Compressed air powered electric generator

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Metal Work is one of Signal"s main clients: the company is a leader in the pneumatic sector and for decades has been working to reduce the problems caused by residual compressed air in the atmosphere.

The idea to produce electric energy through this otherwise wasted flow grew up not only from the new developments in so-called energy harvesting techniques, but even by the chance to work in areas where electricity is absent, or an explosive atmosphere surrounds the location.

Furthermore, compressed air enables the machine to work even in the case of a black-out, thus ensuring a constant operating capacity. "The base idea - tells us Metal Work project manager - as any innovative one, was simple, but its realization was full of question marks: structure, nozzle, turbine, generator, and electric equipment were all items to be produced and the referring technologies were not well known!".

The winning tool for Metal Work was the establishment of a joint multidisciplinary team in partnership with Signal and Brescia University to develop the components.

Signal focused on developing a specific electronic device to convert alternate voltage coming out of the micro-generator, in order to deliver a constant and reliable voltage, even in event of a change of flow rate and pressure of the compressed air. This item was called Pneumopower.

The power coming out from the generator moved by the air needed to be managed in order to maximize efficiency by using MPPT techniques. To ensure safety and reliability, it also blocked excessive rotational speed from the turbine.

Signal operated without any previous bibliographic references and without the chance to refer to similar products on the market: furthermore, the greatest task was to develop a product that could be reliable and affordable at the same time. Because of this, electro valves were considered and avoided, as, while they could solve many issues, they were prohibitively costly.

The result of this endeavour was extremely positive: the product is a small aluminium rectangle (100x50x54 mm). Air enters through a standard fast connector, from which the client can move it through a M8 connector, up to to 12 W stabilized at 24Vdc. Pneumpower visually signals its working state with a LED and electrically with a dedicated signal through the same M8.

Further detail can be seen on client website https://ecommerce.metalwork/store/mw/it/Catalogo/Raccordi-e-Accessori/Valvole-di-controllo-portata-e-altri-accessori-pneumatici/PNEUMO-POWER/PNEUMO-POWER/c/04061101

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The effects of climate change have many scientists and technologists looking toward the future with renewable energy sources in mind. Solar and wind power systems are an eco-friendly energy option, but they are dependent upon certain weather conditions to operate at full capacity.

Energy storage systems are one solution to this problem and can easily increase a power plant’s output and efficiency. One such storage system uses compressed air to save electricity for when it is needed. The idea of energy storage using compressed air has been around for decades but is recently being explored more as a solution to augment renewable energy systems.

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