

## Tube Making in Ukraine and Current Development Trends

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The role of Ukrainian pipe & tube industry, its formation and development in the independent state are shown. The role of individual plants and leading companies in the innovational and investment process of present tube making development is described. Necessity of innovational and investment activity of pipe & tube producers and cooperation with the branch scientific-research organizations to support the product competitiveness in the foreign and home markets is pointed out.

Keywords: TUBE MAKING, INNOVATION PROJECTS, TUBE PRODUCERS

### Introduction

Pipe & tube industry as one of the major components of mining-smelting, oil and gas complexes has a great effect on national economy as a whole. Pipe & tube industry is an important part of metallurgy (including its export potential), ensures operation of fuel and energy industry, building industry, machine industry, municipal engineering and other key economic branches that are the major tube consumers. The state of pipe & tube industry in many respects shows situation in the industry of the whole country.

Traditionally, pipe & tube industry is considered as subindustry of metallurgy producing technologically complicated products. According to the results of last years, Ukraine was in top 10 of leading world tubemakers producing 2.3-2.5 million tons and exporting up to 2 million tons of steel pipes per year.

### Results and Discussion

The primary producer of electrowelded tubes of average diameter mill "159-529" has been reequipped at JSC "InterIpE NTZ" during 2005-2008 in Ukraine.

Scale projects were planned for 2006-2011 and have been started at "INTERPIPE NIKO

TUBE": replacement of sizing mill and reeler, mill "350", long boiler tube processing train, hypersonic and magnetic particle control plant (mill "30-102").

New equipment was installed and welded large diameter tube making was adopted for main gas and oil pipelines: diameter to 1420 mm and wall thickness to 29.0 mm from high-resistance steel of new generation; diameter to 1420 mm and wall thickness to 40.0 mm with one longitudinal seam; equipment for coating pipes with external three-layer polyethylene and internal epoxide anticorrosive layers was installed at JSC "Hartsyzsk Pipe Plant". JSC "Dnepropetrovsk Pipe Plant" carried out a fundamental reconstruction of pipe-rolling plant-80 in 2006-2008.

The direct participant of implementation of these innovative projects at pipe & tube plants of Ukraine is State Enterprise "Ya.Yu.Osada Scientific Research Tube Institute". Besides, the institute in cooperation with other plants has worked out and suggested to implementation new materials and technologies according to the State program of development and reforming of mining and smelting industry of Ukraine for the period till 2011 in the field of tube making. The following are among them:

- sparingly alloyed low nickel (4 %) chromium-manganese heat-resistant steel ЭП838Y

(analogue X40CrMoV511, EN) for thermal power, which increases sulfidic corrosion resistance of tubes (almost in 3 times) and provides stress rupture ductility longer by 10-15 under conditions of using high-sulfur coals, and, as a result, improved reliability as compared to 12X18H12T (analogue 1.4878, EN) steel tubes;

- new steel 06H1 (GOST) with increased corrosion resistance for oil and gas pipes. The experimental batch of these pipes is operated as experimental pipeline at "Akhtyrkaneftegaz" and shows considerably higher (in 5-8 times) durability in aggressive oil-field medium in comparison with pipes currently applied;

- technology of rolled metal and tube making from domestic alloy Zr1Nb for reactors VVER-1000;

- pumping and compression pipe production with strength indexes to P110 under standard API 5CT-2005 with corrosion-resistant coating. Samples of diffusion-galvanized pipes were fabricated from steel 36Г2С (analogue 1135, ASTM).

A number of suggestions related to modernization and reconstruction of current pipe plants were worked out by the institute:

- power saving when hot-deformed tube making on the basis of reconstruction of heating

furnaces (replacement of recuperative heat exchanger and lining, installation of gas burners instead of oil-gas, etc.);

- new tube-straightening machines on the basis of developed straightening technology combining elastic-plastic bending strain along the whole length of pipe and ovalization of its cross-section;

- upgrading equipment for cold-deformed tube making by means of application of ring-shaped calibers instead of calibers-semidisks, which enhances productivity of equipment by 20-30 % and provides cost reduction;

- upgrading cold drawing mills on the basis of long mobile mandrel application (for making high-grade oil country tubular goods with diameter 130-150 mm).

It is necessary to mention that the institute also offers tubular goods manufacturing technology (pressurized gas storage bottles of various size and purpose) implemented already at not metallurgical plants in Ukraine and abroad.

However, metallurgy as a whole and pipe & tube industry in particular were first affected by global financial and economic crisis. Substantial decline of tube production at specialised plants of Association "Ukrtruboprom" (the primary tube producer in Ukraine 80 %) confirms this (**Table 1**).

**Table 1.** Dynamics of steel tube making by plants of Association "Ukrtruboprom" in 2000-2009

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Volume of tube output, thousand tons	1508.4	1496.3	1317.6	1914.8	1817.6	2066.4	2348.8	2293.8	2037.4	1339.4
% in relation to previous year		99.2	88.1	145.3	94.9	113.7	113.7	97.7	88.8	65.7

According to summarized data, the volume of steel tube output in 2009 decreased as compared to 2008 by 34.3 %, and as compared to 2006 (the most favourable year in conjuncture and volumes of output) by 43.0 %. As a whole, decline of tube production from 2.8 million tons in 2006 to 1.7 million tons in 2009 was 40 % in Ukraine. Volumes of tube output in 2009 as compared to 2008 considerably decreased at all pipe plants except for Khartsyzsk Pipe Plant that increased volumes of large diameter welded pipe production by 33.1 % - to 523.2 thousand tons (mainly at the expense of deliveries for pipe connection "Central Asia – China").

Against this background, decrease of pipe production in Russia in 2009 as compared to 2008 seems to be considerably smaller approximately to

18-20 %. Active innovative-investment activity in Russian pipe & tube industry cushioned the consequences of crisis: industrial facilities have been radically modernized, "complex" investment programs have been realised for the last 10 years. Leaders of Pipe & Tube Industry Development Fund noted that level of investments in pipe branch is the highest at the present moment in the real sector of Russian economics and is of order \$200 per ton of finished product. By 2012, the total amount of pipe & tube industrial facilities of Russia will increase to 14 million tons, including 5.9 million tons of large diameter tubes [1].

Implementation of current technologies oriented on satisfying consumer demands allows plants of Russian pipe & tube industry organizing production of competitive products corresponding

to current quality standards. By this time, Russian pipe & tube industry already has all necessary industrial-technological resources for independent implementation of complicated infrastructural projects, scale modernization becomes one of factors defining structure of the world pipe market in the near future [2].

It is necessary to mention that the world experience testifies that level of investments in development and equipment upgrading should be not lower ~ 7 cents per 1 dollar of sent products in order to provide a proper technological level of tube making in view of maintenance of competitive strength of products [3]. Unfortunately, such level of innovative-investment activity at many pipe & tube plants is not observed yet, and there are problems related to absence of necessary volume of current technical resources for proper response to more severe requirements in both foreign and home markets under conditions of the world economy globalization.

Analyzing the primary areas of industry development and consumption of pipes it is possible to mention that now prevailing trend in the world pipe & tube industry is a radical change of "ideology" of competitive strength: transition from a traditional concurrence "price-quality-fulfillment of delivery schedule" to complex deliveries of innovative products and their service during operating period, which corresponds to the strategy of innovation-based development.

In the nearest future, the specified trend will escalate a concurrence in the world pipe & tube market for achievements in the sphere of scientific and technical results, new technologies and equipment [4].

### Conclusions

In this situation, Ukrainian pipe & tube industry needs the state support to implement effective industrial and innovative-investment policy related to complex upgrading and development of branch science. Now, it is necessary to use domestic scientific achievements, i.e. activation of cooperation of manufacture with science. "Ya.Yu.Osada Scientific Research Tube Institute" is ready to cooperate with pipe & tube plants in all directions of pipe & tube industry development, which will undoubtedly promote maintenance of competitive strength of domestic tubeproducers in the world markets.

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### Производство труб в Украине и современные тенденции его развития

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Показана роль трубной промышленности Украины, ее становление и развитие в суверенном государстве. Выявлена роль отдельных предприятий и управляющих фирм в инновационно-инвестиционном процессе развития современного трубного производства. Отмечена необходимость активизации инновационно-инвестиционной деятельности трубных предприятий и сотрудничества с отраслевой наукой для поддержания конкурентоспособности выпускаемой продукции на внешнем и внутреннем рынках.