ENGINEERING YOUR SUCCESS.

Hydraulic Pump Division **SUCCESS STORY: ACME Machine Works Inc.**

ALUMINUM SMELTER EXTENDS LIFE, SHORTENS CLEANING TIME WITH AUTOMATED CRUCIBLE CLEANER POWERED BY PARKER GOLD CUP® PUMP

CUSTOMER
ACME Machine Works Inc.

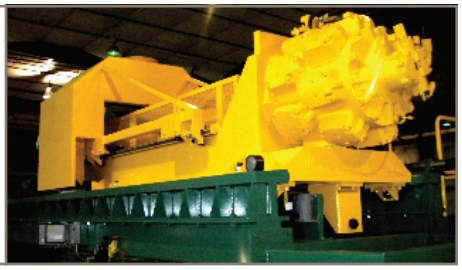
CHALLENGE
Provide reliable, versatile hydraulic power to demanding new automated crucible cleaner

SOLUTION
Parker P24S GOLD CUP® pump and Calzoni MRT 14000 motor

VALUE
Faster, more frequent and efficient crucible cleanings

CUSTOMER

To shorten cleaning time and significantly extend crucible life, Century Aluminum (Monterey, Calif.), a primary aluminum smelter, contracted with ACME Machine Works Inc. (Spokane, Wash.) to custom design and build a fully automated crucible cleaner for its Ravenswood, W. Va. operation.



CHALLENGE

Previously, crucibles were cleaned by manually digging out the remaining bath and electrolytes from the reduction cell with pneumatic hammers – a time consuming, tedious and expensive process because the hammer would damage the refractory brick in the crucible liner. Liner replacement for the 68-inch inside diameter and 36-inch deep crucibles was particularly expensive.

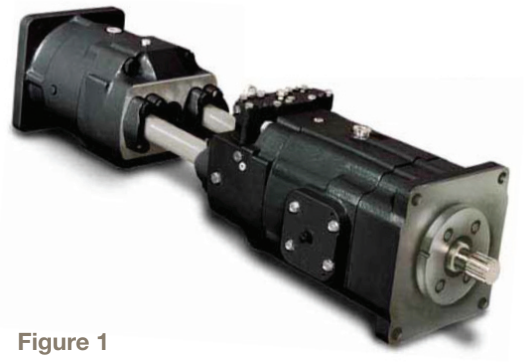


Figure 1

SOLUTION

ACME designed a new crucible cleaner for Century Aluminum that has a 10-minute cycle time if the remaining material in the crucible is still hot after the pour. However, if the crucible is cold or extremely dirty, the cycle will run longer. This is because the machine is designed to slow as more resistance is sensed during cleaning.

To supply hydraulic power for its fully automated cleaner, ACME chose a Parker P24S GOLD CUP® pump with a built-in hot oil shuttle valve and an electronic proportional volume control to permit speed changes depending on crucible cutting conditions. The motor is a Parker Calzoni MRT 14000. At the system's operating pressure of 2,000 psi, the motor delivers 23,000 ft.-lbs. of torque. At the motor's maximum rated pressure, the torque is 40,000 ft.-lbs.

"A previous smaller cutter had used a Sundstrand pump," said Don McManus, Vice President and Sales Manager, ACME Machine Works Inc. "For this application we also looked at Rexroth and Parker. We selected Parker on the basis of available controls, capacity, cost and excellent local support."

The GOLD CUP® series of hydraulic pumps and motors (Figure 1) have earned a solid reputation for their robust, reliable construction and ability to run in stable condition at high speeds and pressures

"Ultimately, Century Aluminum will be able to save between two and four hours per crucible being cleaned. An additional benefit is that crucibles are cleaned more frequently, which results in a net carrying capacity increase that ultimately will reduce the number of trips between the pot rooms and cast house. Furthermore, the cost of crucible liner replacement will be significantly reduced for our customer."

— Don McManus, Vice President and Sales Manager, ACME Machine Works Inc.

in severe duty applications such as the ACME crucible cleaner. Extremely fast compensator response time and versatile control installation are also hallmarks of the GOLD CUP® brand.

Parker's GOLD CUP® pump/Calzoni motor combination proved ideal for ACME's new machine design and provides design flexibility to obtain various types of operation for many applications…

- The combination of a closed hydraulic circuit with a variable pump and fixed motor provides a constant torque output at a fixed maximum pressure over the pump's full speed range. Speed and direction are controlled with a variable displacement over-center pump.

- The combination of a variable pump and variable motor provides for an extended range of motor speeds. At full displacement, the motor delivers maximum torque while its speed and direction respond to displacement changes of the crossover center pump. Power is proportional to motor speed.

- The transmission system has the capability of constant torque and rising power until the pump reaches a displacement and pressure that is equal to that of the drive motor power, then is electronically de-stroked as the pressure is increased in order to maintain a constant horsepower level that will not exceed the drive motor capability. This system provides high speeds at lower pressures, but also provides full motor torque and maximum set pressure.

Additionally, ACME incorporated a different style cutter (Figure 2) from that typically used in the industry in order to achieve the best balance between cost, cutter life and ease of change-out replacement. The cutter is a $30 cast insert with a cemented carbide face. Depending upon how hot the material in the crucible is, cutter insert life is approximately 40 to 50 crucibles. Competitive cutters are round and more expensive, and are also more difficult to change-out in that they require removal and re-installation of a through-bolt that becomes fouled during normal operation.

VALUE

In the new automated cutting operation, once the operator pushes the start button, the crucible being cleaned is rotated 135 degrees instead of the industry standard 90 degrees. This extra 45 degrees of rotation provides for better cleaning. Once the machine completes the cleaning cycle horizontally, the crucible is tipped another 45 degrees to knock loose the debris that was created. The system is sized to process three to four crucibles per hour with each crucible being cleaned after every four to five pours. The cleaned material is then ground-up and re-introduced into the reduction cells.

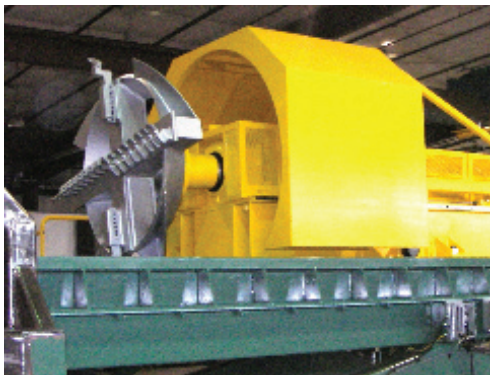


Figure 2

1/2010

Parker Hannifin Corporation
Hydraulic Pump Division
14249 Industrial Pkwy.
Marysville, OH 43040
phone 937 644 3915
fax 937 644 0827
www.parker.com
www.phpump.com