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## COMPANY «PLASMA-MASTER Ltd.» IS ON THE WAY OF INNOVATION DEVELOPMENT

The R&P company «Plasma-Master Ltd.» was founded in 1992 by the specialists in the field of technology of welding and surfacing. It has a research and production activity and is specialized on fulfillment of complicated engineering works. The company has several production facilities equipped with advanced welding, surfacing and machining equipment, which in combination with a gained experience of the company specialists allows solving the complicated technical problems. The company staff amounts 40 associates, mainly of research and engineering profile. The company is cooperating with research institutes of Ukraine, first of all with the E.O. Paton Electric Welding Institute of the NAS of Ukraine.

The Editorial Board initiated the interview with Dr. Som A.I., the director of «Plasma-Master Ltd.» company, believing that acquaintance with its effective activity will represent interest to the journal readers.

### **Dr. Som, the company «Plasma-Master Ltd.» is the recognized leader in Ukraine in the field of plasma-powder surfacing (PPS). How was the company founded? What problems were encountered at the initial stages of its foundation?**

As you remember, in the early 1990s the situation in the country was complicated and ambiguous. The disintegration of the Soviet Union, rupture of economic relations and galloping inflation made many people think over: what is next to do? How shall we do? Our activity at the PWI, where I was working by then, had vague prospects. Later, me with a group of young specialists working along with me in the PWI, decided to organize our own company, which was supposed to be more survivable and effective in a rough sea of market relations. The company under the name «Plasma-Master Ltd.» was registered in April, 1992. In the name of the company the word «plasma» implies a source of heating and we were going to work with using the PPS process. At the beginning it was difficult because of the lack of finances, facilities and equipment. But the knowledge and experience gained in the PWI, as well as foreign relations and sponsor assistance, allowed us to get used to the current situation very quickly. And in 1993, we had already delivered the installation for PPS of our own design and separately two new plasmatrions of different design to Germany. This success gave us confidence in our work. Later we encountered another difficulties, life brought also its corrections. Gradually, all the co-founders left the original team, but me, as the director, and the «brand» remained faithful to our business. The company mainly gained its development since 2000, when Ukrainian economy began its gradual revival. At the present time, in spite of objective difficulties, the company remains stable and has broad foreign relations.



### **What are the main activities of the company?**

The basic list of activities is as follows:

- design and manufacture of equipment for PPS as well as technological maintenance;
- design and manufacture of plasmatrions for surfacing of different structures;
- fulfillment of different welding and surfacing works on the orders of industrial enterprises and private entities;
- consulting services on the choice of surfacing equipment and consumables.

### **Dr. Som, after graduation from the welding faculty of the Kiev Polytechnic Institute you worked 18 years at the PWI, defended thesis for the candidate's degree, became a senior staff scientist. It is interesting, what was the topic of your thesis?**

The topic of my thesis, which I defended in 1985, directly related to the development of equipment, consumables and technology of PPS of parts of an intricate shape (screws of extruders).

**It turns out that the basis of the future engineering successes was laid already by then. Over the recent years you have multiplied your knowledge and «know-how» in the field of technology and design of equipment for PPS of complex products. In your opinion, what are the prospects in expanding the area of PPS application, including for 3D technology?**



Geography of equipment delivery



Plasma-powder surfacing is a unique process and has huge prospects. Today, throughout the world a great number of installations of various design and a wide range of surfacing powders were created allowing solving a wide variety of problems of improving the service life of parts. Here the rational use of these developments is important. The limiting factor in extending the field of PPS has always been a lack of plasmatrions having different design. Therefore, we paid this matter the most rapt attention in our work. Today we have created 20 models of plasmatrions of different design and capacity for surfacing the outer and inner surfaces. The advantage of our plasmatrions is high efficiency, low losses of powder and high quality of deposited metal. Our plasmatrions are successfully used abroad as a part of the equipment of other companies. Today, more than 130 plasmatrions were delivered to 25 countries worldwide, including such countries as the USA, Great Britain, Canada, Germany, Italy, Australia, India and others.

Regarding 3D plasma surfacing, it is necessary to fulfill two conditions: to have a high level of automation of equipment and to have plasmatrions with low losses of powder, because a weld pool should be very short. Today, this is absolutely feasible. Therefore, we are expecting a very rapid development of this direction. An effective object of 3D plasma surfacing can be, for example, screws of oil press equipment, where the turns can be grown completely of a wear-resistant alloy.

**You were among the pioneers in the development of hybrid (laser + plasma) technology. What are the prospects of this technology and in what areas?**

That's right. In 1995 a joint work with the Fraunhofer Institute for Laser Technology (Germany) was carried out on this hybrid technology. On our side, a special plasmatron with a hollow cathode was designed and manufactured, and the German side provided CO<sub>2</sub> laser for the research. Plasmatron was designed on the basis of theoretical research carried out at the PWI. The results of experiments were very encouraging. We reached the surfacing rate of 50 m/h at a high spatial stability of plasma arc, that is impossible for conventional PPS. Unfortunately, due to different reasons, this work was not completed. Now this work can be continued in cooperation with the PWI applying new lasers. This method can be successfully used in different branches of engineering both for surfacing as well as for welding, taking benefit from such advantage as a low arc pressure.

**It is known that the products of your company, and among them manual, automatic and robotic installations for PPS, plasmatrions, feeders, oscillators, cooling units, as well as the services on repair and restoration of screw of extruders**

**and other complex and critical products using PPS require integrated efforts in designing, engineering, mechanics, technology, materials science, and others. How did you manage to form a professional team for solving such complex problems?**

The team was formed gradually through natural selection. The main thing in this work is to inspire the personnel to organize the work properly and to pay everybody a decent salary. It is necessary that people be proud and treasure their workplace. It is not easy in our time but we succeeded in something.

**How are the portfolio of orders and such a broad geography of deliveries formed? How is the guaranty and service maintenance provided?**

Today, we dispose such a powerful means of communication like the Internet, therefore, it is not difficult to attract potential customers to our products. It is important to respond timely to their inquiry and be able to manufacture and deliver the things shown on the website on time. We deliver the spare parts through the quick mail UPS, DHL or other carriers. A number of installations with a program control have a remote access via the Internet, so it is possible to adjust the working programs and settings without leaving the office. In some countries we have representative partners (USA, Poland, Lithuania, Republic of Korea), who also provide technical support to our customers. The geography of our partners is constantly expanding.

**Dr. Som, you are a world-class expert, how do you estimate the directions of further development of plasma-powder surfacing?**

This is, first of all, automation process and extension of rational applications. The equipment for PPS can be successfully applied for welding of critical structures using different working gases and shielding environment. It is not difficult to produce powders for this. This represents a very large field for activities.

*Interview recorded by A. Zelnichenko and V. Lipodaev, PWI*

## INTERNATIONAL CONFERENCE «SURFACING — SCIENCE, PRODUCTION, PROSPECTS»

During the period from 16 till 17 June, 2015 the International Conference «Surfacing — Science, Production, Prospects» was held at the E.O. Paton Electric Welding Institute of the NAS of Ukraine.

The organizers of the Conference were the E.O. Paton Electric Welding Institute, International Association «Welding», Association «Elektrod», Society of Welders of Ukraine, Russian Scientific-Technical Welding Society.

About 100 specialists took part in the Conference from Ukraine, Austria, Germany, Lithuania, Poland, Russia and France. 40 plenary papers were presented on the following directions: theoretical problems of surfacing; new surfacing materials; new technological processes of surfacing; experience of application of surfacing technologies in different branches of industry (metallurgy, mining industry, petrochemistry, transport, machine building); equipment for mechanized and automatic processes of surfacing; systems of monitoring and control of technological processes of surfacing; serviceability; service life of surfaced components; standard documents, including those of an international level for fulfillment of surfacing works.

It is possible to find papers of the Conference in a special issue of journal «The Paton Welding Journal» Nos. 5/6, published for the Conference.

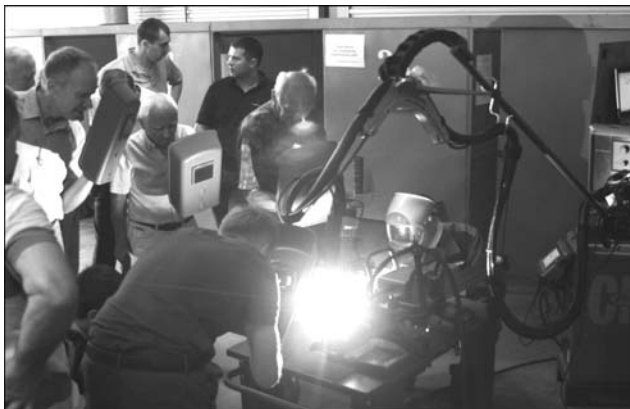
The Conference was opened by Prof. K.A. Yushchenko (PWI), presenting the review paper «Some basic directions in the development of principles and processes of surfacing», in which the attention of the participants was concen-

trated on the new approaches to solution of nowadays problems using surfacing.

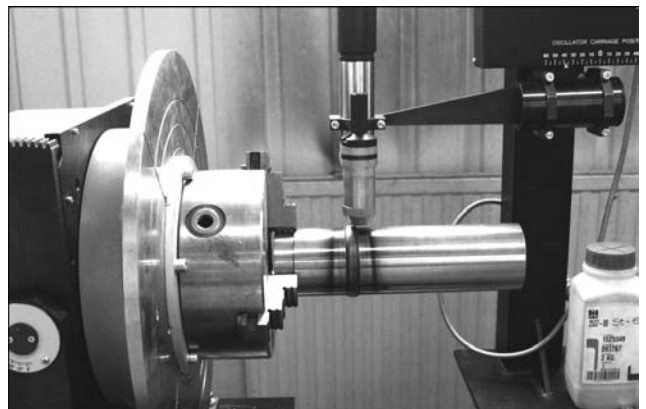
The papers-presentations are to be noted, which presented the great interest to the Conference participants, but were not included into the Proceedings, namely: «Advanced methods of surfacing in industry» by V.L. Bondarenko, K.Yu. Korzin («Fronius Ukraine», Kiev region, vil. Knyazhichi); «Assessment of defects in surfacing» by R. Rosert (Dr. Rosert RCT GmbH, Dresden, Germany); «3D laser additive treatment. New stage of the further development of machine building» by V.S. Kovalenko (NTUU «Kiev Polytechnic Institute»); «Modernization of plasma-powder surfacing process in Kennametal Stellite equipment» by A. Pavlenko, E. Dubinina (Kennametal Stellite GmbH & Co. KG, Koblenz, Germany); «Flux-cored wire for surfacing and repair of parts of carbon-manganese steels» by N.A. Solovej (NPF «Elna», Kiev).

Innovation approaches were presented in two papers of specialists from NTUU «KPI»: «Wear-resistant surfacing with adding of nanooxides into weld pool» by V.D. Kuznetsov and «Capabilities of laser radiation for improvement of electrode wire quality» by S.B. Shevchenko, I.V. Krivtsun, L.F. Golovko, A.N. Lutaj, and V.P. Slobodyanyuk from company «PlasmaTech», Vinnitsa, Ukraine).

From the PWI the larger number of papers was presented by the Department «Physical-metallurgical processes of surfacing of wear- and heat-resistant steels», headed by I.A. Ryabtsev (10 papers) and the Department «Hardfacing



CMT surfacing



Plasma-powder surfacing



The Conference final: voyage along the Dnieper river

consumables and technologies of hardfacing of metals», headed by A.P. Zhudra (3 papers).

During the Conference the exhibition of materials, technologies and equipment for surfacing with samples of products of organizations-participants of the Conference was organized, where the developments were demonstrated of some PWI departments, PWI EDTB, PWI PPWE, as well as of companies TM.Veltek, Vitapolis, Migatech Industry, Navko-Tech, Plasma-Master, PlasmaTech, Fronius Ukraine, Frunze-Elektrod, Elna, ESAB Ukraine.

During exhibition it was possible to make subscription for books and journals in the field of welding and related technologies, published over the recent years, as well as to get familiar with the published collection «Surfacing. Technology. Materials. Equipment» (compiled by I.A. Ryabtsev, I.A. Kondratiev, E.F. Pereplyotchikov and Yu.M. Kuskov). Collection includes 119 articles of associates of the PWI Department «Physical-metallurgical processes of surfacing of wear- and heat-resistant steels», which generalizes and is structuring the many-year experience in the field of research and development of the new methods of surfacing, surfacing consumables, technologies of surfacing and design of surfacing equipment.

On June 16 the operating equipment was demonstrated at the facility of the PWI Inter-Industry Training and Certification Centre: CMT surfacing (Fronius Ukraine); plasma powder surfacing with demonstration of surfaced parts and series of manufactured plasmatrons for surfacing (PlasmaMaster); surfacing with pulsed feeding of electrode wire (PWI Department «Physical-mechanical investigations of weldability of structural steels»).

Over the period of the Conference, on June 16, the Meeting of specialists of enterprises-members of Association «Elektrod» and PWI was held. Discussed were the present situation of activity of the Association and trends in improvement of work and also the coming 25th jubilee since the day of its organizing and the conference on the occasion of its organizing in Rostov Veliky, RF, in 2016. During the Meeting the Agreement was signed about cooperation between the Society of Welders of Ukraine and Association «Elektrod».

The Conference was carried out in creative, friendly atmosphere and finalized by the voyage at the motor ship along the Dnieper river.

*A. Zelnichenko, V. Lipodaev, PWI*

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