

King Asoka's Amazing Engineers



S. Dhammika

Essays on Buddhist History & Culture

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King Asoka is widely acknowledged to be one of the most unusual, not to say one of the greatest, monarchs of all time. And it was Buddhism that made him so. He is also the first Indian king for which we have a great deal of authentic knowledge; his dates, his personality, his religious impulses and his policies. This is because we have a large amount of information about him in his own words, which is what his edicts are, not the usual royal proclamations full of hyperbole and artificial language, empty boasts and fake genealogies. This is almost unique in the ancient world, certainly in ancient India until the Muslim period. As a result, Asoka's edicts have been studied in great detail. As is well-known, these edicts were written on boulders, a few on separate slabs of stone and of course most noticeably on great stone pillars. Crowning each of these pillars was the image of an animal, some of which survive; a noble bull, an elephant, a lion and in two cases four lions back to back, as with the famous capital crowning the pillar erected at Sarnath where the Buddha preached his first sermon. These pillars and their capitals have also been studied in great detail, mainly for their aesthetic qualities, as works of art. But there is one aspect of Asoka's pillars that has received very little attention; the engineering skills that went into designing, producing, transporting and the erecting them.

Today only 30 pillars survive; some are fragmentary, some are lying prostrate, some are still standing but without their capitals, and only two, the one at Lauriya Nandangar and the other at Vesali, are still complete, both with lion capitals. Over the last 2250 years some pillars such as the one at Lumbini were struck by lightning, others like the one at Sanchi were broken up so that their stone could be used for other purposes. The pillar at Patna was probably washed away by the Ganges River's constantly changing course and the one at Sarnath was smashed when the tower of

the nearby temple collapsed on it. How many other pillars there were is unknown, but what remains give us some idea of the engineering implications of these remarkable monoliths.

All Asoka's pillars are made of a hard, fine-grained, honey-coloured sandstone from the quarries at Chunar, about 30 km. further up the Ganges from Varanasi. Even today the evidence of Asoka's masons can be seen in long cuttings in the stone out of which the pillars were formed, and



A broken and discarded pillar at Chunar

sections of pillars that were abandoned either because they broke or because of faults in the stone. After a long section of stone has been cut it had to be shaped. This must have been done by teams of men with iron tools and with the utmost care. When the required shape was near to finish a process of pecking got the surface closer to what was needed. The evidence of this pecking can be seen on the sections of the pillars that were meant to be underground; thousands of tiny peck marks done with a pointed tool. The pillars are exactly cylindrical and taper perfectly from bottom to top with a graduation of only centimetres. Exactly how such precision was achieved on huge, heavy and unwieldy pieces of stone is unclear, but it points to considerable technical skill. When the final shaping was finished the pillars were then polished. This was done by rubbing abrasive grit lubricated with water over the surface of the pillar, a low-tech task but laborious and time-consuming. Probably scores of men worked on each pillar for several months.

When ready the pillar would be carefully rolled down to the Ganges, the way having been smoothed for the purpose, and then loaded onto low barges. A look at

a map showing where all Asoka's pillars are or were situated with show that they are all near (maximum of 25 km.) from a large river, one exception being the pillar at Sanchi.

How was Sanchi pillar transported over sometimes rugged and hilly country



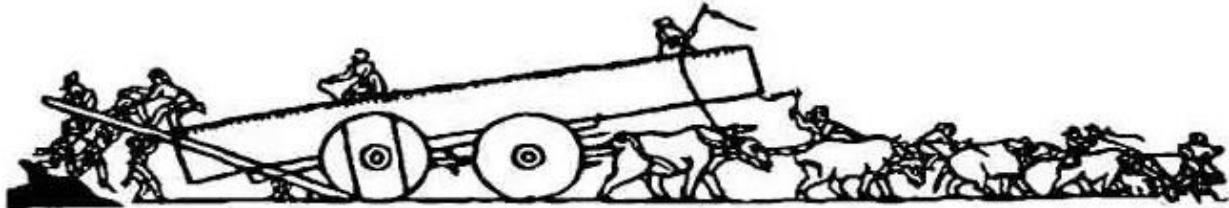
Mason's marks at Chunar

the nearly 600 km from Chunar to where it was erected? How were the other pillars moved from where they were unloaded on the river banks to where they were to be erected, sometimes up to 25 km. away? Fortunately, we have information from some Muslim sources that can answer such questions. Asoka's pillars have long attracted admiration and wonder. Indian monarchs occasionally ordered them moved from where Asoka had them placed to royal capitals. The two pillars now in Delhi were moved from their

original place, the Allahabad pillar originally stood in Kosambi, the one now in the mosque in Fatehabad and the other nearby at Hisar were both moved from their original locations.

Firuz Shah Tughlaq who reigned from 1351 to 1388 saw the pillar Asoka had erected in Topara and was amazed by it. Initially he thought it was made of bronze and dubbed it "the golden pillar". He ordered it to be taken all the way to Delhi to enhance the glory of the new capital he was building there. This major operation was done like this. Kapok cotton was wrapped around the pillar and it was then lowered on a soft bed, encased in reed and raw skins and placed on a carriage with 42 wheels. Two hundred men then pulled the carriage with strong ropes to the bank of the Yamuna River, the pillar was eased to a large barge by means of pulleys and levers and then transported down the river. Just in the last few years an ancient manuscript

has been discovered with an illustration of this operation. Further, an engraving on the ancient fort at Raichur gives some more information about transporting such pillars. It shows a carriage with four huge solid wheels and nine bullocks pulling it with a team of men at the rear with levers helping it along. There is good reason to suppose that Asoka's engineers transported the pillars like this.



Engraving from the fort at Raichu

Having been delivered to the place where the pillar had to be erected it then had to be raised. But that could not have been as easy as it sounds. Each pillar was to have a capital on it and some of the ones that survive weigh two or three tons. We know that these capitals were attached to the top of the pillars with a bronze bolt. But whether the capital was affixed to the pillar before it was raised or after it was, cannot be determined. Either way this again would have been a major and difficult operation. To take the pillar a hole was dug 2.50 m deep on average and a square stone slab was placed in its bottom. The pillar was slid into the hole by means of ropes until it stood upright and earth and gravel filled the hole and then rammed in.

Other than the ones struck by lightning or deliberately toppled, nearly all the pillars erected stood for 2300 years without ever leaning; such was the skill and care of Asoka's engineers. The only exception are the two pillars at Rampurva. Due to an oversight the place selected to erect them has water near the surface, making the ground slightly sodden. Consequently, the pillars started to lean and eventually toppled. When they were discovered they and their capitals had gradually sunk into

the ground so that only a part of one pillar could be seen. We know nothing about Asoka's engineers beyond their work; their names, their origins, how they acquired their skills has all been lost. It was these engineers' skills that made the pillars as perfect as they are, but it was Asoka's deep faith in the Buddha's Dhamma that led them to being created in the first place.