MAIN TENDENCIES AT THE MARKET OF WELDING TECHNOLOGIES IN 2008–2011 AND FORECAST OF ITS DEVELOPMENT (Review)

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The data on the state-of-the-art of world production, consumption and market of welding technologies in the period of 2008–2011 and prospects of their further development are presented.

Keywords: *welding technology, production, consumption, market, economy, statistics*

The situation at the world market of welding technologies in 2008–2011 was changing rapidly. Its growth (35 %) in the period of 2007 — the I quarter of 2008 was followed by recession in the II–IV quarters of 2008 (10 %) which increased in 2009 (24 %). In 2010–2011 the growth of sales was observed at all regional and branch markets of welding technologies. However the majority of leading producers of welding technology goods could not achieve the level of sales of 2008.

According to the data analysis given in annual reports of companies — the leaders in producing welding technology goods, the greatest reduction of sales at the world market of welding technologies was observed in 2009. The volume of sales decreased on average by 35–40 % as compared to 2008. For instance, in the II quarter of 2009 ESAB decreased sales of welding equipment by 46 and welding consumables by 38 %, ITW did by 37.5 % in the first half of 2009, Thermadyne — in the I quarter of 2009 by 36 %, Lincoln Electric — in the first half of 2009 by 41 % as compared to the same periods of 2008.

The market growth began in the I quarter of 2010 when the volume of sales increased on average by 0.7 %. In general during 2010 the volume of sales of the leading world producers of welding technology goods as compared to 2009 grew by 13 (Air Liquide), 28 (Voestalpine AG–Boehler), 14 (ESAB), 20 (Lincoln Electric) and 14 % (ITW). In 2011 the volume of sales at the market of welding technologies increased in the first half of the year, and in the III quarter it was delayed. Therefore, the volume of sales of Lincoln Electric increased by 35 % over the 9 months of 2011, ESAB by 18 and Thermadyne by 19 %. In the IV quarter of 2011 the volume of sales was observed to be even more reduced. It is assumed that decrease of the latter at the market of welding technologies will continue also in the I quarter of 2012 [1–4].

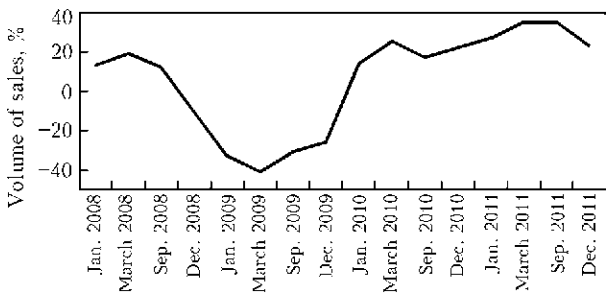

Figure 1. Volume of quarter sales of «Lincoln Electric» for the period of 2008–2011

Appealing to the quarter sales data of the leading world producer of welding technologies — Lincoln Electric (Figure 1), comprising 40 plants in 19 countries of the world and distribution network in 160 countries, it is possible to estimate tendencies at the world market of welding technologies for the period of 2008–2011. The volume of sales of this company in 2011 reached 2.7 bln USD which amounted about 16 % of the volume of sales at the world market of welding technologies [5].

Such fluctuations at the market of welding technologies for the period of 2008–2011 were observed in the time range on the regions and also types of welding technologies (consumables and equipment).

In regional section the greatest sales recession in 2008–2009 was observed in North America and Europe. According to the assessment of ESAB experts, the demand at the American market of welding products decreased by 18 % in 2008 and in the end of 2009 it did more than by 30 % which in total caused reduction of market almost by 50 % during that period. In 2008 the European market decreased less than by 3 % and in 2009 the market abrupt by 26 %. To compare, the demand at the markets of Asia fell only by 1 % in 2008 and in 2009 by 19 %. The markets of China, India, countries of Middle East, South America and Africa remained stable enough though some enterprises were forced to reduce the volume of products [1].

The data from «The Japan Welding News for the World» allow providing an adequate assessment of changes of sales volume in the main regions (countries) and segments of the world market of welding technologies for the period of 2008–2010. Tables 1–3 give data about the volume of consumption of main types

Table 1. Volume (thou t) and structure of consumption of welding consumables on the main world markets

Region (country)	Covered electrodes, %		Solid wire, %		Flux-cored wire, %		Consumables for submerged arc welding (wire + flux) and other, %		Total	
	2008	2010	2008	2010	2008	2010	2008	2010	2008	2010
China	60	57	25	26	4	6	11	11	2600	2700
Europe	13	12	64	56	11	18	12	14	680	540
North America	15	15	58	54	21	22	6	9	520	410
Japan	12	11	47	42	30	35	11	12	365	289
ASEAN countries	51	51	38	35	6	8	5	6	320	260
Korea	14	14	37	34	39	40	10	12	260	210
Russia and CIS countries	58	56	27	26	4	5	11	13	240	200
India	64	59	23	26	4	7	9	8	230	250
Central and South America	54	53	33	32	5	6	8	9	205	185
Middle East	58	59	27	26	5	5	10	10	130	160
Africa	68	62	22	25	4	5	6	8	85	130
Taiwan	30	29	48	46	17	18	5	7	80	70
Oceania	49	49	36	36	6	6	9	9	50	50
Hong Kong	59	58	26	26	5	6	10	10	20	20
									5785	5474

of welding consumables and welding equipment in the regions and countries of the world [6, 7].

The growth of welding consumables for the last years is astonishing. Thus, in 2004 the world consumption of welding consumables in quantitative estimation amounted about 3 mln t [8]. According to the assessment of Japanese experts the world consumption of welding consumables in 2008 reached another peak of 5.8 mln t, thus in four years it increased almost twice. In 2009 as a result of economic crisis the consumption of welding consumables decreased considerably in most countries and regions of the world — first of all in Europe and North America. However in the countries with growing economy (China, India, countries of Africa, Middle East, Turkey, Iran) the consumption of welding consumables continued its growth.

The growth of the world volume of consumption of welding consumables is observed in China and developing countries of the South Eastern Asia (India, Malaysia, Indonesia, Vietnam). China covers almost half of the whole world volume of consumption of welding consumables — 49 %.

The structure of consumption of welding consumables of developed and developing countries is remarkably different. In the developed countries of Europe, America, Japan, Korea the 2/3 of the volume of consumption of welding consumables refers to solid and flux-cored wires. Therefore in Europe, America and Japan the consumption of solid wire prevails, whereas in Korea flux-cored wire. The consumption of covered electrodes in these regions and countries does not exceed 15 % (mainly welding electrodes of special purpose).

In developing countries the volume of covered electrodes is great and varies between 50–60 %. However the structure of consumption of welding consumables in developing countries changes rapidly. In the last years the consumption of solid and flux-cored wires has been growing whereas volume of covered electrodes decreasing. This tendency remained also in the period of crisis 2009. It should be noted that also in developed countries during the period of crisis the decrease of consumption of welding consumables occurred mainly due to decrease of volume of covered electrodes and solid wire, whereas for example in Europe, in general (20 %) decrease of consumption of welding consumables in 2010 as compared to 2008, the growth of consumption of flux-core wire by 30 % was observed.

Though volume of sales grew in 2010, the world market of welding consumables did not reach the level of 2008. In 2011 the world economy, especially in Europe and some Asian countries (Japan, Korea) delayed the tempo of its development which negatively influenced the market of welding technologies. For example, in Japan the volume of consumption of welding consumables in 2011 decreased by 1.2 % as compared to 2010 and amounted 285.6 thou t. It occurred mainly due to decrease of demand on covered electrodes by 3.8 % [9].

The world market of welding equipment recovers very slowly after the crisis of 2009. The consumption of welding equipment in developed countries de-

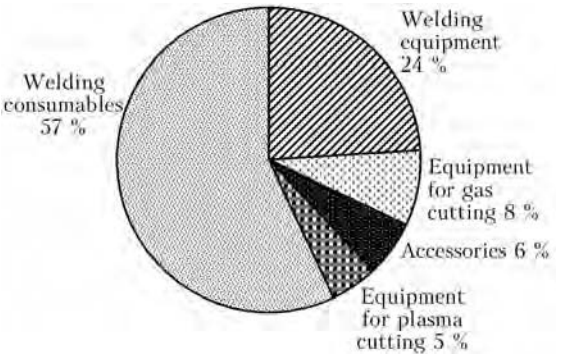

Figure 2. Structure of the world market of welding technologies in 2010 (without shielding gases, means of shielding and abrasive materials)

creased by 40–60 % as compared to 2008. The structure of the world market of welding technologies is presented in Figure 2. The fracture of the market of materials for welding and surfacing in 2010 amounted 57 % and that of welding equipment — 24 %. The leading positions at the market of welding equipment occupy technologies for inert gas arc welding (MIG). Its fracture occupies 40 % of the whole market of welding equipment. This market segment has a quite good dynamics of development, especially automated welding equipment for synergetic MIG welding. This type of equipment surpasses devices for TIG welding in 3–4 times and substitutes them at the market of welding equipment.

The equipment for gas welding and cutting amounts 5–10 % of the market. Its volume is constantly decreasing and, where possible is replaced by electric welding. An exception here is the branch of ship building where applying electric welding is dangerous [10]. The main fracture at the market of welding equipment covers equipment for arc and resistance welding. As is seen from the data of Tables 2 and 3 in 2010 the world consumption of welding equipment for arc and resistance welding amounted in quantitative estimation only 74 % of consumption level of 2008 and in cost one 65 % [6, 7].

The volume of China in the all-world quantitative volume of consumption of welding equipment for arc and resistant welding amounts about 37, European countries — 14, North America — 10 %. In the cost estimation the volume of consumption of European countries — 25, China — 20 and North America — 18 %. The data given above allow estimating the structure of consumption of the main types of welding equipment in those regions. Thus in China and developing countries the demand on cheap arc welding equipment prevails. In the structure of consumption of welding equipment (see Table 2) the volume of equipment for arc welding in China and developing countries amounts in quantitative estimation 98 % and in cost one (see Table 3) — about 90 %. In the developing countries the volume of equipment for resistance welding is considerably higher and amounts relatively 6–8 and 26–34 %.

In 2010–2011 the following tendencies on the regional markets of welding technologies were distinguished. The situation on the market of welding technologies of European countries was diverse. One of the first countries showing its growth of welding technologies market was Germany producing the third part of all welding products in Europe. According to the data of the German welding society, in 2010 it was produced welding technologies for 2.2 bln Euro which overcame the level of 2009 by 7.5 %. The major part of issued production (per 1.8 bln Euro) were machines and devices, however growth of their pro-

Table 2. Quantitative volume (pcs) of consumption of equipment for arc and resistance welding in 2008 and 2010

Region (country)	Arc welding		Resistance welding		Total	
	2008	2010	2008	2010	2008	2010
China	477,000	430,000	8,000	8,500	485,000	438,500
Europe	216,000	150,000	18,000	11,000	234,000	161,000
North America	170,000	108,500	11,500	6,500	181,500	115,000
Japan	120,500	53,150	8,900	3,560	129,400	56,710
ASEAN countries	101,900	67,000	3,400	2,500	105,300	69,500
Russia and CIS countries	83,400	55,000	2,000	1,400	85,400	56,400
India	78,800	65,000	2,100	2,300	80,900	67,300
Korea	72,300	45,000	4,300	2,600	76,600	47,600
Central and South America	69,900	56,000	5,100	4,000	75,000	60,000
Middle East	40,400	36,000	1,000	900	41,400	36,900
Africa	32,000	31,000	700	750	32,700	31,750
Taiwan	26,700	19,500	450	450	27,150	19,950
Oceania	19 000	17 500	500	500	19,500	18,000
Total	1,507,900	1,133,650	65,950	44,960	1,573,850	1,178,610

Table 3. Cost volume (mln USD) of consumption of equipment for arc and resistance welding in 2008 and 2010

Region (country)	Arc welding		Resistance welding		Total	
	2008	2010	2008	2010	2008	2010
Europe	900	589	364	207	1264	796
North America	752	465	242	131	994	596
China	702	589	57	57	759	646
Japan	580	262	156	56	736	318
Korea	163	96	88	50	251	146
ASEAN countries	186	115	31	21	217	136
Central and South America	110	87	47	31	157	118
Russia and CIS countries	136	85	15	11	151	96
India	126	100	17	17	143	117
Middle East	106	90	13	11	119	101
Africa	58	54	6	7	64	61
Oceania	57	50	7	7	64	57
Taiwan	41	29	4	4	45	33
Total	3,917	2,611	1,047	610	4,964	3,221

duction reached only 2.7 %. The cost volume of production of welding and filler materials was only 459 mln Euro however growth of production exceeded 31 %. In 2010 the volumes of export of welding technologies grew as well by 25.5 % after recession in 2009. In 2010 Germany exported welding machines and devices at the cost of 1.4 bln Euro (+13.9 % to the values of 2009). Some growth of sales is observed at the market of welding technologies in the countries of Northern Europe, the Netherlands and Great Britain [11].

According to the assessments of Lincoln Electric the volumes of sales in the countries of South Europe (Portugal, Italy, Spain) in the IV quarter of 2011 decreased and prospect of their growth in the I quarter of 2012 is not predicted which is connected with considerable recession of industrial production and growth of unemployment reaching 22 % [4].

Experts from the companies like Frost&Sullivan, ESAB, Lincoln Electric observe noticeable growth of sales at the market of welding technologies in Russia. According to the forecast of Frost&Sullivan the volume of sales at domestic market of this country will grow almost twice in 2017 as compared to 2010, i.e. from 445.4 to 941.2 mln USD. It should be noted that 80 % of welding equipment supplied to the Russian market is low cost group of products and market volume grow due to increasing import of welding technologies unlike growth of domestic products [12].

The market of welding technologies in North America started growing in July, 2009 after remarkable recession. Basing on the assessment of market dynamics in 2009, the experts predicted that level of sales of 2008 would be achieved only in 2013. However sales of large companies (annual volume of sales was 2.0–1.5 bln USD) like Lincoln Electric, ITW exceeded the level of 2008 already in 2010. In 2011 the smaller companies like Thermadyne (annual volume of sales is about 500 mln USD) reached also the level of sales of 2008. In 2011 the market of welding technologies of this region developed very dynamically. For example sales of Lincoln Electric occupying 50 % of the market of North America grew in that segment of the world market in 2011 by 29 % and reached 1.3 bln USD. According to the assessments of experts the average annual growth of market of welding technologies in the USA in the period of 2011–2015 would amount 6.4 % and volume of the market — 7.1 bln USD [13].

The market of welding technologies of Asian region continues active development. The volume of this region in 2010 at the world market of welding technologies grew by 11 % as compared to 2008 mainly due to the markets of China and India. Today China is the leading world producer and consumer of welding technologies. According to the data of Frost&Sullivan the volume of market of equipment for welding and cutting in China in 2010 reached 3.5 bln USD among which 1.1 bln (about 28 %) covers inverter power sources for welding and cutting. The volume of production of inverter power sources is still negligible — it amounts approximately 60–70 % of the level of developed countries. According to the assessment of Chinese experts the share of inverter power sources in 2010 was about 47 % of all equipment being manufactured, while in 2012 it should increase up to 63 %. Moreover, in 2012 the cost of welding equipment products should exceed 4.2 bln USD [14].

The leading manufacturers of goods observe considerable growth of sales at the market of welding technologies in the countries of South America (Brazil,

Figure 3. World market of welding technologies (distribution on regions in 2010)

Venezuela and Argentina). The sales of Lincoln Electric increased in that region by 33 % (up to 157 mln USD) in 2011, the market of welding technologies in the countries of North and South Africa.

The regional distribution of the world market of welding technologies is given in Figure 3. According to the assessment of ESAB specialists the cost value of the world market of welding technologies except of the market of welding robots and means of automation amounted 13.6 bln USD in 2010 [15].

In 2009–2011 the process of regional redistribution of industrial capacities on production of welding technologies of the large transnational companies continued. The investments into the building of new enterprises and purchase of existing ones became regular among the leading world companies-producers of welding technologies in India, China, South America, Eastern Europe and Middle East, facilitating growth, modernization and concentration of industrial capacities in those regions. For example in 2010 ESAB acquired 60 % of shares of Condor Equipamentos Industriais Ltd. leading Brazilian company, producing equipment for gas welding and cutting, and in 2011 — Sychevsky Electrode Plant (Smolensk region), occupying leading position at the market of welding consumables of Russia. Lincoln Electric invested 20 mln USD into development of capacities on production of welding consumables in Chennai (China). The industrial capacity of enterprise grew from 10–15 to 70 thou t of welding consumables per year. Lincoln Electric purchased also 100 % of shares of Chinese company Jinzhhou Jin Tai Welding and Metal Co., producing welding wire. In 2011 Lincoln Electric purchased two enterprises producing welding wire in Russia — Severstal-metiz Ltd. and OJSC Mezhgosmetiz-Mtsensk [1, 4].

The economic crisis gave also an impetus to diversification of activity of number of companies. For example, in November, 2011 it was announced about acquisition of the company Charter International plc. comprising ESAB, British Colfax Corporation, world leader in development, designing, production, sales and service of systems for transportation of liquids [16].

The process of widening (merge) of enterprises producing welding technologies was noticeably activated. It is especially active in China, India and countries of South-Eastern Asia where volume of small and medium business is very high. In September, 2011 Thermadyne announced amalgamation of its enterprises producing of welding technologies in Malaysia and China, and also enterprises producing equipment for plasma cutting in North America. Lincoln Electric amalgamated two enterprises which are located in USA and Canada [3, 4].

From the estimation made by specialists of Boston Strategies International, according to the Herfindahl-Hirschman index of production concentration, the market of welding equipment at the present period is estimated as moderately concentrated having the index 1281 in the IV quarter of 2009. From the forecast the index of concentration 1400 in the IV quarter of 2012 will exceed the level of 1400. This concentration index has already caused anxiety and is regarded as some prevention signal indicating the high probability of market monopolization [17].

As is seen from abovementioned, the period of 2008–2011 was rather complicated for manufacturers of welding equipment. The very quick change in tendencies at the market required adequate reaction from the manufacturers of goods in the sphere of production and management. As the manager of the largest Japanese Kobe Steel Ltd. company noted, the quick feedback on the demands of consumers allows reaching success today. The slogan of the company — Quality product/Technical support/Quick delivery is the formula of success at the present market of the welding equipment [18].

In accordance to the data of investigation carried out by the marketing company BCC Research (USA), the world market of welded products in 2011 was 16.3 bln USD (Figure 4).

It is expected that in 2012 the world welding market will reach 17 and in 2017 — 22 bln USD. The annual rate of growth of market up to 2017 will be 5.2 %. Here, the cost volume of market of welding consumables, shielding gas and protection means will reach 10.9 bln USD in 2012 and will increase to 14.4 bln USD by 2017. Annual growth of this market segment will amount on average 5.7 %; market of welding equipment was 4.5 bln USD in 2011. According to the forecast of BCC Research, its volume will increase up to 4.7 mln USD in 2012, and up to 5.5 mln USD and more by 2017. Annual growth of this market segment will amount on average 3.3 % [19]. The main branches-consumers of welding equipment are construction, transport, power engineering (including oil-and-gas production industry, electric power engineering, petro-chemical industry, production of pipes and construction of pipelines), repair and restoration works. Figure 5 presents average world

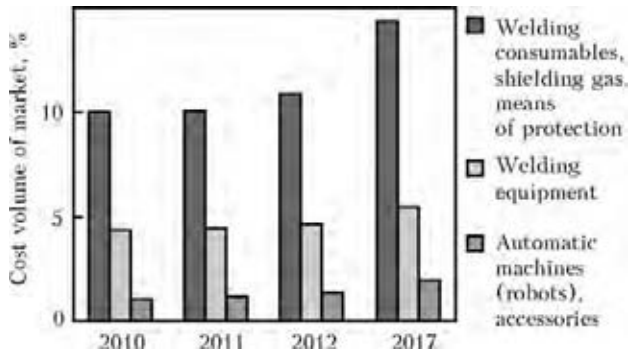

Figure 4. Estimation and forecast of development of the world welding market in 2010–2017

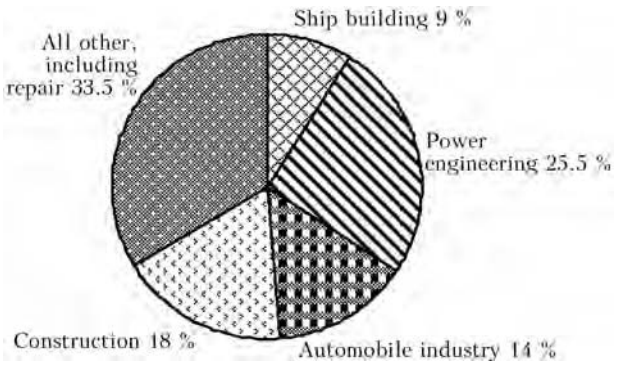

Figure 5. World market of welding technologies (distribution on the main branches of industry in 2010)

values of distribution of welding equipment market between main branches-consumers [10].

Unlike most metal processing branches of industry, having reduced their production, and respectively consumption of welding equipment in the period of crisis of 2008–2009, such branches as electric-power engineering (wind, nuclear, hydro and solar energy, construction of pipelines) and repair/technical maintenance increased the consumption of welding equipment and consumables.

From the assessment of experts of Frost&Sulluivan, the annual growth of market of welding equipment by 7 % is expected by 2015. It is predicted that volume of the market of welding technologies in this field of industry will grow from 1.9 (2008) to 3.0 bln USD (2015) [20]. From the assessment of experts of EASB and Frost&Sullivan the most prospective segment of the market of welding technologies is wind power engineering. Nowadays the volume of the world power production using wind power installations exceeds less than 2 %. However the tempo of growth of capacities is constantly increasing. Thus, the capacity of wind power engineering in the world in 2007 was 27,000 MW and in 2012 it is predicted to increase up to 60,000 MW. The investments into welding equipment of this market segment are constantly growing. From the estimates of ESAB specialists each new introduced 1 MW of capacity consumes 700 kg of welding consumables and 600 kg of welding flux. This market segment has good prospects for the further growth [1]. However in this case there are also more prudent estimates as for development of the market of wind power engineering. The President of ITW company considers that it is not necessary to expect too much benefit from wind power engineering, the rapid growth of the market can occur to be only a splash [2].

In spite of the accident at the Japanese NPS and protesting spirits concerning the development of nuclear power engineering in Europe and North America (USA) in 2012 the construction of two NPSs in South Carolina and Georgia will start. The Saudi Arabia is planning to construct 16 nuclear reactors over the next twenty years. Realization of this and some other projects gives grounds on a good prospect of growth of welding equipment sales in this market segment.

The growth in construction of new main on-land and underwater transnational and transcontinental oil-and-gas-pipelines in most regions of the world predetermined the increase in demand on welding equipment in this market segment. Many companies, for example Lincoln Electric, concentrate their efforts on the development of new types of welding equipment for orbital welding, as well as welding consumables for welding of spirally-welded pipes. From the results of studies of Frost&Sullivan, the world market of welding equipment will grow in this segment in the period from 2009 to 2016 by 45 % and reach 547.7 mln USD [21]. Good prospects of growth at the market of welding equipment and services are predicted by researchers in the sector of repair and technical maintenance [22].

Welding/brazing and surface strengthening (surfacing), as well as different types of thermal spraying (plasma, gas-flame, arc, high-speed gas-flame) are the main technologies among those which are used in the sector of repair and technical maintenance. The share of market of welding equipment and consumables in 2010, as well as forecast for 2017 in the sector of repair and technical maintenance are given in Figure 6.

From the data of investigations carried out by Frost &Sullivan, the cost volume of the world market of welding equipment for repair and technical maintenance was 650.3 mln USD in 2010. Specialists predict that in 2017 the market volume will reach 859.6 mln USD, and its mid-annual increment will be 4 %.

The equipment for arc welding occupies dominating position at the market of repair and technical maintenance. Its share in 2010 was 82.5 %, the share

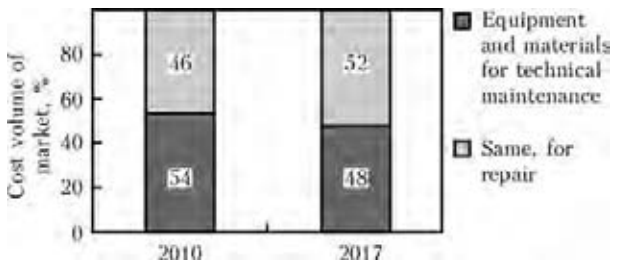

Figure 6. Structure of the market of welding equipment in the sectors of repair and technical service in 2010 and 2017 (forecast)

of equipment for gas welding — 15.8 %, other — 1.7 %. During the period by 2017 the share of equipment of arc welding will grow up to 84.8 %, while the equipment for gas welding will reduce down to 12.8 % in the structure of the market.

The cost volume of the world market of welding consumables for repair and technical maintenance amounted 1755.6 mln USD in 2010. Over the period of 2010–2017 the annual growth of market by 4 % is expected, moreover it is predicted that cost volume of the market in 2017 will reach 2450 mln USD, i.e. the market of welding equipment for repair and technical maintenance will exceed 3 bln USD in 2017.

Thus in spite of periodic recession during economic crises the world welding market continued its growth, development and transformation.

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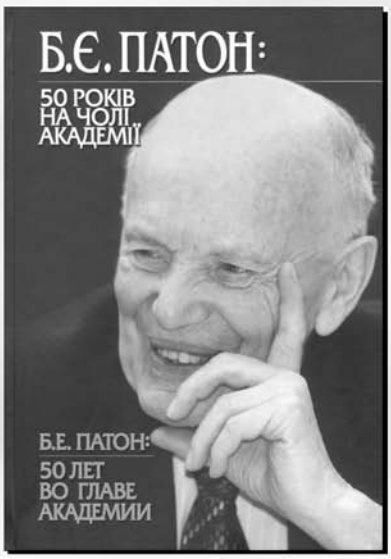
NEW BOOK

(2012) **B.E. Paton: 50 years at the head of the Academy.** — Kyiv: Akademperiodyka, 2012. — 776 p., 136 p. ill. (in Ukr. and Rus.).



The book highlights 50 year of activity of academician Boris E. Paton, outstanding Ukrainian scientist and research organizer, in the position of President of the National Academy of Sciences. Well-known scientists, including academicians A.P. Aleksandrov, G.I. Marchuk, Yu.S. Osipov, N.M. Amosov, Zh.I. Alfyorov, N.V. Bagrov, O.M. Belotserkovsky, P.A. Vityaz, D.M. Grodzinsky, L.V. Gubersky, I.M. Dzyuba, M.Z. Zgurovsky, E.N. Kablov, V.G. Kadyshevsky, N.N. Kudryavtsev, Yu.I. Kundiev, N.P. Laverev, N.V. Novikov, B.I. Olejnik, V.V. Panasyuk, Yu.N. Pakhomov, E.M. Primakov, V.A. Sadovnichy, A.M. Serdyuk, K.M. Sytnik, V.V. Skorokhod, A.A. Sozinov, V.I. Starostenko, B.S. Stogny, V.Ya. Tatsy and P.P. Tolochko share their impressions from their personal communication with B.E. Paton, his great influence on development of science and engineering. The book is illustrated with numerous photos.

It can be useful to all who are interested in the history of science.