The purpose of this project was to analyze the microwear polish patterns on numerous stone tools, both archeological samples (Neanderthal tools) and control stone tools made recently using ancient techniques. Microwear analysis is one method used by archaeologists to determine the functions of the stone tools. A few archaeologists have obtained qualitative data on the microwear polish patterns present on stone tool artifacts using standard optical microscopy techniques. They have shown a relation between the qualitative surface roughness and morphology of the wear pattern and potential functions of the tools, such as meat cutting, dry hide scraping, and wood shaping, among others. In this project we coupled the qualitative optical microscopy analysis of the microwear polishes with quantitative atomic force microscope (AFM) analysis of the microwear polish on the stone tools. Using standard optical microscopy techniques, we selected control regions, which had no visible evidence of a polish, and compared them to regions with visible evidence of a polish. With the AFM we were able to obtain the surface roughness measurements of the control regions and the polish regions. There are significant differences in surface roughness between the control and polish regions, and we can link the extent of the polish to the possible uses of the stone tools. These AFM techniques have previously only examined recently-made control stone tools, and have never before been applied to real archeological artifacts.