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CONCEPT DESIGN

STS Freight Mounted Transport System with the capacity of 100 million tons per annum

Part 1. Executive Summary

103-000000010ES

Sydney — Minsk
2011

The List of Major Implementors

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Contents

1 Introduction

The purpose of this concept design is the development of freight mounted transport system, based on Unitsky String Technologies (STS), which will solve the problem of iron ore haulage in the volume of 100 million tons per annum and even more within logistics chain “ore-dressing plant – sea port stockpile”.

The project is aimed to develop technical and economic issues, which determine applicability and relevance of new STS transport system development and organization of its mass production.

The freight transport system is designed to haul small- and middle lump iron ore over the distance of up to 250 km in Australia and other countries with the same climatic conditions.

Concept design consists of 3 parts:

- Part 1 “Executive Summary” 103-000000010ИПЗ.

Part 1 provides brief analysis of the global market state and also the description of STS 103 transport system, selected according to the results of Part 2 and Part 3 of the Concept Design.

- Part 2 “Design Notes” 103-000000010ПЗ.

Part 2 provides a detailed description of different versions of STS 103 transport system.

- Part 3 “Analyses” 103-000000000РР.

Part 3 provides the calculations and analysis, defining the main parameters of STS 103 transport system.

2 The Relevance of Project Development

The world market of iron ore (see Fig. 1) has recently become one of the most fast-growing markets. In terms of volume sales it is one of the largest mineral markets, its sales stand down only to oil and coal markets.

Fig. 1. Iron ore

World reserves of iron ore (see Fig.2) are concentrated in 6 countries. In particular (according to USGS, Metal Research), in Ukraine (20%), in Russia (16%), in China (14%), in Australia (12%), Brazil (10%), Kazakhstan (5%).

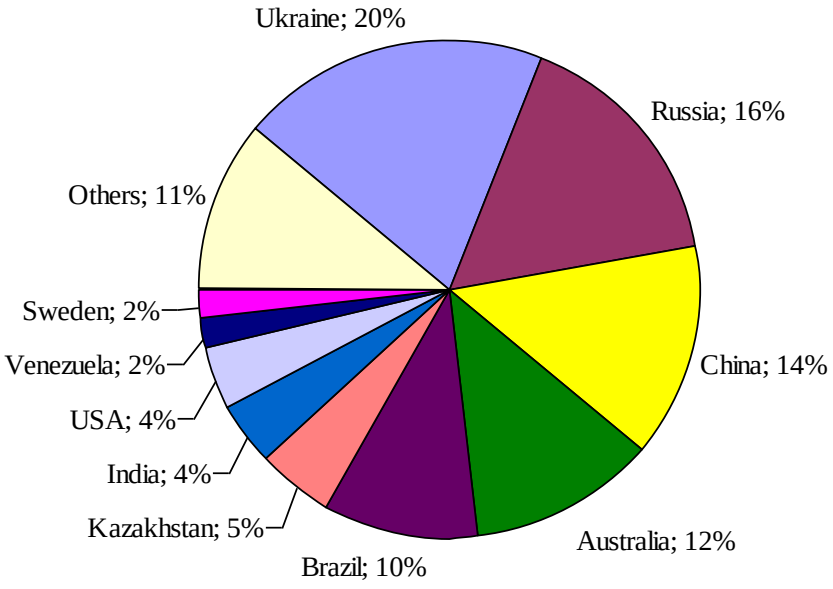

Fig. 2. Iron ore reserves around the world (January, 2010)

More than 2 billion tons of iron ore is produced in the world every year. In 2009 the extraction of ore has increased by 5% and now is amounted to 2.3 billion of tons. The structure of iron ore extraction in different countries in 2009 is represented in Fig.3 (according to USGS, Metal Research). The largest producer of iron ore is China. More than 40% of iron ore in the world is produced there. Besides, the largest producers of iron ore are Brazil (16%), Australia (16%) and India (11%).

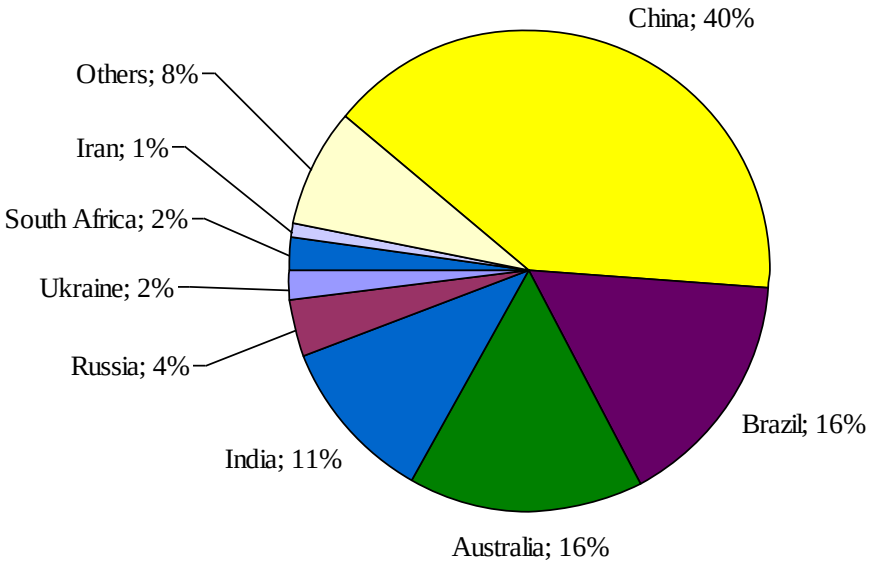

Fig. 3. Iron ore extraction around the world in 2009

The main engine of global iron ore trade is the development of metallurgical production in the countries of East Asia, which are not provided with their own raw materials to the full extent. China plays the key role. Iron ore is most often used for the production of cast ore and direct reduced iron products (basic materials together with charcoal used in the smelting of crude steel).

Traditionally the main iron ore supplies in the world are carried through the contracts and prices, concluded between Japan and EU metallurgic industry and Brazilian (Vale) and Australian (Rio Tinto and BHP Billiton) mining companies. However, because of the crisis and market instability, spot prices became of great importance. In 2010 spot prices were doubled. The growth of spot prices forced such companies as Vale, Rio Tinto and BHP Billiton to introduce a quarter system of raw materials pricing in 2010. According to Credit Suisse Group AG iron ore price may increase by 21% in 2011. Analysts from Credit Suisse

say that spot prices for iron ore will increase and will be approx. $178 per ton in comparison with $ 147 per ton in 2010.

Such growth of prices is explained by several reasons. For example, one of the reasons is flood in Australia in 2011. It caused concern among Chinese consumers who started to make orders for raw materials in India at $ 181 — $ 183 per ton.

However, the main reason of price growth is insufficient supplies of ore, primarily due to a lack of manufacturing capacity. Increase of capacity is hampered by the remoteness of the mines from the sea. Thus, transport infrastructure is more expensive and requires more time for its construction. In Australia iron ore deposits planned for development are located at a distance of 500 km from the sea, in Africa they are located at a distance of 700 km from the sea, in Brazil they are located at a distance of more than 1000 km from the sea. Transportation of iron ore in large quantities (10 MTPA and more) at such distances is currently implemented by railroad, which construction is capital extensive and time-consuming.

In such a situation there is an increasing demand for affordable and flexible in operation innovative transport systems, which are easy to install and have low material consumption. And as a result they have lower price than a conventional railway. Freight transport systems, based on STS technology, meet such requirements.

There are several types of STS freight transport system:

- suspended (a rolling stock is hanged up to the bottom of a string-rail structure);
- mounted (a rolling stock is placed on the top of a string-rail structure);
- traction and braking forces are implemented with the help of drive wheels;
- traction and braking forces are implemented with the help of traction cable;
- with electric contact system or without it.

Each STS transport system has its own most efficient area of application. Mounted STS is the best solution for transportation goods over long distances (up to 1,000 km and more). Bulk cargoes are transported by trains, composed of locomotives and freight modules.

The project is aimed to develop technical and economic issues, which determine applicability and relevance of new STS freight mounted transport system designed to haul small- and middle lump iron ore in the volume of 100 MTPA and more (up to 200 MTPA)