

# Russian Welding Technology & Industry – An overview

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In Welding Technology, Russia as part of erstwhile USSR, has had its due share in development over the last century & presently it is upcoming to take its rightful place in international arena. In that context, this overview may be of some interest.

## ■ INSTITUTE-INDUSTRY CO-OPERATION

The Russian Welding Society (RWS), founded in 1993 with HQ in Moscow and 45 Regional Divisions in the main regions of Russia, has its roots in the Moscow Experimental Welding Plant (MEWP) started as early as 1944.

## ■ OTHER WELDING INSTITUTES & PLANTS

Besides the above, Russia is now having (1) The Russian Scientific & Technical Welding Society (founded 1993), (2) CIS Electrode Association; (3) Central Scientific Research Institute of Black Metals; (4) All Russian Railway Research Institute (founded in 1918, having Lab. for special methods of Welding at Moscow; 2500 staff-members including 380 highly-skilled researchers; (5) All-Russia Scientific Research Institute of Hardening & Reconditioning, Moscow, to name a few.

## ■ INDUSTRY

In Russia, JSC Spets Electrode (41, Volgogradskiy Prospect, Moscow 109316 & in St. Petersburg; [www:http://www.spetselectrode.com](http://www.spetselectrode.com)) is the largest Joint Stock Co. in CIS countries.

An ISO-9000 plant, by 2000 it covered 5 factories & 1500 people. Already completed about 16 Electrode mfg. lines to cover over 140 grades of high quality MAW electrodes.

There are over 60 firms, big and small, manufacturing Electrodes, Machines & Accessories. Russian Electrodes are exported to all CIS countries & to Czechoslovakia, Germany, Egypt, Israel, Mongolia, India, Iran, Cuba, Turkey, China, Poland, Vietnam, Iraq etc.

## ■ WELDING PIRACY IN RUSSIA

Small piracy firms are in Russia also, like in Perm, Volgodonsk, Moscow, St. Petersburg & Yekaterinburg.

## ■ WELDING ELECTRODE DEVELOPMENT

Welding Electrode Development in Russia (& erstwhile USSR) is credited to E. M. Kuzmak & I. P. Doronin, for introduction (1937) of an additional 'Metal Material' into the coating of Electrodes to intensify filler fusion. By the second layer of coating of same composition, welding deposit factor increased

double than Electrodes without Iron Powder. As observed by Russians, by another 10 years, world (U. K., France, Germany & USA) saw the development of High performance Iron-powder Electrodes. Between 1950 to 1975 Russians saw Revival period for High performance Electrodes and since then Quiet period continued till the recent spurt of Welding activities (1990-2000). Some other legendary welding Inventors of old days may include (1) N. N. Bernardos, (2) N. G. Slavyanov (3) E. V. Sokolov (4) N. A. Tarkxov (5) I. M. Vagapov etc. while recent Welding Technologists may cover (1) L. P. Moiso, (2) B. P. Burylyov, (3) Prof. U. V. Kuskov (RWS) and others.

## ■ STANDARDS & CERTIFICATIONS

1. R : Russian National Standards (& Ukrainian GOSTS)
2. GAN : Gosatomnadzor Certificate of Russian Federation.
3. MR : Maritime Register of Shipping, Russia.
4. Russian & Ukrainian Ministry of Health Hygienic Certificates
5. Acceptance Certificate of TCD (Technical Control Deptt.), Russia

## International Standards

Along with above Russian (& old USSR) Standards, Industry also follows :

ISO 2560 (based on IIW Commission); ISO/DIN 2560. 2 (1997); ISO3580/3581 : AWS (A5.1); EN 499; T.U.V. as well as relevant AISI, DIN Codes, Lloyd Register (UK) etc.

## Some Russian Welding Standards

1. GOST 9466.2 (1975)
2. GOST 9467 (1975)
3. GOST 10051 (1975)
4. GOST 10052 (1975)
5. GOST 2246

[all amended in 88 & 90]

## ■ "OK" ELECTRODES OF RUSSIA

One series of New Generation Electrodes, with Rutile, Zirconium-basic coating is somewhat unique to Russia (Manufactured by Spets Electrode). These enjoy Welding Deposit Factor : About 12.8–25.6 gm/Axh at average Arc Voltage of 33–45V. Refer Table-1 below.

Choice of Electrodes for Dissimilar Metals & Alloys are also in plenty. Like "Carbon Equivalent", "Chromium Equivalent" (Schaeffler Diagram) is also very popular in Russia.

## ■ WELDING TECHNOLOGIES FOR HARDENING & REBUILDING

Over 50 technological processes are in use. A few may be worth noting:

1. By Plasma Arc Welding Surfacing-over layers
2. By Electric-Arc Metallizing Process for Detailed Restoration & for Rust protection (Most productive Method of Drawing of Metal Covering)
3. By Resistance Welding with Filler Materials for surfacing Journals/Shfts (M/c Power Input : 50 KVA)
4. By Gas Powder Welding / Gas-Torch Surfacing (0.02 Mpa max. Gas Pr.)

## ■ RUSSIAN RAILWAYS & WELDING TECHNOLOGY

Most Interesting Contribution : Continuous Welded Rail Track

without insulated joints, where continuous welded Rail may be as long as open track itself. Advanced Monitoring Systems for operating Safely like Special Purpose Facility (UPPV-1) allowing to relay continuous Welded Rails, while replacing running edge of the rail on curved section.

## Some Other Contributions

1. Hardening & Restoring Tech. by Welding, Hard Facing.
2. Using Rail Rolling Stock Brg. with Hollow Rollers.
3. VNIIZHT developed Dual-Arc Wheel Flange Hard Facing Technique to cope with wheel wear problem. Wheel Flange Plasma Hardening Technique contributes to wear-reduction & to increase wheel life by not less than 35%. Journals are Thermal Sprayed (also involved in solving Cast Iron welding problems).
4. All above save spare parts by 8-10% (Repairing of above 800 Railway parts undertaken).

TABLE - 1 (Russian "OK" Electrodes)

Electrode Grade	Coating	Few Electrode Dia. (mm.)	Coating Mass Factor%	Current (Amp)	Arc Voltage (V)	Output of Electrode Fusion	
						Kg/hr	gm/Axh
OK Femax 33.60	Rutile (P)	4.0	150	150-230	33	3.1	13.5
		6.0		280-450	36	6.4	14.2
OK Femax 33.85	Rutile (P-O)	5.0	220	200-350	40	6.0	17.15
		6.0		300-500	44	9.5	18.5
OK Femax 38.95	Zirconium (Zr-O)	5.0	240	330-400	45	9.0	22.5
		6.0		400-520	52	13.3	25.6
OK Femax 48.15	Iron powder (O)	4.0	125	140-200	—	1.9	9.5
		6.0		220-360	26	3.8	10.5