



ELECTRODE SLIPPING SENSOR

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Software and hardware complex
for automated control of ore-thermal
electric furnaces (APCS OTEF)

Purpose

Electrode slipping sensor is part of Vega SAUR™ complex and intended for standard and spontaneous slipping («sliding») measuring of the ore-thermal electric furnace electrode and formation of measurement data for transmission into microprocessor automation equipment.

Applications

Electrode slipping sensor is used in ore-thermal electric furnaces of metallurgical, chemical and other industries, equipped with carbon, graphite and self-sintering electrodes.

Method of measurement

Conversion of the linear movement of the electrode by rolling its surface with a measuring roller (wheel) into a sequence of signals performed by an encoder (incremental quadrature).



Feature characteristics

- measurement of the electrode slipping value with an error of no more than 1.0% for every 500 mm of the slipping;
- measurement of the amount of electrode spontaneous slipping (sliding), both during the slipping operation and during the pauses between the next slipping operations;
- automatic accounting of the value of one-time, shiftable and daily slipping with a cumulative total (accumulation);
- automatic accounting of the electrode sliding value with a cumulative total (accumulation);
- automatic calculation of waste energy settings for generating a command for the next slipping operation based on the total value of the actual slipping in the previous slipping operation and the amount of sliding;
- automatic correction of the calculated waste energy setting by the amount of sliding during the pauses between the next slipping operations;
- automatic electrode slipping, depending on the rate of its waste and the electrode single slipping set value by no more than 15-25 mm.

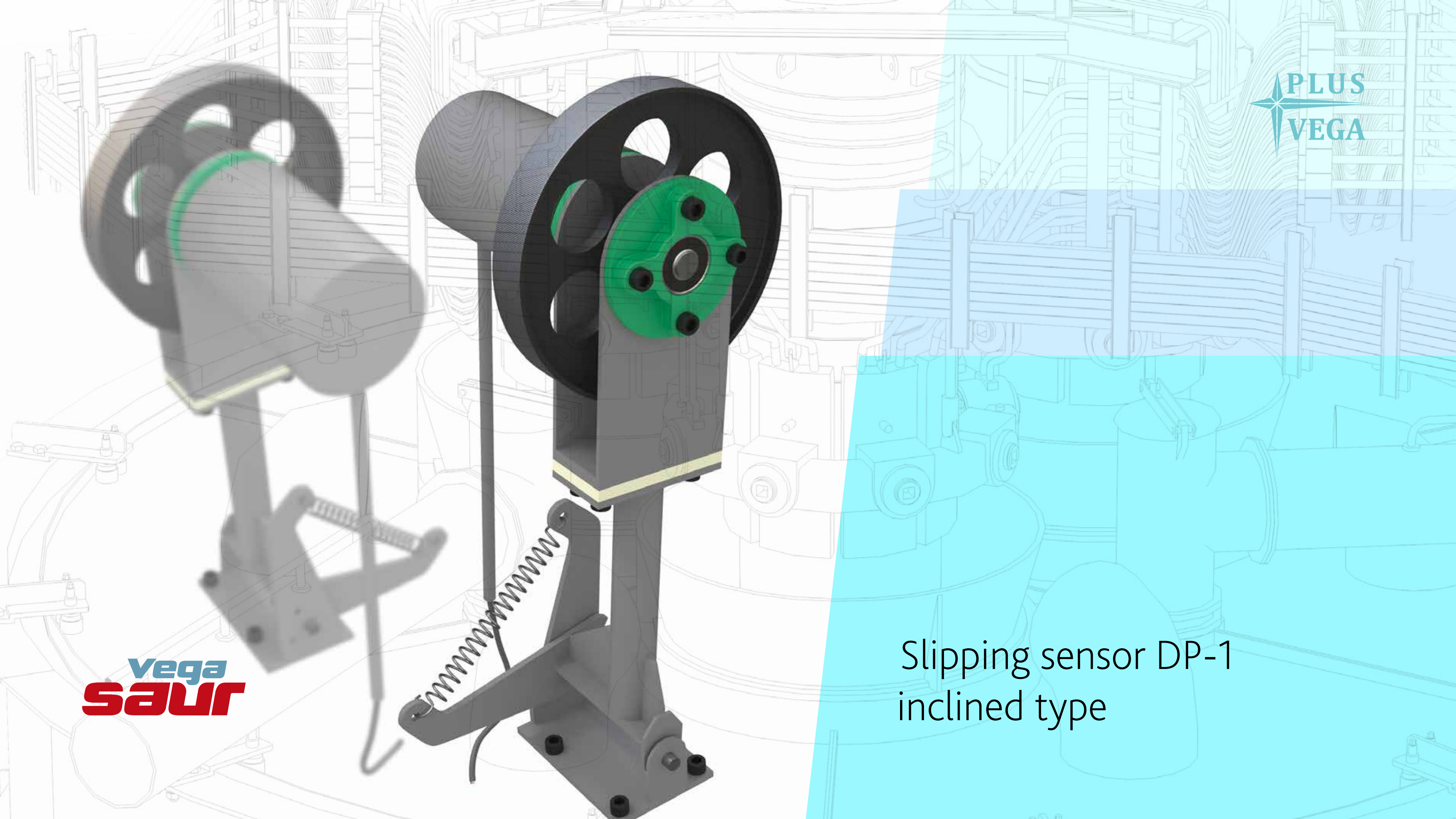
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Application efficiency factors

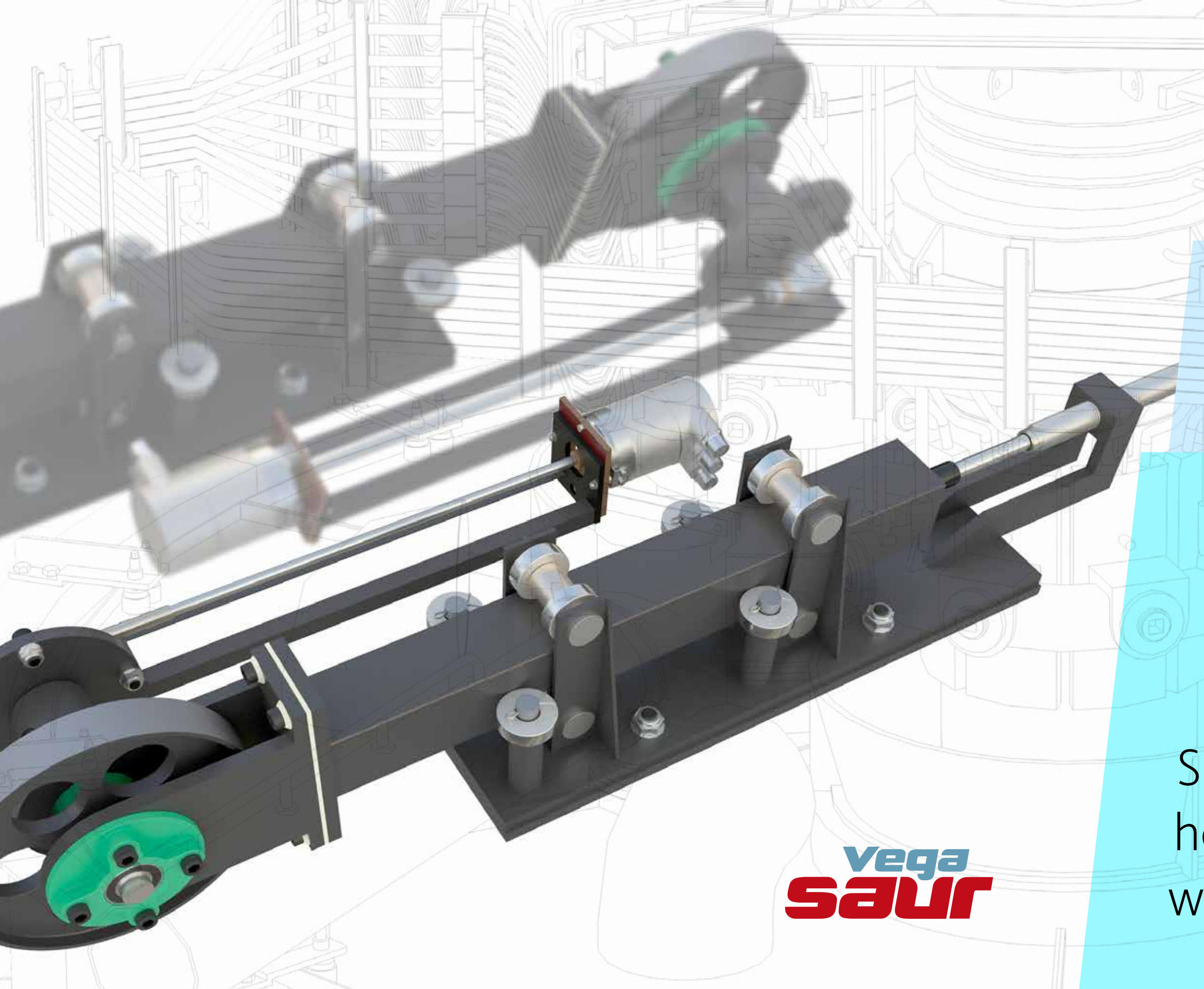
The use of sensor makes it possible to implement an automatic slipping mode based on reliable information about the size of the electrode slipping, which:

- reduces the influence of the slipping operation on the electrical mode by eliminating the need to maneuver («pulling») the electrode to eliminate the current overload during the slipping operation. This significantly reduces the likelihood of creating conditions for electrode sliding and, as a consequence, emergency shutdown of the electric furnace at currents significantly exceeding the permissible values;
- stabilizes the electrodes position in the furnace bath optimal zone by eliminating abrupt changes in the electrode length and their exit out from the optimal zone with the currently accepted practice of a single electrode slipping by 50-100 mm (or more) according to the subjective decision of the smelting personnel;
- stabilizes the electrode working part length on the basis of continuous calculation, taking into account the rate of electrode slipping and waste;
- increases the resistance of the electrode block by reducing the temperature difference between isotherms along the vertical and horizontal section of the working part of the electrode, which significantly reduces the risks of its destruction (breaks, chips and cracking) due to thermal overextending, the value of which does not exceed critical values when slipping no more then 15-25 mm.
- completely eliminates the subjective influence of the “human factor” on the electrode slipping mode and, as a consequence, on the smelting process as a whole.

Slipping sensor DP-1
inclined type

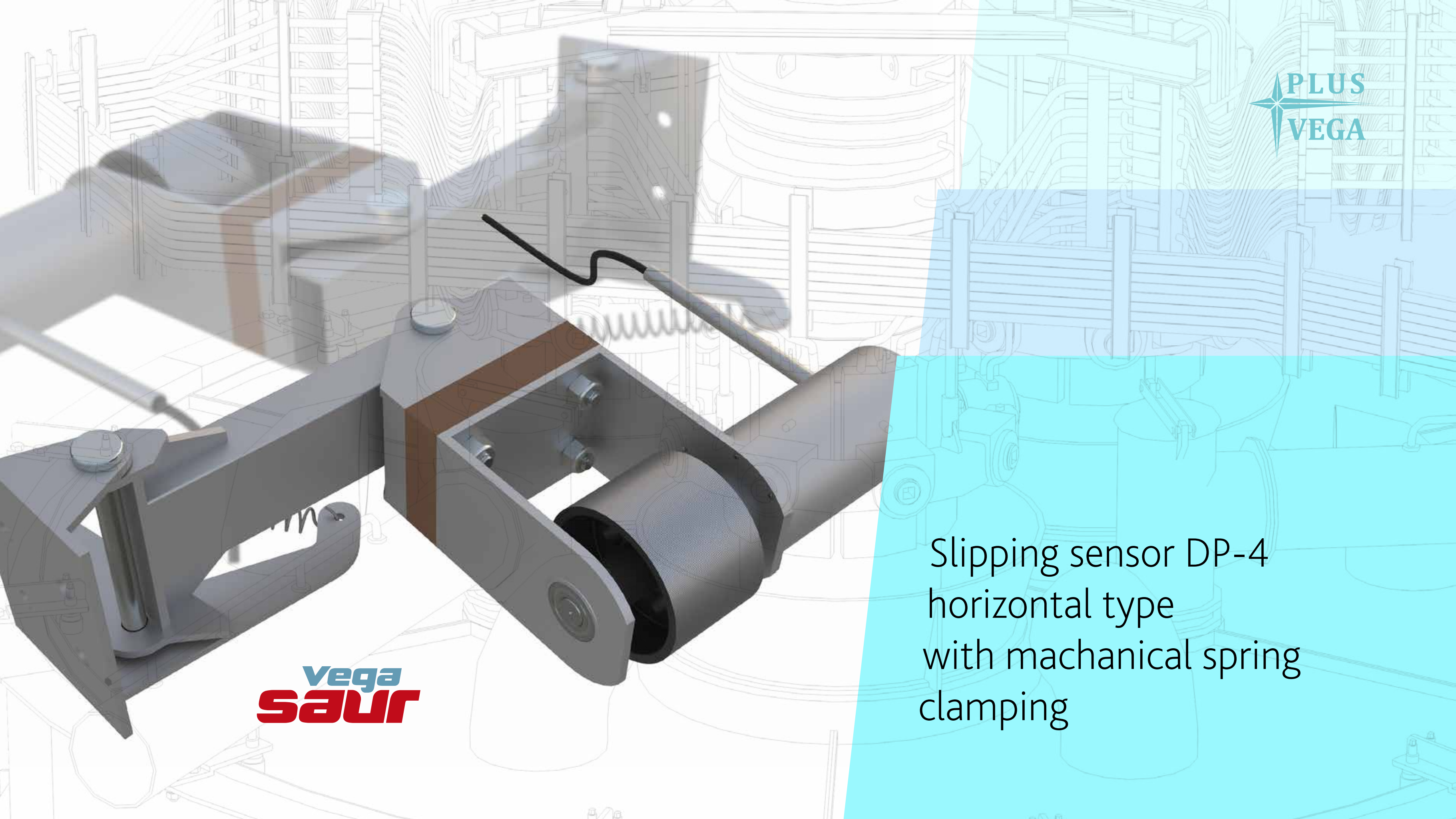


Slipping sensor DP-2
horizontal type
with pneumatic pressure device

A detailed 3D CAD model of a slipping sensor DP-3. The device features a long, black, rectangular main body with several silver-colored cylindrical components and bolts. A green sensor head is visible at the bottom left. A long, thin metal rod extends from the top of the body. The background is a light blue gradient with faint white line drawings of industrial machinery.

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Slipping sensor DP-3
horizontal type
with gas spring clamping

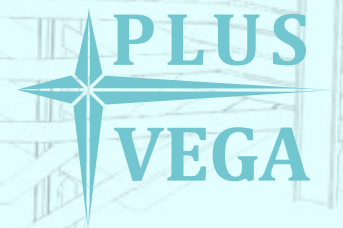


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Slipping sensor DP-4
horizontal type
with machanical spring
clamping

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Slipping sensor DP-5
horizontal type
with electromagnet clamping



JSC «VEGA PLUS» does not lobby the use of either technical or software of a certain manufacturer.

We have successfully operating systems implemented on the basis of leading vendors:

Schneider Electric, Siemens, GE, EMERSON, ABB, Allen-Bradley.



SIEMENS



Allen-Bradley
by ROCKWELL AUTOMATION



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More than 50 furnaces in 9 countries



JSC «VEGA PLUS» executives have more than 45 years of experience in the successful development and implementation of automation systems and APCS at various enterprises of ferrous and non-ferrous metallurgy, have 46 copyright certificates and patents, and more than 160 scientific papers, including monographs.

In total, ore-heating furnaces with a total installed capacity of more than 1000 MVA have been automated with the participation of JSC «VEGA PLUS», which is the best indicator in Europe.



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By purchasing the VEGA SAUR™ complex
Customer can expect:

- free consultations;
- round-the-clock technical support;
- efficiency and flexibility in solving nonstandard issues.

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