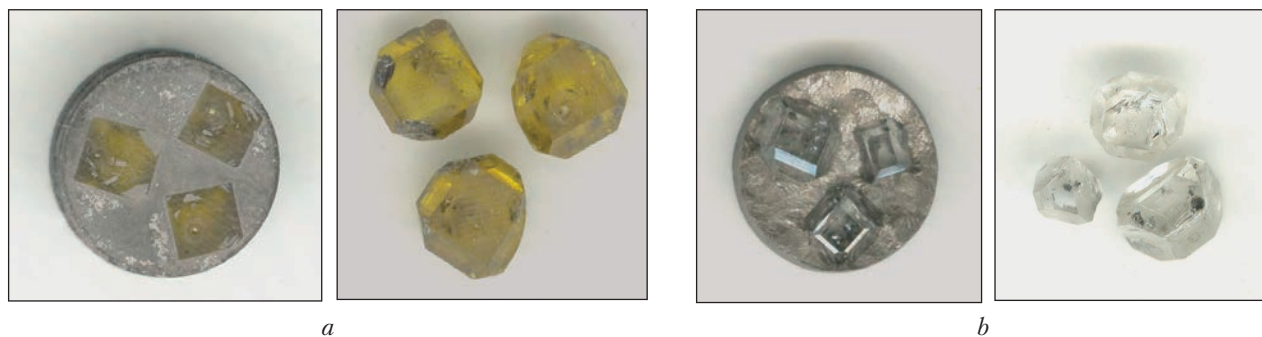
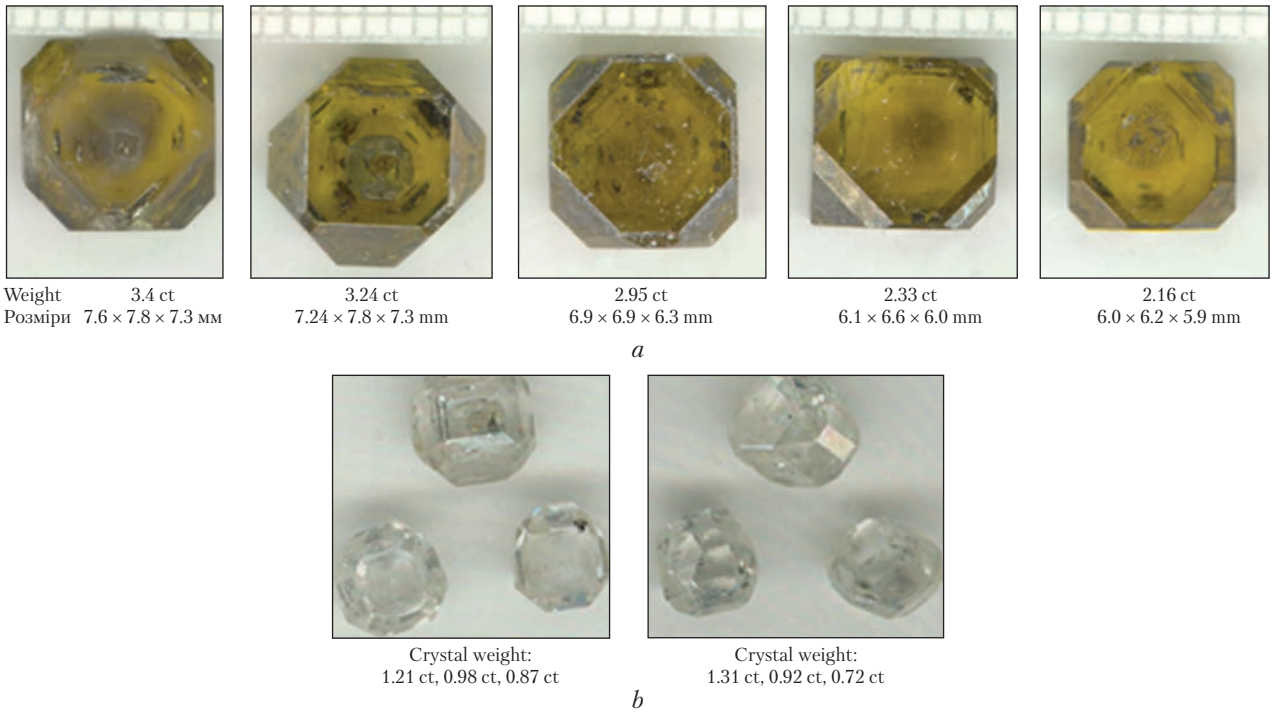


**Fig. 1.** The main types of devices for growing diamond single crystals at high pressure and temperature: *a*) 6-punch high-pressure equipment (China); *b*) belt-type device (USA, South Africa, Ireland); *c*) toroid-type device (designed by the Institute of Superhard Materials of the NAS of Ukraine); *d*) Bars device (designed by the Institute of Geology and Geochemistry of Minerals, the RAS)



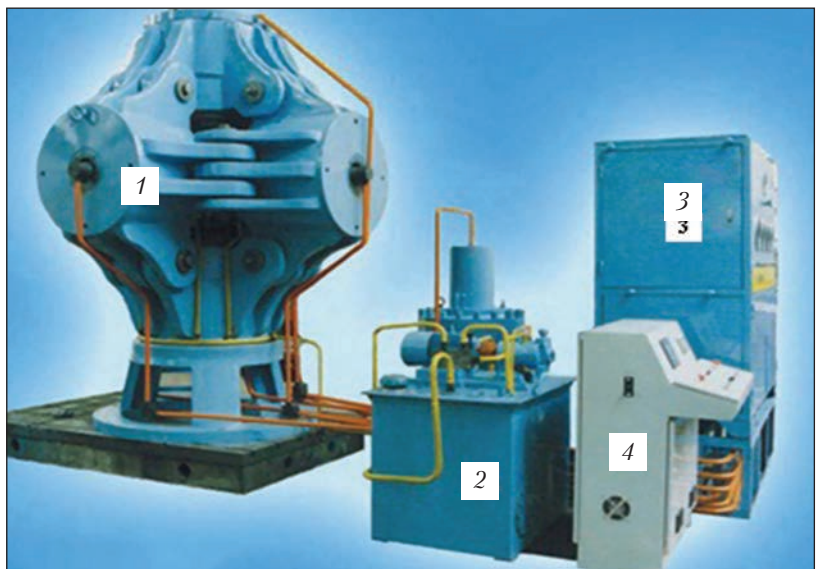
**Fig. 2.** General view of single crystals of Ib (*a*) and IIa (*b*) types after growing in the metal solvent and after etching by chemical method



**Fig. 3.** Samples of single crystals of Ib type (weight 2–3.5 ct) (*a*) and IIa type (weight 0.7–1.3 ct) (*b*)



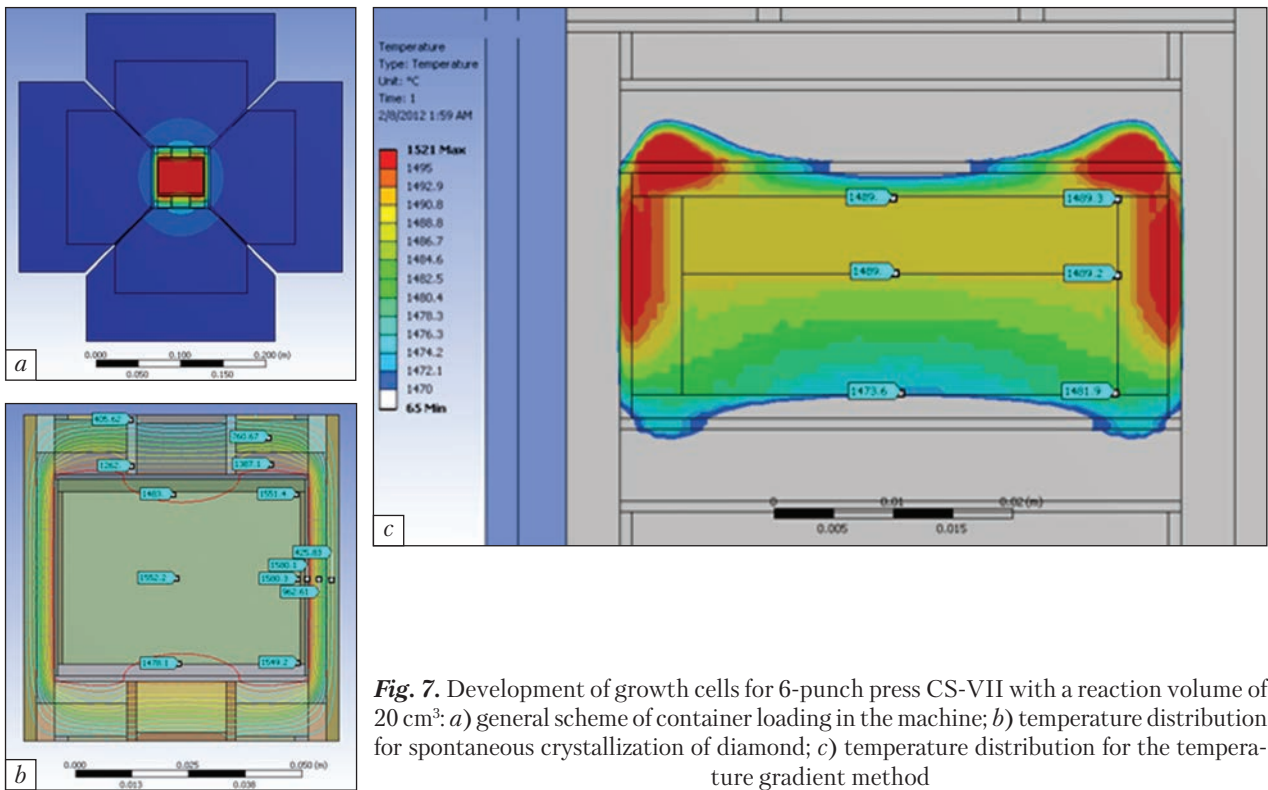
**Fig. 4.** General view of diamond single crystals of IIb type grown on crystal seed in the system Fe-Al-B-C (weight 2.0–2.5 ct)



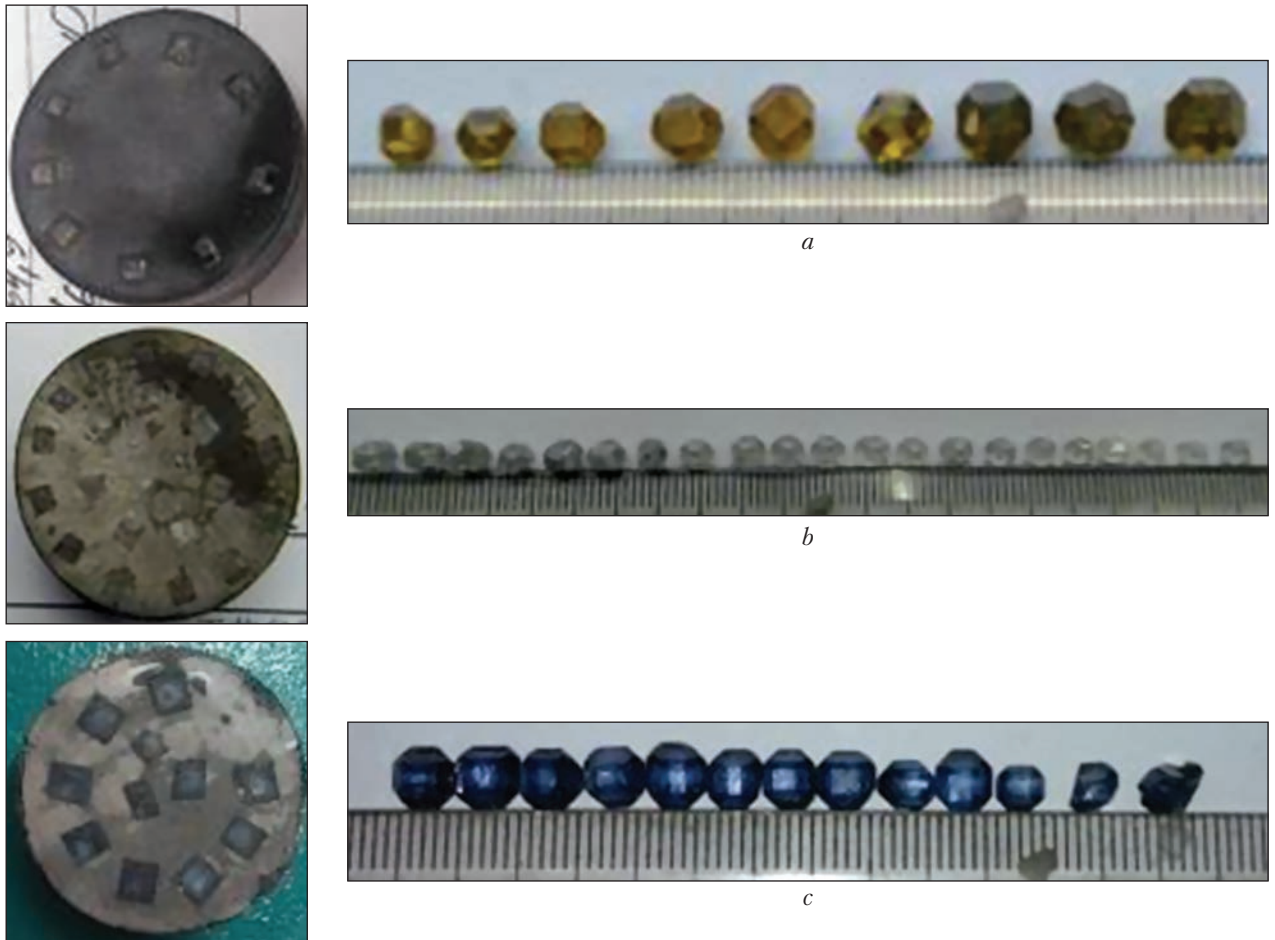
**Fig. 5.** 6-punch press CS-VII (plunger diameter: 560 mm, load: 25 MN): 1) 6-plunger stand, size: 3.4 × 3.4 × 3.7 m; 2) hydraulic pump unit; 3) hydraulic system control unit with oil tank; 4) electronic controller of heating and growth cell load parameters



**Fig. 6.** General view of shop for the production of diamonds (equipped with 6-punch press CS-VII with a plunger diameter of 560 mm and load of 25 MN)



**Fig. 7.** Development of growth cells for 6-punch press CS-VII with a reaction volume of 20 cm<sup>3</sup>: *a*) general scheme of container loading in the machine; *b*) temperature distribution for spontaneous crystallization of diamond; *c*) temperature distribution for the temperature gradient method



**Fig. 8.** General view of structurally perfect diamond single crystals of various types obtained by the temperature gradient method from crystal seeds in 6-punch AVT: *a*) Ib type, *b*) IIa type, *c*) IIb type. Left: solvent with grown crystals; right: general view of crystals after etching from the solvent