Pipe Construction Techniques in the Pre-Colombian Southwest Adam Sezate, Archaeology Southwest and University of Arizona

Introduction

Southwestern smoking pipes in the archaeological record span a temporal range from the Late Archaic to the Historic period. Many styles have been found throughout the region. However, the most common styles are conically and tubular shaped pipes of stone and ceramic.

Stone pipes in particular represent an investment simply because they can be timeconsuming to construct and last significantly longer than their ceramic counterparts. This brief study shows some of the techniques that may have been used to construct stone and ceramic pipes with the tools that were available in the pre-Colombian Southwest.



Methods

For the construction of stone pipes several grades of vesicular basalt were used. Some were denser and harder than others. For shaping, pecking with hammer stones and sanding with sand stones were used. For drilling, a variety of basalt, chert and obsidian flaked stone tools were knapped into thin sections and used as drills. I obtained materials from Sentinel Mountain located above the Santa Cruz River in Tucson, Arizona and the Upper Gila River Floodplain near Gila, New Mexico. Clay and sand from the Santa Cruz River and Hopi Yellow clay formed the paste used to construct the tubular ceramic pipes.

To measure efficiency, the time to shape and drill stone pipes was measured with pecking, sanding, hand drilling, and hafted drilling. Ceramic pipe construction time was measured only for the shaping and firing. After the pipes were finished, I visually inspected the use wear patterns left on the stone pipes and the tools.

				Re	esults					
one Pipes	Original Max Length	Original Max Width	Red. Length	Red. Width	Shaping Method	Time to reduce	Drilling Method	Drill 1	Drill 2	Time to Drill
ila River V. Basalt B1)	8.6 cm	7.5 cm	6.2 cm	4.4 cm	Sand/Peck	4.5 hours	Hand Drill/Peck	3.3 cm	2.9 cm	> 8 hours
entinal Peak V. asalt <mark>(VB2)</mark>	10.2 cm	8.3 cm	8.3 cm	6.3 cm	Pecking	2.8 hours	Combo.	3.9 cm	4.4 cm	5.25 hours
ila River V. Basalt ' <mark>B3)</mark>	5.7 cm	5.4 cm	5.0 cm	3.8 cm	Pecking	.5 hours (break)	Hand Drill/Peck	1.4 cm	.3 cm	.25 hours (break)
ila River V. Basalt B4)	5.2 cm	5.3 cm	5.2 cm	5.3 cm	No shaping	NA	Hafted Drill	1.9 cm	.8 cm	.5 hours (break)
eramic Pipes		Time to Sha	ape Tim	ne to F	ire					

and the second sec			_
anta Cruz (SC2)	.35 hours	2.5 hours	
anta Cruz <mark>(SC1)</mark>	.4 hours	2.5 hours	
lopi Yellow <mark>(HY3)</mark>	.1 hours	1 hour	
lopi Yellow <mark>(HY2)</mark>	.1 hours	1 hour	
lopi Yellow (HY1)	.25 hours	1 hour	

All four stone samples were varying degrees of vesicular basalt. VB1 was by far the hardest and densest of the samples. Shaping the exterior was done with a combination of pecking and sanding.

Conversely, VB2 was a softer pipe with larger cavities. Pecking was sufficient to shape the pipe under three hours. Sanding provided no added benefit. VB3 is the softest pipe with the largest cavities. Unfortunately, pecking created a fissure early in the shaping process and I was forced to abandoned the pipe. VB4 was a red vesicular basalt where no shaping was conducted. The original pipe dimensions were sufficient to begin drilling.

Three of the four pipes were drilled using a variety of techniques while VB4 was drilled only with a hafted drill bit. Ceramic pipes were constructed quickly with aid of sticks to form the clay around the smoke holes and a "pinch pot" method to shape the exterior. HY1 and HY2 were pinched and formed quickly by hand. The interior bowl was formed by carving it with a small stick and then punching it through the end of the clay to form the smoke hole. HY3 shaped in the form of a modern smoking pipe. Two cylinders were formed, one around a small stick and the other pinched; both were scored together at 90 degrees. SC1 and SC2 were formed using a conically shaped mesquite stick to

When constructing vesicular basalt pipes a variety of techniques can be used for shaping the exterior. My observations suggest that there is no single best technique that can be applied to shaping pipes. The technique is largely dependent on the type of stone. Two of the four stone pipes were destroyed in the process of construction as a result of improper pecking. Soft vesicular basalt, especially when pecked at an angle, can flake in a similar manner as any siliceous material. Furthermore, pecking with too

Drilling is difficult by hand. One must peck with the drill bit and twist to provide both the penetration and outward force to widen the hole. No single method alone can provide an effective drill. As with VB4 before its destruction, a hafted drill bit can better provide both. It is easier to provide downward force on the drill shaft and provide a much faster rotation using a fire starter technique (rubbing the stick rapidly between two hands). The disadvantage to this is that it requires more advanced knowledge on flaking stone tools. One must flake a drill bit that is able to be hafted, which is difficult and similar to producing a projectile point. Otherwise, drills only need be roughly conical in

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Figures 12-15, in clockwise direction beginning in top left corner. Figure 12 shows VB2 pecking use-wear. Figure 13 shows VB4 hafted drilling use-wear. Figure 14 shows sanding use-wear. Figure 15 shows drilling and pecking use wear on basalt stone tool.