Explosive compaction of systems based on metal powder is a promising direction in the development of the new structural materials. In this case, the study of composite based on powders over the wide range of strain rate $10^{-5}$ s$^{-1}$ to $10^5$ s$^{-1}$ to identify the mechanisms of deformation and fracture and their connection with the internal microstructure is of interest. The processes of high strain rate and fracture caused by the shock wave in such materials have not been studied at all. In this work the samples were synthesized of powder composite material by the explosive compaction. The initial synthesis mixture consisted of powders ASD-6 (average size of 18 microns) and aluminum oxide (average size 36 nm). The mixture was premixed in a tumble mixer for 24 hour. The amount of Al$_2$O$_3$ in the mixture was 10% by weight. The resulting mixture was placed in an axysymmetric container. The container was a copper tube with a diameter of 32 mm and a length of 350 mm (wall thickness 1 mm). Explosive compaction occurred under the action of the detonation products of industrial explosive Uglenit E-6 with a detonation velocity of 2300 ± 200 m/s. As a result the composite with density 2.65 g/cm$^3$ was obtained by synthesizing. The measured longitudinal sound velocity was 6.10 ± 0.1 km/s. Vickers microhardness was 106 ± 6 kg/mm$^2$. Using electron microscopy and X-ray diffraction data on the composite structure, the parameters of the crystal structure and phase composition were found. For the shock-wave experiments the samples of 2 mm and 5 mm were cut. The plane shock waves in the samples were generated by impacts of aluminium flyer plates of 0.85 mm and 2.0 mm in thickness with velocities of 630 ± 30 m/s. The free surface velocity histories were monitored with the VISAR. The measured values of the Hugoniot elastic limit in the composite sample with thicknesses of 2 mm and 5 mm were 0.24 ± 0.01 GPa and 0.2 ± 0.01 GPa. The dynamic strength of the composite was 0.4 ± 0.01 GPa and 0.35 ± 0.01 GPa for samples 2 mm and 5 mm in thickness.