product development, etc.) for the industry average is given in Figure (4) and the individual companies in Figure (5). The effort by area differs greatly from company to company. In comparison to carbon steel production less is spent on liquid steel production and more on product development. The carbon steel producers have greatly reduced the cost of producing liquid steel from raw materials, including
scrap, in the past decade. I am not sure if the specialty producers have made similar improvements. Again, one would expect more effort in product development for specialty producers because of the large variations and number of products. Also, a company could expect to obtain a competitive advantage with unique products; this is more difficult for carbon producers to achieve.

The specialty steel industry conducts less cooperative research than carbon producers and it tends to be with one or a few companies rather than industry wide. With the exception of Carpenter all belong to the Center for Iron and Steelmaking Research (CISR) at Carnegie Mellon University. There does not appear to be any other common collaborative research effort. The smaller amount of collaborative research may be the result of the more competitive nature of the specialty industry with respect to highly specialized and proprietary products. However, collaborative research projects on precompetitive non proprietary processes may be a way of leveraging research resources.

The final part of the survey dealt with what technical developments which had to be addressed in the next ten years. Strip casting was mentioned by five of the seven companies. Whereas several companies have programs in this area the major development of these appears to be in Europe, Japan and Australia. Other areas cited by several companies deal with raw materials including scrap and chrome ore and pickling acid usage. There also were concerns about decreasing the cost of liquid steel production and the development of new high strength and tough steels and new ferrite grades. Reducing melting and refining costs and reducing the need for pickling acid appear to be areas for possible collaborative research.

Conclusions

The specialty steel industry has been reasonably profitable in the past decade as compared to carbon steel. The industry typically spends 0.5 to 1.0% of sales on research which is double that for carbon steels. Funding for research tends to be
corporate rather than from plants which apparently leads to a better distribution of work between shorter term assistance projects and longer term research and development projects. Specialty steel producers concentrate more on final product production and product development rather than primary steelmaking. Based on the carbon steel industry experience there may be an opportunity to reduce the cost of steel production for specialty producers. Less collaborative research is done by the specialty steel industry. Possibly collaborative efforts on precompetitive issues such as raw materials and steelmaking may be useful. Long term issues include cost reduction, product development, strip casting and pickling.
List of Figures

Figure 1. Percentage of sales spent on research.
Figure 2. Industry average of research distribution according to duration.
Figure 3. Research distribution according to duration for individual companies.
Figure 4. Industry average of research distribution according to area.
Figure 5. Research distribution according to area by individual companies.
Figure 1. Percentage of sales spent on research.
Figure 2. Industry average of research distribution according to duration.
Figure 3. Research distribution according to duration for individual companies.
Figure 4. Industry average of research distribution according to area.
Figure 5. Research distribution according to area by individual companies.