

Project Title: [Bocal Hardness and Curvature](#)

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Area: [Mechanical Engineering](#)

Sponsored by: [Fox Products Corporation](#)

Fox Products of South Whitley, Indiana is a manufacturer of double reed musical instruments. These include bassoons, contrabassoons, oboes and English horns. Fox seeks to improve uniformity in the hardness of their bassoon bocals. A bocal is a hollow conical metal tube attached at the small end of a musical instrument to extend its length. For the scope of this project it is made of silver plated nickel silver. In addition to uniform hardness, the bocal bending process should also yield consistent curvature and consistent length. Fox Products has determined a uniform hardness and consistent curvature will enhance the bocal's acoustical properties.

The successful completion of this project will require a bassoon bocal with an average hardness of HRB 42-45. The most current average hardness is HRB 70. The current standard deviation of 8.5 should also be reduced by at least 20%. The final dimensions of the bocal must match Fox Products' current design with a +/- 0.010" tolerance.