

FAST (SPS) Production Systems for the Powder Metallurgy and Ceramics Industry

René Kirchner
 FCT Systeme
 GmbH
 Rauenstein/D
 www.
 fct-keramik.de

FCT Systeme GmbH, located in Rauenstein, Thuringia in Germany is a member of the FCT Group, which today is not only a leader in the development and manufacture of hot presses, gas pressure sintering furnaces, maximum temperature vacuum sintering furnaces and spark plasma sintering systems, but also a world-renowned and competent technology partner for component manufacturers and users in the areas of technical ceramics and powder metallurgy.

One of our most important concepts is the Field-Assisted Sintering Technology (FAST). This technology, also known as spark plasma sintering (SPS), is implemented in various FCT system concepts today. We provide our customers with FAST systems from the lab scale (HP D 5, HP D 25) all the way to the industrial scale (HP D 125, HP D 250, HP D 250/C).

Today's industrial systems are based on maximum pressing forces of 250 t, with resulting maximum component diameters of 300 mm depending on the required pressure and temperature. A fully automatic process with high-precision, freely programmable force and temperature control and extensive data logging of all relevant process data are standard features of the FCT FAST systems. A special feature is the DC pulse power unit, which can generate a broad range of DC pulses and bursts, including continuous DC current.

In addition to maximum process reliability, another especially important aspect of the FCT concept is economical production.

Fig. 1 shows a 2-chamber system (HP D 250/C). In this semi-continuously operating system, the cooling process was separated from the actual sintering process both physically and with respect to the parameters. Additional optimization of process parameters and tool design (multiple tools) can achieve double or triple productivity as compared with conventional system.

Fig. 2 shows the result of an optimized SPS-process for WC targets with a diameter of 200 mm, with an



Fig. 1 FAST 2-chamber system (HP D 250/C)

optimized SPS process for WC-targets with a time of 40 minutes at $\geq 99\%$ theoretical density. The successful implementation of this innovative concept for efficient and economical production was not only a result of the now widely known advantages of SPS/FAST technology, but also of the extensive development activities of FCT in the areas of hardware, processes, tools and materials.

FCT offers its partners a wide range of capabilities (systems engineering

at the FCT Technical Center, FEM calculations of processes and tool optimization, etc.) for tailoring the systems and processes to their individual requirements.

Based on this know-know, FCT Systeme GmbH today is a competent partner for the development and implementation of customized solutions for SPS systems. Maximum customer satisfaction is the basis of our activities, as is also manifested in the extensive range of services that we offer.

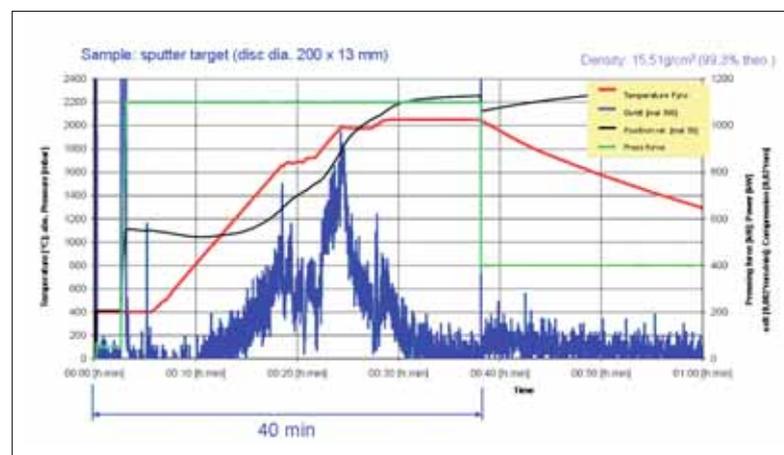


Fig. 2 Optimized SPS- process for the manufacture of binder-less WC targets