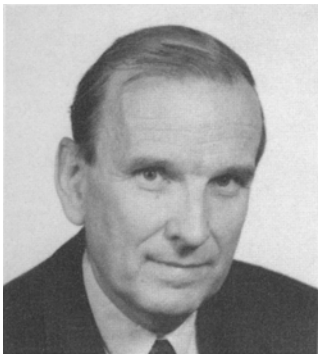
Editorial

Thermal Spray in the Czech Republic



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Despite the fact that all the artificial barriers in Europe fell more than 7 years ago, knowledge about "what is going on there," e.g., in the post-communist countries, often diffuses to the West very slowly. Of course, there are now many participants from these countries presenting contributions at various conferences, but the overall picture is often distorted. I am afraid that the area of thermal spraying (TS) is not an exception.

The Czech Republic (formerly Czechoslovakia) between the World Wars was among the most developed industrial countries of the world. Some of its industrial products were very famous, such as glass, porcelain, shoes (Bata Shoe Comp.), and machinery in general (Škoda Works). Others were rather infamous, like tanks and machine guns (e.g., Bren used during WWII). In the production of all of these products, various techniques of TS had been widely used. A nickname has even been introduced for the TS technique developed by M.U. Shoop, using "Czechicized" form of his name—"šopovani." However, companies were not only users, they also carried out a considerable amount of R&D work.

How many of you plasma sprayers have in your library the book called *Plasma Technology*? This book was written in the late '60s by Gross, Grycz, and Miklóssy (all Czechs) (Ref 1), and is even now regarded by many as the basic book in that field. In the late '60s and early '70s, the first (and so far only) commercially available water stabilized plasma gun (WSP) was developed in Prague by Kugler et al. World-wide patent coverage was secured and in the latter half of the '70s and in the '80s some 20 to 30 systems, called PAL 160, were sold at home and to Japan, Russia, Germany, France, and the U.S. Unfortunately, R&D work on the WSP practically ceased for many years and was only resumed by the Institute of Plasma Physics AS CR (IPP) just a few years ago.

The size of the Czech Republic is approximately 10 million people and circa 79 000 km^2/31 000 sq.miles and there are quite a few TS shops and R&D facilities. These TS and R&D facilities are located primarily in 3 cities. Brno, the second largest Czech city, has two R&D labs at its Technical University and the Military Technical Institute for Protection, and three very well-equipped companies doing shop jobs (APS, HVOF, flame, etc.). In Plzen, famous for the Pilsner Urquell Beer and the machinery giant ŠKODA, there is an R&D lab at the Western Bohemia University and R&D as well as a spraying shop at Škoda-Research, Ltd. (APS, HVOF, etc.). In Prague, there is IPP, which cooperates closely with the Czech Technical University and The Prague Institute of Chemical Engineering. There are also several small job shops scattered throughout the country.

Generally, there are three possible approaches to R&D in TS. One is concerned mainly with the technique as such, developing new guns and spraying systems. Another just uses commercially available systems for materials processing, coatings, etc., targeting a particular application and, as side products, may produce some interesting contributions to R&D. Finally, there is a strictly materials science approach, not concerned with the TS process itself. IPP in Prague has the advantage of having at the same location plasma and materials physicists, materials scientists, designers, and engineers, and therefore a complex approach to TS can be taken there.

In this and the following issue of JTST, several papers originating from the Czech Republic will appear—one is from the Plzen group and the remaining are based on IPP work. However, joint authorship with overseas colleagues suggests many good international ties and indicates the openness of the Czech Republic to international collaboration. The published papers are not fully representative of the work of the authors' labs, but they present a scope of their research—from theoretical calculations and modeling, studying the two most important materials for WSP (alumina and zircon), to the practical evaluation of properties of deposited materials. Results of the plasma physics group at IPP can be found elsewhere (Ref 2).

I do believe that there is a bright future for thermal spraying because, in many cases, a single material cannot fulfill all the requirements of the present day high technology; and therefore composites, FGM, protective coatings, sandwiches, and sprayed self-supporting structures are the answer. All these products either might be manufactured or can only be manufactured by TS methods. Let's keep the pace.

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References

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2. M. Hrabovsky, M. Konrád, V. Kopecky, and V. Sember, "Generation of hydrogen-oxygen plasma in a torch with the water stabilized arc," *Trans. IEEE on Plasma Science*, in press.