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ASSIGNMENT 1 – THE PYRAMIDS OF GIZA

' Instructor's Name'

' Subject'

The Great Pyramids of Giza are a symbol of the magnificent construction techniques of the Ancient Egyptians. Centuries have passed, still the mystery behind how these grand monuments, which have stood tall through the test of time witnessing rise and fall of multitude of civilizations, were constructed. It is the last remaining testimony of a glorious era, and a symbol of the splendor of human engineering skills. The sheer size of the pyramids rivals any contemporary building, built using modern technology and equipments. They were constructed sometime in 2547-2524 B. C, and for a whopping 3, 800 years these pyramids held the record for being tallest structures on the earth.

For the ancient engineers, the two most challenging aspects of the pyramid construction would have been to lift the heavy stones to great heights, and to place them in an accurate position. There are many theories floated regarding the construction of these pyramids, including outrageous ones such as the alien theory. Unfortunately, all the theories are based on assumptions and suppositions, as it could not be clearly laid down how these gargantuan structures can be built by the primitive means available to the Ancient Egyptians. However, based on archaeological evidence Egyptologists have put up many theories to explain the constructions of the pyramids of Giza, which includes the external ramp theory, and Jean-Pierre Houdin's " internal ramp" theory.

The external ramp theory suggests that, an external ramp was built on one

side of the pyramids and as the structure progressed the ramp was also raised. This theory, proposed by Jean-Philippe Lauer, further state that a single ramp made of mud bricks would be constructed and extended as the pyramid rose, and the stone blocks would be brought up through them using rollers and levers. It was one of the broadly believed theories by Egyptologists, because a large straight ramp is the only structure, which could effectively build the entire pyramid. The theory is heavily based on the accounts given by Herodotus in the 5th century BC, who was one of the earliest scholars to write about the pyramids. He wrote in his accounts, " This pyramid was made like stairs, which some call steps and others, tiers. When this, its first form, was completed, the workmen used short wooden logs as levers to raise the rest of the stones; they heaved up the blocks from the ground onto the first tier of steps"

Though most of his assumptions are questioned by the modern day Egyptologists, his account gave merit to the levering and ramp theories. However, the model had some serious shortcomings, like lack of ample archaeological evidence, huge labor costs, and functional problems in constructing such a massive structure. Dieter Arnold, a pyramid expert, states that the ramp would have buried the entire trunk of the pyramid during the construction period, thus obscuring the corner and edges of the pyramid, which would have hampered the mathematical calculations of the engineers.

In any structure, particularly this pyramid where the four faces meet at an exact point 500 meter above the ground, human eye observation is a must. As in this theory, if the ramp is removed at the end of construction, and the

pyramid is visible only after the building process, it would be too late for even minor corrections. Also dragging a block across such a steep structure is not a feasible task. To finish the upper part of the pyramid, the ramp has to be as high as the dome of St. Peter's Cathedral, which raises questions regarding the practicability of this theory.

The internal ramp theory was proposed by Jean-Pierre Houdin, a French architect, who spent eight years studying the pyramids of Giza to unwrap the mystery of its construction. To develop this theory Houdin used a CAD architectural model of the pyramids, and tested a construction method proposed by his father who was also an architect. Houdin's theory proposed that each ramp of the Great pyramid was built as a spiral and ended up in an open space. He suggests that the pyramids were built in two stages. First, a 2m inner ramp was first built by the workers leaving the corners open. The workers would then maneuver the blocks around this inner ramp to complete the structure.

In this theory the inner spiral ramps help the workers to move the heavy stones, as opposed to traditional theories which believed that the Egyptians used outer ramps for construction. As the pyramid structure rose towards the sky the ramp too was lengthened. Once the construction was completed, according to this theory, the inner ramps were shut as their purpose was met. Houdin consulted renowned Egyptologists, such as Robert Brier, before finalizing his theory. His version, developed using modern technology, is the latest and most widely accepted version.

The pyramids of Giza till data remain an engineering enigma, with no proper theories in place, which could fully explain the construction of such

magnificent structures, without the modern day iron tools or technologies. Much of the earlier theories' shortcomings are addressed by Houdin's theory, but there are no scientific proofs to back his theory yet. His team is seeking permission from the Egyptian government to conduct non-invasive scientific tests, such as microgravimetry and infrared and acoustic testing, on the pyramids. If those tests are allowed maybe it will give some concrete facts about the methodology used for the pyramid construction. With available data, though, the internal ramp theory sounds more nearer to the truth than the other theories. The mere fact that 5000 years later the humankind is still wondering how an ancient structure was erected is in itself, a testimony to the engineering brilliance of the pyramids.

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