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## **Manufacturer Maximizes Productivity Through Machinery and Processes**

In 1992, a diesel mechanic by the name of Reggie Ronzello, Jr. decided to apply his expertise and experience to an area he was truly passionate about... high performance motorcycles. His father, a manufacturing engineer, saw the potential in his son's idea and through their combined efforts, R&R Cycle was born. The shop, now an industry leader, began in humble surroundings. The Ronzellios converted their basement and garage into small machining and production areas and started building high performance bike engines.

Within 2 years, demand for its quality engines propelled R&R Cycle into a new facility located in Manchester, New Hampshire. The shop brought a fresh approach to engine design and construction that resulted in quick growth and a reputation as a leader in the field. The head of the family, Reggie Ronzello, Sr., lent his knowledge as a manufacturing engineer to the shop to optimize the end product through both design and machining processes.

In addition to advanced design, R&R Cycle differentiates its product by being the only manufacturer in the country to produce full-billet engines. This means R&R Cycle's engines start as a block of solid material that is then machined down. Other manufacturers begin with a pre-formed casting already containing a majority of the crevices and crooks. This reduces the amount of machining necessary to complete an engine. It also leads to less than optimal efficiency and performance.

"By doing everything in billet, your machining can be impeccable," says Ronzello, Sr. "Even more importantly, you have one consistent material type. This means the material expands uniformly as the engine runs and heats up. With inconsistent or different types of materials, you get different rates of expansion. That causes your tolerances to shift and, in high performance engines, even that small of a loss can increase vibration and cause instability."

While full-billet manufacturing results in superior engine performance, it also provides increased production challenges. Where competitors can get by with drilling a few holes and fly cutting the face of a component, R&R Cycle must machine the complete part from a solid block. As its engines require

much more machining, R&R Cycle is forced to streamline its processes to remove any potential inefficiency.

The first and most obvious step in maximizing operations involves obtaining the best possible machinery. For R&R Cycle, this means manufacturing its engine components on Mori Seiki NH5000 horizontal machining centers.

“To achieve the levels of performance we need out of our engines, we have to hold machining tolerances to 5 ten thousandths of an inch,” says Ronzello, Jr. “In addition to speed, we really depend on that extreme accuracy and the repeatability of the machines. That’s why we went with Mori Seiki when we purchased our first NH5000 in 2001 and that’s why we stay with them.”

According to the Ronzellos, the unparalleled rigidity of the shop’s two NH5000s helps maintain tight tolerances. The machining centers previously used at R&R Cycle rested on individual feet. As temperatures change with the seasons, the shop’s concrete floor shifts and changes just enough to have affected the accuracy of those machines. The NH5000’s extremely rigid body, coupled with a unique tri-base, causes the machine to perform as if it were level, even when placed on a surface that is not. In fact, the engine parts are consistently machined to such close tolerances that R&R Cycle has eliminated most of the gaskets and O-rings from its engines’ designs.

Increased rigidity also allowed R&R Cycle to speed up feedrates without sacrificing accuracy. Previously, on a specific set of cylinder heads, feeds had to be kept to 80 ipm to achieve the needed tolerances. Using the same two inch shell mill in the NH5000, the shop was able to raise feedrates to 450 ipm. A representative from Valenite suggested that the machine would benefit from a new shell mill and the feedrate climbed even higher, to 550 ipm. The cylinder heads, whose total machining time used to exceed fifteen hours, are now finished in less than five and a half hours.

In addition to reducing actual machining time, R&R Cycle has taken steps to minimize set-up time. Utilizing the NH5000’s standard Automatic Pallet Changer (APC), the shop implemented pallets with tombstones to simplify the steps needed to set a job up. Additionally, rather than touching off on individual jobs, R&R Cycle takes advantage of the NH5000’s accuracy and repeatability, programming with the center of rotation as absolute zero.

“Our tombstones are designed for specific jobs,” explains Ronzello, Sr. “When a job begins, the Mori Seikis automatically touch off on the tombstone to identify which program should be running. Then it’ll touch off on the part to ensure the operator loaded it to the tombstone correctly. If it’s correct, the machine proceeds with the job. If it’s not, it’ll notify us and an operator will check it. It’s simplified set-up and saved us a lot of time and we couldn’t run that way without the NH5000’s repeatability.”

In addition to improving efficiency, the move to pallets with tombstones provided additional flexibility that fits well with R&R Cycle business structure. The company tailors its engines specifically to each customer's motorcycle and riding habits. Realizing that the perfect solution for one situation may prove horribly mismatched for a different bike, the company constantly seeks to expand its knowledge base of a large variety of motorcycles. The company does this by exposing employees to a wide variety of bikes that come through the shop to be upgraded. The flexibility afforded by their current machining operations allows quick response to urgent customer needs.

"We have very fast changeovers with the Moris," says Ronzello, Jr. "If we're in the middle of running an engine head and a customer brings a bike in with an urgent problem that requires components we don't have in stock, it's easy for us to shift. We just drop the job currently running, put the new one in, call up the needed program and it just goes without having to really touch anything."

Increased flexibility and speed are helping R&R Cycle continue to meet the growing demand for their product. The company currently has a waiting list of approximately 400 dealers that have applied to distribute their products.

"We're very fortunate right now in that the quality of our engines has given us the opportunity to expand as fast as we can grow," says Ronzello, Jr. "The NH5000s have allowed us to reduce total machining time on an engine by over 66%. Now we're making other moves to increase our capacity."

Later this year, construction will be completed on an addition to R&R Cycle's current facility. Working closely with its distributor, Tyler Machine Tools, R&R Cycle plans to fill the area with more NH5000s and a 24 pallet linear pallet pool from Mori Seiki. The increased capacity, coupled with the benefits of further automation, will allow R&R Cycles to continue its growth, providing standard setting high performance engines to motorcycle enthusiasts around the world.

#### About Tyler Machine Tool

Tyler Machine Tool is a premier distributor of machine tool equipment serving the Western and Eastern New England states. For more information on Tyler Machine Tool, please visit [tylermachine.com](http://tylermachine.com) or call 603-474-7730.

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