

Stone sawing machine at the Temple of Artemis in Jerash, Jordan

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Abstract

Finishing materials play an important role in architectural design. Since ancient times, claddings made of noble materials (mainly stone) convey grandeur. Clearly, there was a technology to transform quarry stones into slabs using stone sawing machines. An example of this comes from the excavation work carried out in 1930 at the Temple of Artemis in Jerash (6th century AD). The archaeologists found a facility which was classified as a stone sawmill. The efficiency of such machines, their construction method and their resistance characteristics have not been studied as yet. This paper aims to define such parameters for the stone sawing machine located in Jerash.

Keywords: design analysis; historical technology; stone sawing; Jerash; roman machine; watermill.

Máquina de aserrar piedra en el Templo de Artemisa en Jerash, Jordania

Resumen

Una parte importante en el diseño arquitectónico son los materiales de acabado. Desde la antigüedad, los revestimientos en materiales nobles, principalmente pétreos, significaban magnificencia. Es evidente que existía una tecnología para la transformación de piedras de cantera en losas con máquinas de serrar piedras. Un ejemplo importante proviene de las excavaciones arqueológicas, realizadas en 1930, del templo de Artemisa de Jerash (S.VI dC), en el cual se descubrieron unas instalaciones catalogadas como un taller de aserrado de piedras. La eficiencia, modo de construcción de tales máquinas y su resistencia no han sido estudiadas con anterioridad al presente artículo. En este trabajo definimos estos parámetros para la máquina de serrar ubicada en Jerash.

Palabras clave: análisis de diseño; historia de la tecnología; aserrado de piedra; Gerasa; maquinaria romana; noria hidráulica.

1 Introduction

An important consideration in an architectural project is the proper use of the finishing materials. The cladding of walls with noble materials (mainly stone) is a procedure which has been used since ancient times to give some distinction to a building. This construction system was well established. In his book *De Architectura* (27 BC- 23 BC), Marcus Vitruvius Pollio, [1], refers to this when describing the marble-cladded walls in the house of King Mausolus (351 BC). In *Naturalis Historia* (77 BC), Gaius Plinius Secundus, [2], makes reference to this same building and claims that there is a technology for cutting marble into slabs. He clearly states that the stone was cut by abrasion, as a result of the reciprocating motion of metal saws over a line on which fine-

grained sand was fed. The first evidence of this cutting technology in Roman times can be found in a poem by Decimius Magnus Ausonius, [3], to the river Moselle (370 BC- 371 BC). There, he corroborates Plinius claims and points out that the sawing process is powered by a water wheel.

In 1930, during the excavation work carried out at the Temple of Artemis in Jerash (6th century AD), the archaeologists found a facility which was classified as a stone sawmill [4]. This construction includes reservoirs to collect water, a mill race with lateral walls which possibly served as a support for a hydraulic wheel (Fig. 1) and, most significantly, two limestone column drums showing evenly spaced and perfectly linear saw marks which were made using four blades. The depth and linearity of those saw marks