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Creation of a technology for cleaning the surface of minerals

Knyazeva Victoria

Problem:

Due to the transition to deep horizons of ore mining, altered ore blocks are very common. In the altered ore blocks, kimberlites are to varying degrees transformed into clay minerals.



Purpose: To create a technology for cleaning the surface of diamonds to improve the performance of enrichment processes.

Tasks:

1. Analysis and collection of data by methods cleaning.
2. Selection and justification of methods.
3. Creation of cleaning technology.

make up to 96% of the binder mass of kimberlites, which are concentrated on the surface of diamonds and make it difficult extraction processes

Data collection

Cleaning technology	Application	Special	pros	Minuses
Mechanical scrubbing	equipment included in enrichment scheme		cleans up impurities with all minerals	Increases concentrate, additional expense electricity
Thermal	Heating water in the factory		cleans up carbonate impurities minerals	Big consumption electricity
Ultrasonic	Embedded in initial scheme		cleans up impurities with all minerals	not big consumption electricity, selection special modes
Electrochemical	Embedded in original scheme		Preventing no the formation of impurities on surfaces	Big consumption electricity
Combined	Embedded in original scheme		cleans up impurities with all minerals	Selection special modes

Stages of work



Schematic diagram of fixation (1.2.3) and removal (A.B.V.D) of hydrophilizing mineral formations from the diamond surface

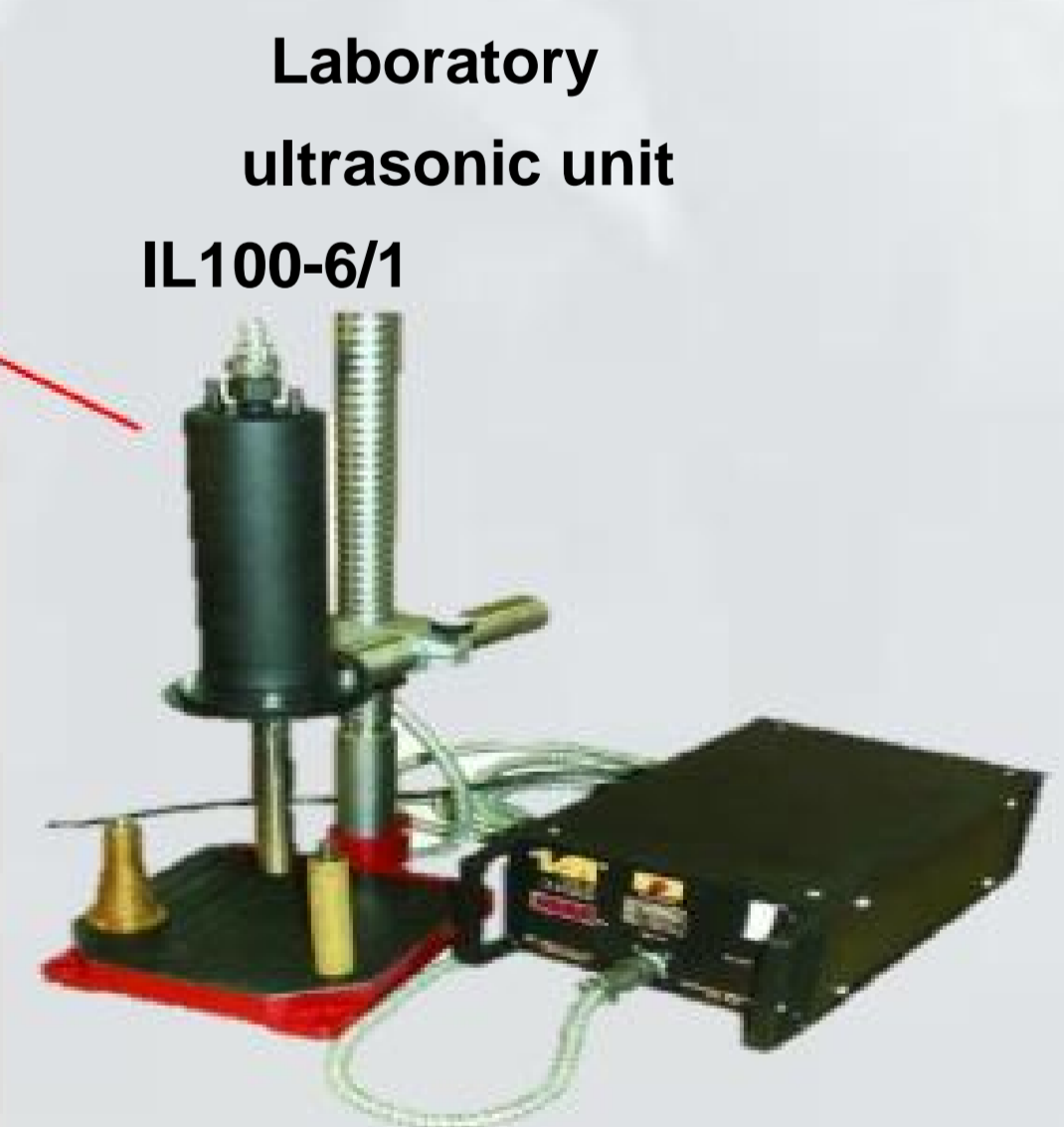
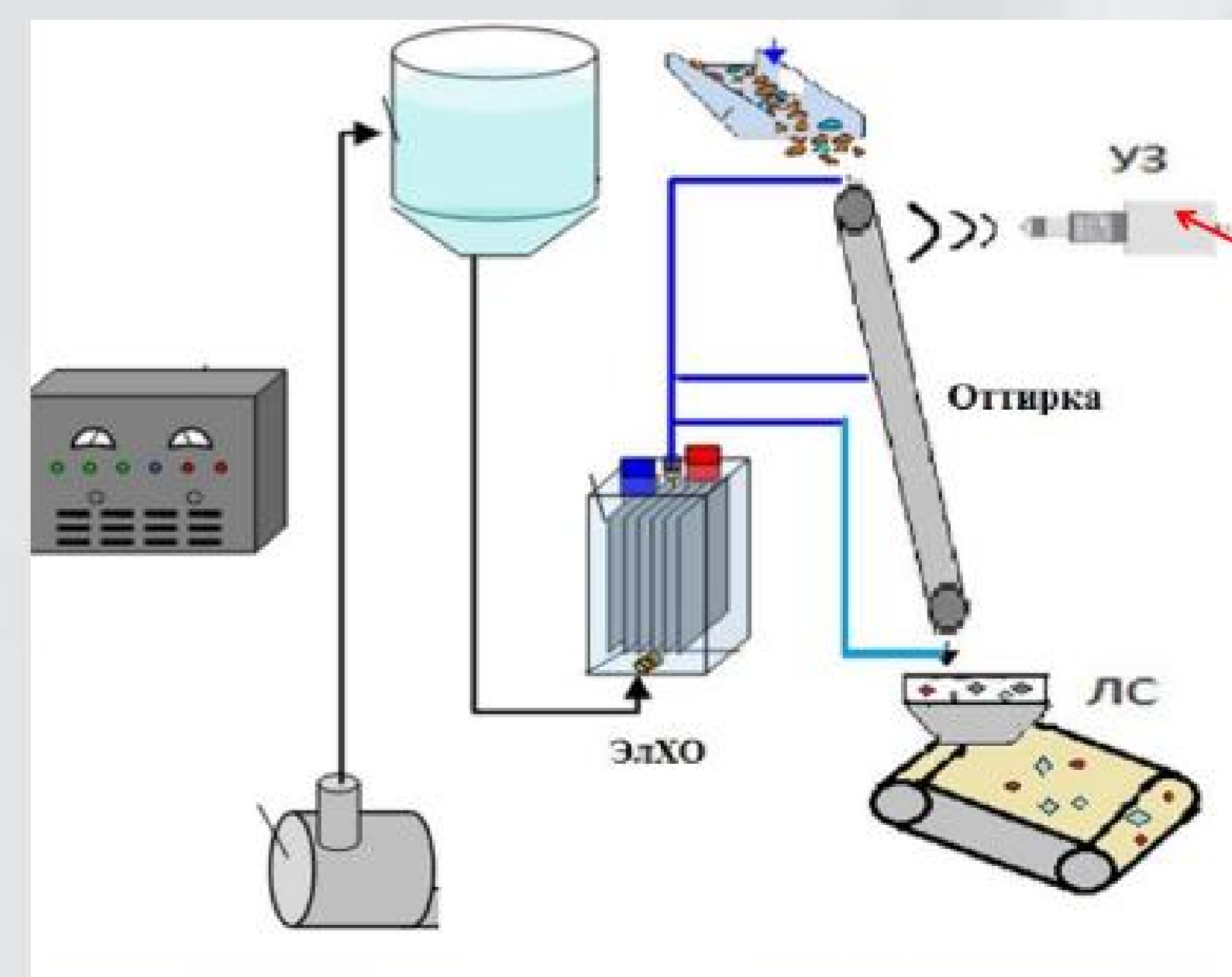


1 - film surface formation; 2 - relief surface formation; 3 - single slime grains;

Cleaning methods: A - chemical dissolution with EICW products; B - mechanical (shear) removal; B - mechanical (vortex) action; D - mechanical (dispersion) removal

Cavitation area (power more than 1.5 W/cm²); Pre-cavitation area (power less than 1.5 W/cm²)

About the product

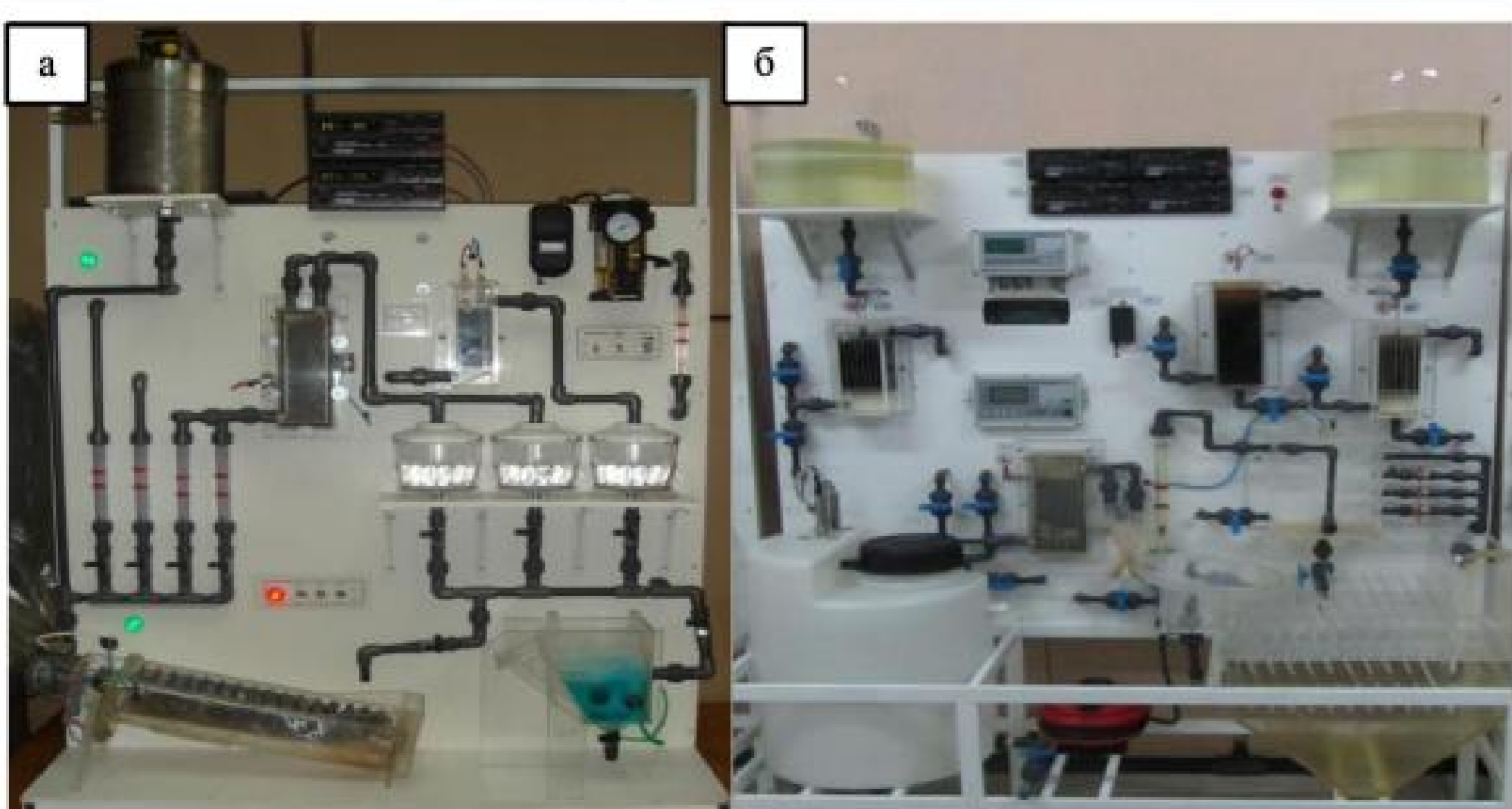


Power (from 630 W to 10 kW) - at an operating frequency of 22 ± 10% kHz / Power change

Stand in the MPTI laboratory, the use of a combined diamond cleaning technologies

achieved by adjusting the amplitudes of ultrasonic vibrations.

Assembled scheme of the stand



Additional extraction of 1-2% of diamonds at the stage of separation of fine grades (-6 + 1 mm), due to the use of combined technology

surface cleaning.

3000 carats per day 0.05 \$ + 450 \$ per day.

No.	Mineral, formula
one	Gypsum,
2	CaSO ₄ ·2H ₂ O
3	Chalcopyrite, CuFeS ₂
4	Cassiterite, SnO ₂
five	Halite, NaCl
6	Goethite, FeO·OH
7	Hematite, Fe ₂ O ₃ Serpentine,
eight	Mg ₃ [Si ₂ O ₅](OH) ₄ Minnesotaite (iron talc), Fe ₃ Si ₄ O ₁₀ (OH) ₂
nine	Anhydrite, CaSO ₄ Phlogopite,
10	K ₂ (Mg, Fe) ₆ [Si ₆ Al ₂ O ₂₀] (OH, F) ₄ Calcite, CaSO ₃
eleven	Saponite, (Ca,Na) _{0.3} (Mg,Fe ₂
12	+) ₃ (Si,Al) ₄ O ₁₀ (OH) ₂ * 4H ₂ O

Identified mineral formations on diamond surface, which can be cleaned with diamond surface