Compact pulsed power of a table top size has been developed by using the magnetic pulse compression circuit with saturable cores as closing switches. This high repetitive and reliable pulsed power generator is widely used in universities, companies and institutions.

Here, characteristics of the compact pulsed power generator and plasma production using this generator in water, supercritical fluid and atmospheric air flow are described. Then applications using these plasmas produced in special environments are summarized.

The plasma in water is produced comparatively longer pulse, and its diameter increases with the pulse width over a threshold voltage. Its radius is changed from several mm to several cm with a high repetition rate from 1 pps to several hundred pps. The water cleanings in dam and of sewage are examples of applications.

The plasma in supercritical fluid shows a unique behavior. As one example, observations by means of Schlieren imaging method confirmed that the pattern of low temperature plasmas was a tree-like streamer independent of medium phase, and that the supercritical phase led to streamer branches of higher complexity than those in the gas and liquid phases. New reaction chamber might be made by this unique plasma.

The low temperature plasma jet with a small diameter is produced by the compact pulsed power generator. This stable plasma jet in atmospheric air flow causes a strong chemical reaction, and used as sterilizer and surfaces cleaner.