



Attachment No.7 Horizontal Strip Casting Line



CONSTRUCTION OF THE FACTORY FOR CONTINUOUSLY CAST COPPER WIRE ROD PRODUCTION (CCCWR)

<p>Project title</p>	<p>CONSTRUCTION OF THE FACTORY FOR CONTINUOUSLY CAST COPPER WIRE ROD PRODUCTION (CCCWR) CCCWR implies modern continuous production of thicker copper wire rod product ($\phi \geq 8$ mm). Such products, due to their unfavorable casting structure, are further processed by cold drawing or cold rolling into thinner copper wires, which are used for the production of various types of electricity conductors, and to the greatest extent for the production of electrical cables.</p>
<p>Sector</p>	<p>Energy sector</p>
<p>Location</p>	<p>Gajevi Vrapcići, Mostar</p>
<p>Location description</p>	<p>On the project pictures show the layout and content of the one proposed site (Gajevi Vrapcići, Mostar) for factory building. The three largest CCCWR processors in B&H are located in Western Herzegovina, Distances of the main CCCWR processing plants from the proposed project site are: - Miviko d.o.o Posušje: 37 km, - TT Kabeli d.o.o. Široki Brijeg: 30 km, - Athabasca Investment d.o.o. Tomislavgrad: 93 km So for now, the location proposed for the realization of this project: Business zone "Gajevi-Vrapcići" in the immediate vicinity of the city of Mostar, the center of which is 7 km from the mentioned location Mostar is the largest city in Herzegovina with a little over 100,000 inhabitants. Mostar has a relatively developed industry, especially in the area of aluminium production and processing. There are two universities operating in the city, and Mostar itself has a very active tourism. The main road communication that passes through Mostar is the M17 highway, which is part of the European route E73. The distance from the port of Ploče to the proposed location is 50 km.</p>



	<p>There is an operational local airport 14 km south of Mostar. The significantly larger and more operational Sarajevo International Airport is approx. 130 km.</p>
<p>Project background</p>	<p>This Project is now an expanded Business Idea, which We: three experienced metallurgical engineers from B&H propose to potential investors for further development based on Our experiences and knowledge.</p> <p>Please note that this trio of engineers recently successfully completed the Conceptual Project of continuous casting of brass and tombak strips including their cold rolling, annealing and adjustment. This preliminary project worth approximately 25 million Euros is currently being considered by a potential investor.</p> <p>In the absence of our own company that would promote our attractive Business Idea, we believe that the tasks of promoting the capacity building for the production of CCCWR-wire can be successfully carried out by the B&H state agency FIPA, so we delegated these tasks to them.</p>
<p>Project status</p>	<p>The Conceptual project entitled: "Production of cold-rolled strips based on copper and its alloys" has been completed, which leads us to think about the advantages of forming a center for copper processing where the technological advantages of continuous casting of CCCWR and Cold rolled Strip would be produced at the same time using commercial advantages in the procurement of this scarce Copper metal its better utilization and creation of new products.</p> <p>Production of Cold rolled Strip is also based on continuously casting but here horizontally as is shows in Attachment No.7.</p> <p>Among other things, this Conceptual Project considered and defined:</p> <ul style="list-style-type: none"> - the needs of the own Holding for given Strip (by types, dimensions and qualities) of a well-known customer who is also the bearer of the investment, - Locational and infrastructural needs of the project, - It was considered and defined the technical- technological part of the project, - Offers from renowned European equipment manufacturers were obtained, - The minimum volume of production was defined and the investment value was estimated for that volume, etc. <p>The extended business idea means that it defines:</p> <ul style="list-style-type: none"> - the basic technology of CCCWR production, - the needs of domestic CCCWR consumers, - sources of supply of cathode copper and critical consumables, - a preliminary selection of possible suppliers of basic equipment was made, - obtained a high-quality reference and budget offer from a Chinese company for the delivery of basic equipment, - considered the potential location of the project and dimensions of the facilities on the location. - etc. <p>Note:</p> <p>Overall, we can say that the status of the project has moved far from the concept and is in progress towards the preparation of the Pre-feasibility Study.</p> <p>To prepare this study, it is necessary to have a well-known investor who, as the bearer of the investment, will together with us define the final project task, make the necessary decisions and solve all the problems of the project in its realization.</p>
<p>Project description</p>	<p>None of the 3 producers of copper conductor wires and power cables in B&H produce their basic entry material CCCWR-wire with a thickness of 8 mm. Their</p>



needs for this wire are:

Miviko d.o.o. Dry land.....12,000 t/y
 TT Kabeli d.o.o. Širiki Brijeg.....9,000 "
 Athabasca Investment d.o.o. Tomislavgrad...1,500 "
 Total:.....22,500 t/y

All three B&H conductor wire and cable manufacturers are equipped with machinery to further process CCCWR into thinner copper conductors and cables. The idea of this project is to use modern and basically simple technology to produce high-quality CCCWR in a simple and economical way in one integrated continuous plant.

Our country does not produce raw copper. By directly procuring raw copper in the form of sheet, electrolytically treated cathode copper and by enabling it to be processed into thick CCCWR-wire, we would increase the degree of processing of imported copper at our own capacities, which should lead to more positive financial and foreign exchange effects as at processors as well as in the wider social community.

The process of Up Cast- casting of thick copper wires begins with continuous re-melting of cathode copper in a channel induction furnace or in a special electro-resistant graphite furnace.

From this aggregate, in an integrated process, the copper melt is transferred to the induction-heated, using the principle of connected vessels. The holding furnace, from which the fully prepared melt, with the help of graphite tools immersed in it (graphite molds), which are intensively cooled by water, continuously buoyantly and in several veins, is poured into the CCCWR wire semi-finished product. Thanks to the water cooling of the casting tool, the wire semi-finished product in a sufficiently hardened state, on the principle of drinking from a straw, is automatically lifted upward step by step. In an additional, air-cooled state, the cast wires are directed onto coils of finished thick copper wire. Oxygen in the finished product, during the entire process of melting and preparing the melt for casting, maintains reducing conditions. This is achieved by covering the open melt with charcoal pellets or flakes. In this way, it achieves the casting effect, avoiding the gravitational pressure of the metal on the walls of the tool, thus increasing the working life of the tool and achieving a straight-axis structure of the cast semi-finished product. In order to achieve optimal exploitation life of graphite tools and reduced oxygen content in the finished product, reducing condition are maintained during the entire process of melting and preparing the melt for casting. In this way, the reduction of the content of harmful oxygen in the melt to the level of 2 to 10 ppm is achieved, which oxygen content is retained by the CCWR-wire cast and coiled. The semi-finished product "sucked" from the melt, thanks to the intensive water cooling of the graphite tools for casting, retains a sufficiently clean surface and such finished thick wire is ready for further processing into thinner wires without any prior preparation of its.

Up Cast process was developed in the 70s and it enables the simultaneous casting of several semi-finished copper conductors with a conductor thickness of 8 to 20 (30) mm. Smaller continuous plants for vertical buoyancy casting of wire CCCWR-semi-finished 8 mm thick with 2,4, 6, 8,10, 12 or 14 cores have respective annual productions from 1,000 to 12,000 t/y. Each vessel in this production generally has



	<p>a production speed of max. 3.2 m/min, so according to the number of cast cores of thick wire and their thicknesses, the production capacities of the plant are calculated, for which sufficient capacities for melting raw copper in the form of copper cathodes should be provided.</p> <p>The carriers of the technology of Up Cast continuous casting of copper wires are European companies: Rautomead-Scotland and the Finnish company Up Cast Oy. The only difference between their technologies is the melting method. Rautomead mainly uses a single electro-resistive graphite furnace for melting copper cathodes while Up Ccast Oy uses single or separate channel induction furnaces. Several Chinese companies have been successfully trained for the production of plants with continuous production of CCCWR-wires.</p> <p>For the delivery of the main equipment of such a plant with a production capacity of 6,000 t/y we received their well-developed offer on the basis of which we can embark on an indicative assessment of the value of the investment and the elaboration of the results of the investment. The Chinese company Benteng submitted to us the offer of their plant "SYLZ-6000T Copper Rod Upcast Machine". The technology of re -melting and casting copper is based on a single channel induction furnace Casting of copper wires is done in 12 cores, the wires which are wound on reels in two rows with 6 reels in one row. Casting takes place automatically via a crystallizers (water-cooled molds) at a speed up to 3.2 m/min. There is automatic regulation of buoyant movement and winding of the finished wire. (automatically pulled up). Air-cooled wires are wound semi-automatically forming coils weighing 3 to 4 tons.</p> <p><i>Two SYLZ-6.000T plants from the Chinese company Benteng, parallely installed in one hall. Each of the two plants casts 12 cores of CCCWR-wire with a thickness of 8 to 20 mm and winds them on the available 12 reels, forming coils of finished CCCWR. Both plants produce a total of 12,000 t/y of CCCWR wire.</i></p> <p><i>Note:</i></p> <p><i>The following plant with higher capacity from the company Benteng produces 8,000 t/y working with 14 casting tools. This a plant is 30% more expensive than the previous plant SYLZ-6,000 t/y. This indicates the possibility of a phased implementation of the investment, where in the first phase a larger hall is built and one plant is installed, and in the second phase another or more additional plants are installed in the available hall.</i></p>	
Estimated total investment cost	<p>25 million EUR</p> <p>In the case of building a production hall, supporting facilities and infrastructure for the installation of two SYLZ-6000T plants according to the picture in attachment No. 6, and those two plants are procured and installed, the investment would not exceed USD 1.500.000. Subsequent procurement and installation of an additional plant from the same supplier would cost less than USD 500.000 USD, because there is no need to invest in the hall and infrastructure.</p>	
Form of cooperation with foreign partner	Financial	Technical
	In agreement with a foreign investor	
Supporting information available	For additional information about this project, please contact FIPA either by e-mail: fipa@fipa.gov.ba or phone number: +387 33 278 080.	