



ENERGY EFFICIENCY ON THE GUARD OF ECOLOGY

How to provide the maximum
ecological safety on the sites of oil
industry?

Bederov Lev Grigorievich,
Safe Technologies, Inc.

Ladygin Konstantin Vladimirovich,
Ph.D., Safe Technologies, Inc.

Stoppel Semyon Isaakovich,
Ph.D., Safe Technologies, Inc.

Kodenko Boris Nikolayevich
Safe Technologies, Inc

Parthenia Nikolay Vyacheslavovich
Safe Technologies, Inc

FIG.1. Incinerator I-1 for Omsk
refinery. Construction and
installation works

ANY ENGINEERING SOLUTION RELATED TO ENVIRONMENTAL SAFETY MUST BE MADE WITH DUE CONSIDERATION OF THE ENVIRONMENTAL REGULATIONS. WHO PROVIDES ENVIRONMENTALLY SAFE ENGINEERING SOLUTIONS FOR THE OIL PRODUCTION AND REFINING SECTOR, HOW DOES THIS WORK, AND JUST HOW EFFECTIVE ARE THESE SOLUTIONS?

Tags: eco-friendly technology, pitless drilling, processing of drilling waste, incineration of waste, production safety.

The term "ecology" can cause an executive director of oil-processing plant a serious headache due to several reasons. Being a responsible citizen and an inhabitant of the planet (a CEO just cannot be irresponsible) one does not wish to leave behind neither rotting nor poisoned marshes, nor tons of hydrocarbons released in the air. On the other hand, it is doubtfully that there can be anything comparably of the same harmfulness as the oil industry is and all the participants of the process are well aware of this fact, including authority representatives and owners of the business.

That is why none of technological solutions in this field can be approved without compliance with the environmental regulations.

Safe Technologies Industrial Group (ST Inc) has a proven long-term record of the manufacturer and expert in both thermal and ecological equipment. In the field of oil-processing thermal waste treatment is a natural choice for most of the oil waste either flammable or containing flammable substances. That is the reason why ST Inc constantly delivers new ecological methods for oil extraction and processing spheres. So recently a range of works has been successfully performed, from the research to the actual manufacturing, launching and test-driving the operation capacity, assigned to fulfill transaction to the pitless drilling: processing the drilling waste in the furnace of non-stop pyrolysis TDP-2. This type of furnace has proved its great features and runs on, among others, in Kuyumbinskiy field (operated by OAO NGK Slavneft).

Incineration of the oil containing waste has been mastered by ST Inc long ago and today it's a turn for new development: incinerator I-1 on the basis of the tube furnace.

The tube furnace is the must-have component of any oil-refinery. It is one of the most common and yet the most expensive detail of any refinery. The simplicity of operational principles is illuminated by the need of heatproof materials of high quality usage.

The function of tube furnace can vary, can be either heating the product (coolant), or cracking, vaporizing or heating with partially vaporizing. The Russian engineers V. Shuhov and S. Gavrillov initially had proposed the

FACTS

IN **1891**

Russian engineer V. Shukhov proposed the design of a cracking tube furnace

BY **9.9** %

Omsk Refinery Increased Bitumen Production in 2016

Up to **1000** °C

The combustion temperature of gas waste

cracking tube-type furnaces back in 1891, 20 years prior to Mr. Barton (USA) repeated their concept and principles.

There are several types of such furnaces they are graded accordingly to their productivity (the right amount of the product heated to the right temperature) and to their design (radiant, convection, mix radiant-convection is the most well spread today). The tube furnace technology tends to achieve a more efficient heat-output performance, reducing capital and operational expenses along with environmental impact.

Thus, the solution of combining useful heating of the product with the thermal tailings destruction naturally arises. Particularly this solution had been picked and later well studied by the engineers of BT Inc.

The thermal gas disposal incinerator I-1 of non-stop bitumen boiling plant 19/3 of Omsk OPP, one of the biggest in the country, presently is being assembled on the customer's site. The purpose of the incinerator is heating the oil grade MT-300 Om, the coolant that is used in other technological processes with the simultaneous technological gas emissions disposal of the bitumen oxidation line along with the drippings produced by the bitumen pouring line.

Due to constant rise of bitumen consumption for road construction, in 2016 Omsk OPP increased its bitumen output by 9.9% up 430 thousand tons a year, which resulted in the necessity of technological and ecological solutions upgrade.

Here some of Incinerator I-1's characteristics:

- Productivity is up to 80 000 kg/hr of MT-330 Om Oil
- The temperature of gas emission thermal disposal is 900-1000 °C
- The fuel: natural gas
- The gas emissions productivity is up to 13 500 kg/hr (oxidation) and 350 kg/hr (bitumen drippings).

Fabrication of the coil required almost 700 meters of heatproof steel. The ribbing of the heat exchanger pipes was carried out at the workshop owned by ST Inc and located in town of Sosnoviy Bor.

At the Incinerator I-1's fabrication the closest attention was paid to the reliability of the equipment. Reliability is always a very attractive value, although in the case of I-1 it becomes crucial.

In addition, the reason for that is that the furnace operates in the tight tandem with bitumen oxidation column, in the technological scheme of which no waste disposal torch included.

The Resolution of the Government RF from 2012 dedicated to the dramatic reduction of torch-using facilities directly points at the undesirability of the vital resources wastage, not mentioning environmental pollution. The technological scheme of the bitumen line and its blowers are entirely locked on the Incinerator, thus the furnace stoppage leads to shutting down the whole production line causing the customer considerable economical outlay. That is why in this particular case advanced developments of ST Inc, which are well known for its reliable control-systems and visual interfaces, are enforced with additional cascade of sensors and programming logic accordingly. This was essential to provide the safety for production along with preventing faulty automatic alarm that inevitably leads to shutting the whole production line down. Certainly, the by-pass system for critical situations is also included.

One of the biggest and well-known design agency in Russia fulfills the drawings of the plant, and the equipment for Omsk OPP is wholly fabricated using the production assets of Safe Technologies with Sosnoviy Bor's machinery plant participation, its full production capacity, also belonging to the Industrial Group.

The certain divisions of ST Inc. purchase all the materials, auxiliary devices and required parts. Specialists of the company carry out the commissioning too. Such approach to the projects implementation can guarantee the

FIG. 2. Lining operations of a tube furnace at the production site of ST IG



contractor nearly full independence from any external conditions, therefore meeting the dead-line and appropriate quality control at all stages, from the very earliest to the final stage.

The tube furnace is not the first and, of course, not the last product of ST Inc for oil-refineries. A furnace of alike design but of less productivity assigned for processing the admixture of ammonia and triethylamine is manufactured for "Salavatskiy Chemical factory".

The Company's portfolio has yet other examples of similar orders: high-productivity coils, steam super-heaters etc. Recently the Company has signed the contracts for two tube-furnace developments, this time both of standard type, for one of Russian oil processing giants.

The oil-processing field is a strategic industry for Russian Federation and no surprise why to work in the field ST Inc is getting involved the Company that is well known as nationally as well as internationally for its unique engineering in the area of thermal waste treatment.

FACTS

IN **2016**

Government Resolution released on toughening the ecological fines

700 M

of grade heat-proof steel required to fabricate the coils of Incinerator I-1