

RB ROYAL AND MILLER CONNECT FOR A UNIQUE THREE-IN-ONE MACHINE

Fluid handling challenges overcome in design of combined welder/generator/compressor

Combining multiple machines into a single unit is a great idea – but it results in some daunting design issues of trying to fit everything into the smallest possible package. When Miller Electric Manufacturing Company began development of the Miller Big Blue® Air Pak™, the company turned to RB Royal Industries of Fond du Lac, Wisconsin to help solve some of those problems.

Miller Electric is a world-class manufacturer of welding machines and other industrial equipment. The company's new Big Blue® Air Pak™ is the first-of-its-kind machine that combines a welder, generator and air compressor into a single, portable unit. Fluid transfer design – essentially the "plumbing" of the machine – proved particularly challenging. The size of fittings, material selection and the actual configuration of the fluid handling system all had to be taken into consideration. To resolve these issues and help ensure that the fluid handling was properly integrated with the overall design of the machine, Miller contacted the experts in fluid handling applications, RB Royal Industries.

Multiple challenges had to be addressed. Because the unit is designed to be portable, space for fluid connections was at a premium. At the same time, the connections had to stand up to rugged use and transporting of the machine.

RB Royal's custom-designed tube and hose assembly acts as an insulator against the engine's vibrations. The flexibility of the hose provides relief from tolerance stack-up. Corrosion-resistant stainless steel tubing was used (left) to withstand the sometimes harsh environment within an enclosed engine compartment.

The U-shape configuration was needed to trap the oil, preventing it from draining back into the engine. This stabilizes the level of oil in the engine, allowing the operator to get a more accurate reading of the oil level when the engine is in the stopped position.

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RB Royal also had to take into account heat and vibration generated by three functions in close proximity to each other in an enclosed space. Of course, the connections also had to be practical to manufacture and economical to produce.

Working closely with Miller, RB Royal engineers made sure their solution met the constraints of the project and was compatible with the overall design of the machine. RB Royal engineers actually became an extension of the Miller design team, saving considerable time and reducing duplication of effort and excessive travel in the development of the machine. Miller actually delivered a prototype Big Blue to RB Royal's new 3,000 sq. ft. Product Development Center or PDC. The PDC, with its dedicated equipment, allowed Miller and RB Royal engineers and technicians the opportunity to work on project modifications in 'real time' rather than waiting for production machinery to become available. RB Royal's PDC becomes a competitive advantage when 'time to market' is critical.

RB Royal approached the project by creating prototype assemblies to fit into the actual unit. The engineering team determined that custom metal tube assemblies were appropriate for fluid paths between two fixed points or on mounted components that were adjustable during assembly of the machine by Miller. This provided the rigidity, precision and durability required by a portable, heavy-use machine. Custom metal tube assemblies also were used to protect fluid paths from high temperature surfaces where hose assemblies could prematurely fail. Custom metal tubing assemblies were also vital in the development of a "remote" oil filter application to make it easier and safer to service the unit, thereby creating value. No more reaching under or behind the engine to remove and replace the oil filter.

In applications where point-to-point tolerances were tight, RB Royal engineers determined that custom hose assemblies or hose/tubing assemblies were the best solution. Flexible hoses also were used in applications where vibration was an issue.

RB Royal Industries produces custom-designed and manufactured hose and tube assemblies and precision machined products for OEM manufacturers and OEM component system suppliers.



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