

**Open Letter to Dr. Mark Lehner
from Bill McNulty**

**Version 2.1
April 2018**



**Fig. 1 Casting Hieroglyphic from
Funerary Papyrus of the Steward of Sethnakhte**

In the 1991 NOVA special “This Old Pyramid” Professor Joseph Davidovits explained his pyramid construction theory. In 1991 Professor Davidovits believed a material similar to concrete was carried in a wet form to the site of the Giza Pyramids and cast in wooden forms. Professor Davidovits was questioned by Dr. Mark Lehner on his theory of Egyptian pyramid construction and their dialog can be seen in the above video. I would like to offer different answers to Dr. Lehner’s questions about the construction of Ancient Egyptian Pyramids.

Joseph Davidovits and Margaret Morris coauthored “*Pyramids: An Enigma Solved*” which details their pyramid construction theory. Joseph Davidovits has released an updated book on his theory called “*They Have Built the Pyramids*” and Margaret Morris has released a new book “*The Egyptian Pyramid Mystery is Solved.*” For a more detailed description of their theories of pyramid construction visit www.geopolymer.org and www.margaretmorrisbooks.com.

Before I address Dr. Lehner's questions I would like to state that Joseph Davidovits and Margaret Morris were an inspiration to start my own investigation into construction of the Giza Pyramids. I've developed my own theory of why and how the Giza Pyramids were built which can be found at <https://www.gizathrone.com>.

Now to Dr. Lehner's questions –

Question 1. “What was the advantage of this ... of reconstituting the limestone... What was the advantage as opposed to cutting the blocks?”

Current archeological belief states that blocks of stone weighing up to 70 tons were dragged up temporary external ramps or internal ramps to build the Giza Pyramids. An investigation using infrared light is currently being carried on to locate this possible internal ramp. This possible ramp has been detailed by Bob Brier and Jean Pierre Houdin in their book “The Secret of the Great Pyramid”. Another possibility is that the blocks of stone used in Pyramid construction were cast by Ancient Egyptian pyramid builders who carried buckets of natron (sodium carbonate) and limestone (calcium carbonate) or granite to wooden or woven casting forms to cast the Giza Pyramid blocks in situ. Once the forms were filled with the cementitious material of natron and limestone or granite jugs of water were added to turn the material back into a solid stone. This cementitious material is similar to concrete and the Ancient Egyptians were the first to cast pyramids, Egyptian statues and obelisks.



Fig. 2 Workers casting pyramid blocks from the Tomb of Rekhmire

© Zeitouna - *Atlas of Egyptian Art*

In the Tomb of Rekhmire a couple of murals depict scenes of pyramid block casting. The upper section of the Rekhmire mural above shows a brick maker making mud bricks, as they are still made today. The water carriers and the workers of the lower section of the mural are carrying material from piles of natron and limestone or granite to pre-

positioned forms to cast pyramid blocks. The size of the two piles of natron and limestone or granite are a pictorial representation of the percentage of the natron to stone mixture. The Giza Pyramid builders cast the pyramid blocks with a mixture of 20-30% natron to 70-80% limestone or granite dust and chips.

After the wooden or woven casting forms were filled with the cementitious mixture large jars of water were added until the cementitious material had the consistency of a slurry. After a short period of time the wet cementitious material would harden into a solid stone and resemble a carved block of limestone or granite. After the cementitious material hardened the casting forms would be removed, repositioned, refilled and the procedure was repeated over and over as the Giza Pyramids rose course by course.

After the cementitious material hardened a layer of salt would rise to the top of the cast pyramid stones. This salt residue was removed with boning rods and string before the next course of pyramid blocks was cast. For a description of pyramid casting please read the casting article at www.gizathrone.com.

Question 2. “You know there is mortar between the blocks in the pyramids?”

The simple answer to this question is - toes. Or more specifically, pyramid builder’s toes. To prevent the Ancient Egyptian pyramid builders from breaking toes and other bodily injuries it was necessary to fill the gaps between the stone blocks. Filling the gaps between the pyramid blocks also fixed the natron component of the cementitious mixture. Mortar was the best material to fill the gaps between the Giza Pyramids blocks because it would flow into the gaps.



Fig. 3 Tomb of Rekhmire mural showing workers casting pyramid casing stones

© Zeitouna - *Atlas of Egyptian Art*

The interior chambers of the Giza Pyramids were not sealed and a layer of salt was present when the chambers were opened in 820 A.D. Salt encrustation in the Great Pyramid interior chambers is still a continuing problem. The salt which leaches from the interior chamber walls of the Giza Pyramids has been removed numerous times in the past forty years. To stop salt leaching from the walls of the interior chambers of the Giza Pyramids a layer of sealing wax needs to be applied.

Question 3. “There are spaces between all the blocks in the pyramids. Why?”

Wooden and linen forms were used to cast the pyramid blocks of the Giza Pyramids. After the cementitious material of natron and stone went through an exothermic reaction and solidified into a solid block of stone the wooden between the blocks were removed and an empty space remained where the form separated each stone block from the next one. The spaces between cast pyramid blocks were filled with mortar during construction and in some places this mortar has disintegrated over the centuries.



Fig. 4 **A casing block on the Osiris Pyramid with an empty casting brace hole**

A slightly different method was used to cast the casing stones of the Giza Pyramids. The casing stones of the Giza Pyramids were cast without a gap between the blocks. After a casing stone was cast the wooden and woven forms were repositioned to form the far side and front of the next block. Each casing block was used to form one side of the next casing stone on the same level. When the casing casting forms were removed a hole was left at the bottom of the cast casing stone from a bracing plug that was used to hold the casting forms in place during casting.

In the casing stones of the Re Pyramid a combination of forms was used to cast the casing stones. Some Re Pyramid casing stones are smooth and flat and others have a protruding “unfinished” look. These protruding casing stones were probably cast using a combination of wood and woven linen casting forms. A wooden form was used along the interior of the blocks and a cloth container was attached to the wood that allowed the cementitious material in the forms to extend beyond the exterior or exposed wooden casting forms. This wood/linen casting form combination gave each casing block a unique “unfinished” shape. A similar method of casting stone was used in the blocks of Machu Picchu and Cuzco in Peru.



*Fig. 5 Casing stones of the Re Pyramid
(Note the smooth sides of the blocks in the upper left corner)*

Question 4. “But, in the Queens Pyramids where the pyramid is almost half destroyed, of Menkaure, for example, or the queens pyramids of Khufu, there are big, big spaces between all the blocks and they are very irregular, almost like boulders. So why are there these spaces if one block is poured against another block? Like concrete?”

The cementitious mixture of natron and stone wasn’t poured. Natron and limestone or granite was carried in buckets and poured in a dry state into wooden or woven forms on the different courses of the Giza Pyramids. Water was added to the casting forms after they were filled with the natron and stone mixture in sufficient quantities to cause an exothermic reaction. The exothermic reaction of the natron/stone mixture converted the

cementitious material into solid blocks of stone. This cementitious mixture is similar to today's concrete.



Fig. 6 **Basalt platform near the NE corner of the Great Pyramid with cracks due to bad casting**



Fig. 7 **Cast basalt platform on top of limestone base**

The cementitious material may have been put into the casting forms in a wet state but, the entire form had to be filled in one session. If a wet cementitious material was used for casting in two or more sessions per casting form a dividing line or separation would occur between each cast layer.

The basalt platform located near the Northeast corner of the Great Pyramid was probably cast with a wet cementitious material. This basalt platform doesn't contain any consistent breaks between blocks of stone. This basalt platform was probably poured or cast in one session. This may explain why the basalt platform contains a large number of fractures. It's not possible to carve the basalt platform to conform to the underlying limestone base with that degree of skill.



Fig. 8 **Stack of cement sling bags each weighing about 3 tons**

If the cementitious material wasn't mixed properly or water didn't reach all of the material then the exothermic reaction didn't produce a stable stone product. Giza pyramid workers who used a bad mixture of natron to stone mixture or the wrong ratio of water to cementitious material this would create an unstable finished product. Pyramid stone blocks cast with a bad mix would eventually disintegrate when exposed to the elements and be washed away or worn down by wind, rain and sand over the centuries. The breakdown of improperly mixed or unsealed cast pyramid stones has caused the irregular shaped blocks found on the Giza Plateau.

Question 5. “Why are there tool marks on these blocks?”

The tool marks on the Giza pyramid blocks come from copper chisels used to carve the wooden casting forms. After the natron/stone cementitious mixture solidified into a solid block of stone an impression would remain from any tool marks on the inside of the wooden casting forms. You can see the same “tool marks” in today's poured concrete where plywood is used to form concrete structures. Marks left by plywood knots in

today's casting forms can be seen after casting forms are removed when poured concrete has set.



Fig. 9 Plywood knot marks left on today's poured concrete

I hope these answers to Dr. Mark Lehner's Pyramid construction questions will help continue the debate about how the Giza Pyramids were built. Taking core samples from a number of the millions of blocks that make up the Giza Pyramids will confirm whether the stones were cut from Giza and Aswan quarries or cast in situ using a natron and stone mixture.

About the Author- I currently hold two United States patents which combine sodium carbonate(natron) with calcium carbonate, limestone, granite, schist, sandstone, basalt and other stone materials with water to re-constitute the cementitious material into solid stone objects or products. Please check out U.S. Patents - #6,264,740 and #6,913,645 at the web site - www.uspto.gov.