A BARDEN

Precision Bulletin

Emerson Bearing
Service. Inventory. Solutions.

Number 13

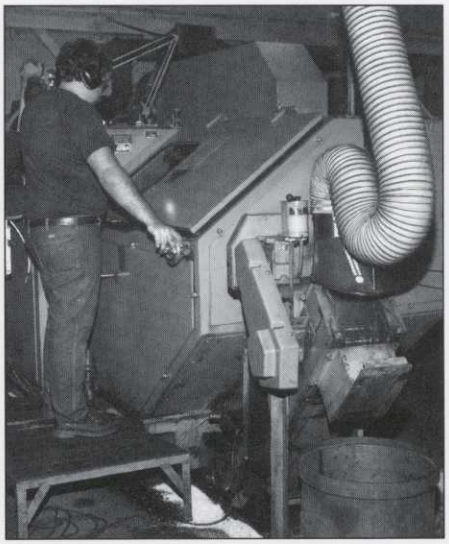
MANUFACTURING HIGH PRECISION BALLS

Blank made from wire | **Headed sphere** | **Soft grind removes flashing** | **Heat treating adds strength** | **Hard grind polishes balls** | **Lapping further hones surface**

Barden precision ball bearings are designed to meet exacting standards for performance, quality and reliability that exceed industry norms. This level of precision is attainable only by carefully monitoring and controlling a wide range of manufacturing and process variables. The balls used in Barden bearings are measured against the same stringent criteria that inner and outer rings are subjected to. The combination of near perfect raceway and ball geometry results in bearings that excel in accuracy, wear and endurance. This Precision Bulletin examines how balls are made at the Winsted Precision Ball Company, a Barden subsidiary.

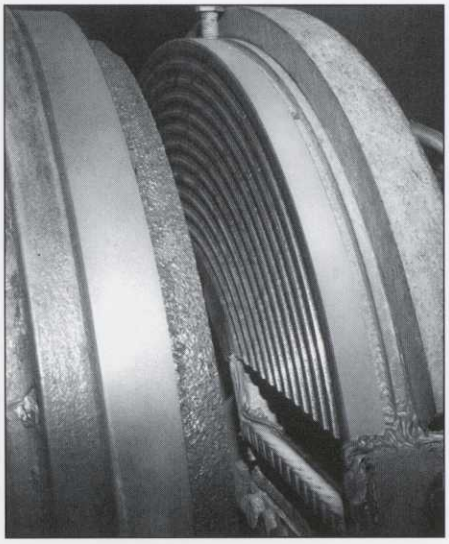
Wire coils in storage

Many different types of wire materials are used to make balls, depending upon properties required. Wire is kept in inventory in the form of coils. Materials used include Type 440-C and Type 302 stainless steels, chrome alloy AISI 52100, M-50 and T-15 tool steel, and brass.



Ball headers heading ball spheres

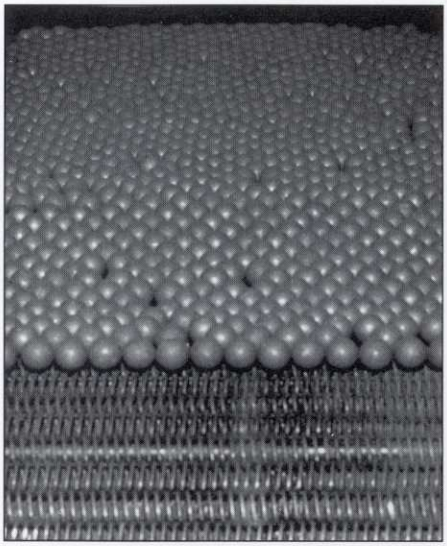
Headers draw wire from coils and make headed spheres, a process which compresses and strengthens the steel. The headed sphere forms the nucleus of the ball from which material is removed through a series of grinding and lapping operations.



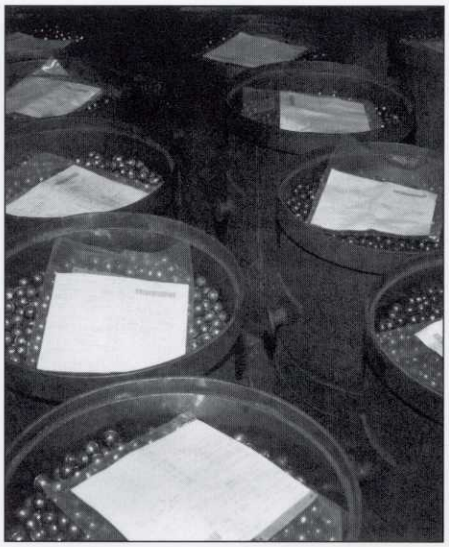
Soft grind plates

During the "soft grind" phase each batch of balls is ground between two concentrically grooved cast iron grinding plates which remove flashing caused by the cold heading operation. The process takes between four and thirty hours, depending upon the toughness and type of material.

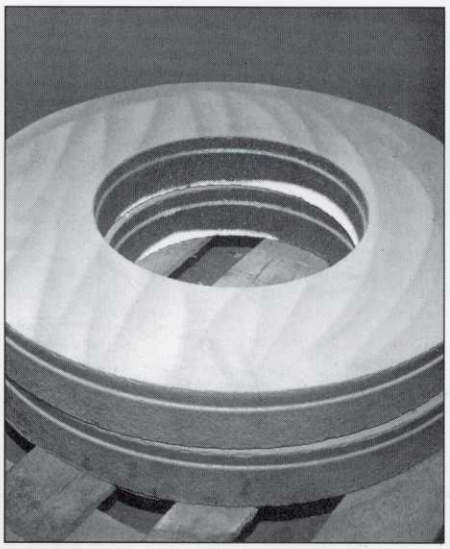
THE BARDEN CORPORATION
P.O. Box 2449
200 Park Avenue, Danbury, CT 06813-2449
(203) 744-2211



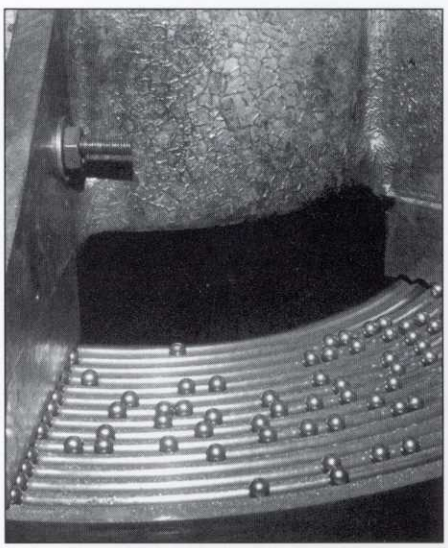
Balls on heat treating conveyor
Balls are heat treated in large furnaces. Feed rate and temperature are carefully monitored and controlled. Heat treating balls between 1,500° F and 2,000° F, depending on the material, alters the molecular structure of the material resulting in a hardened, strengthened and better ball.



Inventory/process control
Quality control is guaranteed through small batch processing and careful monitoring. Each production run is segregated and identified with a bar-coded electronic "paper trail." Lot traceability, routing status and inventory are all controlled from beginning to end.

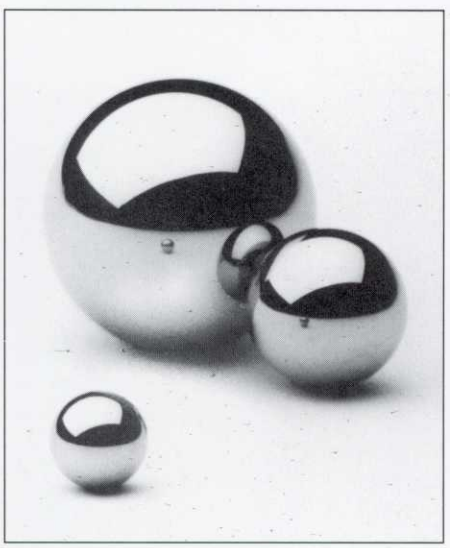


Hard grind plates
The hard grind operation is very similar to the soft grind phase except that only one of the opposing grinding plates is grooved cast iron. The second grinding plate is flat and made of an abrasive material. The ball surface becomes noticeably rounder and smoother after hard grinding.



Lapping machine
The final grind is called lapping. Two grooved, carefully matched plates fine hone balls. An oil and industrial diamond or aluminum oxide slurry provides the cutting capability. Balls are fed into lapping channels at random to ensure complete integrity of the operation.

Quality control inspector
Balls are inspected and tested throughout all phases of the manufacturing cycle. A metallurgical lab performs hardness and nondestructive tests which can reveal batch flaws. Constant testing and inspection ensures that only balls of the highest quality will ever be used in a Barden precision bearing.



Finished balls
Finished balls are cleaned and degreased as the final step in the production cycle. Balls can be lapped to 3 millionths of an inch and can be finished to within one millionth of an inch for the ultimate in precision and accuracy.

Emerson Bearing
Service. Inventory. Solutions.