CHAPTER 2

Considering Realistic Construction Methods

When modern readers imagine stone cutting, transport, and other work on ancient Egyptian construction sites, they often picture harsh, exhausting labor in which most tasks depended heavily on human muscle power. It is true that, in an age without engines, any work performed against gravity ultimately relied on human effort. However, it is difficult to imagine that pyramid construction consisted of unrelenting, brutal labor comparable to slave work.

According to widely accepted scholarship, the most intensive phase of pyramid construction coincided with the Nile inundation, when agricultural fields were submerged and farmers could not cultivate their land. These farmers were conscripted as laborers. If the work had been excessively harsh, it is unlikely that conscription would have proceeded smoothly year after year. Moreover, agricultural production—and the taxes levied upon it—formed the economic foundation of the state. Overworking farmers would have risked serious social and economic consequences.

This conclusion is not based on modern humanitarian values but on a colder, more rational assessment of what would have been sustainable. It is reasonable to assume that the labor demanded of conscripted farmers was kept within the bounds of what they were accustomed to during agricultural work. They were not treated as expendable.

Another key theme of this book is sustainability. Pyramid construction spanned more than a decade—twenty-seven years in the case of Khufu's pyramid. Any proposed method must therefore be evaluated in terms of whether it could be sustained over such a long

period.

Khufu's pyramid is estimated to contain approximately 2.3 million stone blocks. Even in modern mass production, such a quantity is extraordinary. For comparison, Toyota—the world's largest automobile manufacturer—produced about 11.3 million vehicles worldwide in 2025. Pyramid construction, therefore, must be understood as a project involving the mass production of stone blocks and the execution of a large-scale construction process. In this context, sustainability becomes an essential criterion.

Another important perspective when considering ancient Egyptian construction techniques is feasibility.

Although ancient Egypt was a highly advanced civilization, it faced severe constraints in construction materials.

Timber. Large, strong, flexible beams were virtually nonexistent along the Nile. Imported cedar from Lebanon was valuable and could not be consumed in large quantities on construction sites. As a result, long beams, robust scaffolding, and precise wooden shafts were structurally difficult to achieve.

Metal fasteners. Copper nails were too soft to provide the holding power of iron. Ropes could be used to lash wooden members together, but Egyptian ropes—made from papyrus, flax, or date-palm fibers—were weak and wore out quickly, making them unreliable as structural connectors.

Wheeled carts. Although wheels may have been known earlier, Old Kingdom axles lacked bearings, and friction would have increased dramatically under heavy loads. Suitable axle timber would also have been difficult to obtain. While carts may have existed, they were not viable for transporting multi-ton stone blocks.

Pulleys. Egyptians certainly used simple methods such as looping a rope over a log to change direction, but the modern concept of a pulley with a rotating wheel and axle—let alone compound pulleys—was unlikely to have been widespread. The durability of Egyptian rope was insufficient to support such lifting systems.

Levers. Without iron reinforcement, the tips of wooden levers would have been prone to breakage, restricting their usefulness in handling heavy stone.

Given these material constraints, modern assumptions about levers, pulleys, scaffolding, and carts cannot be applied directly to ancient Egypt. Any method that relies on such equipment must be evaluated with caution.

1. Process Design and Construction Infrastructure

In 2013, a team led by the French Egyptologist Pierre Tallet discovered a papyrus archive—now known as the Diary of Merer—at an ancient harbor site on the Red Sea coast. Tallet has stated that Khufu reigned for 27 years, a figure introduced in the Conclusions of his 2017 edition of the diary.

The basis for this figure has not been clearly disclosed (see Chapter 4, Section 4, and Column 4 for further discussion). Nevertheless, among the various reign-length estimates proposed in recent scholarship, 27 years is the longest. A longer reign spreads the same 2.3 million blocks over more years, which lowers the average annual and daily production rate required. I therefore adopt 27 years here not because I regard it as established, but because it yields the most conservative possible baseline: whatever the true reign length turns out to be, the actual pace of construction can only have been faster than the figure calculated below, never slower.

If we assume a 27-year construction period on this basis, the average annual production would be 85,185 blocks, or 233 blocks per day.

However, as discussed in later chapters, the number of blocks required per course decreases as the pyramid rises, while the available working area also shrinks, forcing a reduction in the number of workers who can operate simultaneously. For this reason, production cannot be treated as uniform across the entire construction period. During the early and middle phases of construction, it is likely that a daily output of



Fig. 2-1. Comparison of block size in Khufu's pyramid with a human figure.

approximately 500 blocks was required, even under conservative assumptions.

Because the main construction season coincided with the Nile inundation—summer—daylight hours were long. Excluding meals and rest, workers may have had up to 11 hours of productive time per day. Even so, producing 500 blocks per day requires completing one block every 1.3 minutes. The more one considers this, the clearer it becomes that this was not merely "construction work" but a large-scale industrial production system requiring careful process design and continuous throughput.

The production of stone blocks can be broadly divided into two major stages: "quarrying" and "shaping."

From the nature of the work, quarrying was likely carried out by teams of workers who moved laterally across the rock face, cutting out one block after another. I assume that each sub-process—preparing the quarry surface, cutting the grooves, inducing the final fracture, and removing the block—was assigned to a dedicated group of workers, and that these units advanced sequentially to the next target area.

By contrast, the processes following quarrying were, conceptually, a kind of flow production. After rough shaping came intermediate finishing, final finishing, and—in the case of casing stones—precision finishing. Because the blocks were large and difficult to move frequently,

it is likely that the workers moved from block to block rather than transporting the stones between workstations. Both of these major production streams would have needed to handle roughly 500 blocks per day.

In addition, temporary stockyards would have been indispensable to accommodate work-in-progress, variations in block size, and fluctuations in the labor required per block. These storage areas must have held hundreds or even thousands of blocks at any given time.

From quarrying to shaping, from shaping to transport, and from transport to the pyramid itself, the entire sequence—including intermediate stockyards—would have required a layout designed to minimize backtracking and detours, ideally forming a single, straight, uninterrupted logistical corridor.

Next, the transport route itself had to be prepared. Moving 500 large blocks per day is comparable to a modern road carrying 500 heavy trucks daily. Such a route would have required durable surfacing and would have been a core infrastructure element supporting mass production. Mudbrick, used extensively for paving and scaffolding, would also have required transport routes from the Nile floodplain to the worksite.

To maintain throughput and reduce heavy manual labor, the Egyptians must have developed equipment to improve efficiency—mechanisms for breaking rock with strong impact, devices for flipping blocks during shaping, and various tools and fixtures. These devices would not have been isolated; many identical units would have been deployed to create overall production capacity.

The following sections examine these methods and tools in detail, reconstructing the production system by imagining the processes and equipment that would have been necessary.

2. Quarrying of Stone Blocks

The stone used in the greatest quantities for pyramid construction was the limestone core blocks. From Dahshur to Giza, the total number of

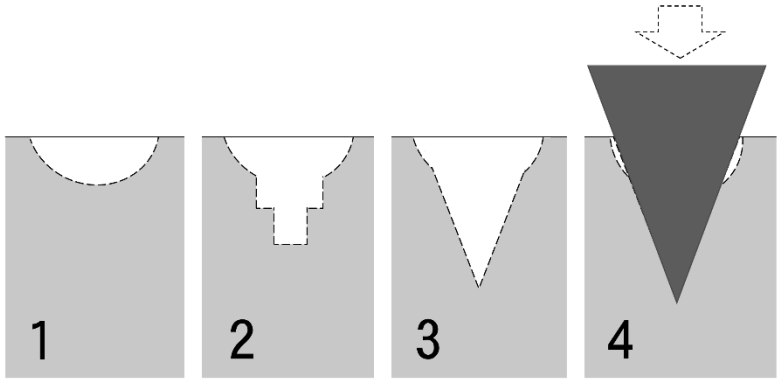

Fig. 2-2. Conceptual diagram of the stone-splitting process.

limestone blocks used in the large pyramids may have approached ten million.

The limestone quarried at Giza is classified as calcitic limestone. Calcite is well known for forming transparent rhombohedral crystals, and both limestone and calcite consist of calcium carbonate. As sedimentary rocks, they contain natural bedding planes formed during deposition.

In actual quarrying, these bedding planes were frequently exploited to split the stone. In this respect, limestone differs fundamentally from granite, an igneous rock with a dense structure and no bedding planes.

Because the unfinished obelisk at Aswan is such a famous example, detailed explanations of granite-quarrying techniques are abundant. However, the methods used for limestone were quite different. For this reason, the present book focuses specifically on the techniques used to quarry limestone.

The initial stage of stone splitting was likely as shown in Fig. 2-2. A block of diorite—harder than the limestone itself—was struck against the edge where the limestone block was to be cut, or the limestone was pounded with a stone hammer to crush the surface and create a depression (2-2-1).

This depression was then deepened using copper chisels, copper picks,

or stone hammers (2-2-2). This method is strongly supported by archaeological evidence: traces of partially worked limestone and large quantities of worn, rounded diorite hammerstones have been found around quarry sites.

At this point, however, I question the conventional view that the work shown in 2-2-2 was simply extended further—using chisels and picks to dig deeper and deeper until a long, narrow groove was formed.

To reconsider this, I imagined myself as a laborer working in the quarry.

The task of quarrying was to cut and extract large stone blocks—an ongoing struggle against the overwhelming weight of the material compared with human strength. In the early stage (2-2-1), when workers were striking the rock with hammerstones or pounding it with diorite blocks, it is natural to think that increasing the weight of the tool would increase its destructive power. But it would be physically impossible to use a hand-held tool weighing several tens of kilograms for any sustained period. The desire to use an even heavier object—something that could deliver greater force without relying solely on human strength—would have arisen almost inevitably.

What came to my mind was the yoitomake, a traditional Japanese gravity hammer still used today in places where heavy machinery cannot be brought in. As shown in Fig. 2-3, a frame is built from logs, and a heavy stone suspended by ropes is lifted by a group of workers and then

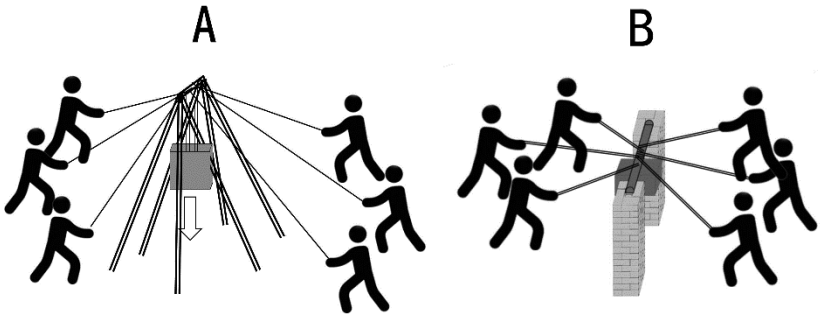

Fig. 2-3. Conceptual illustration of a yoitomake-type gravity hammer.

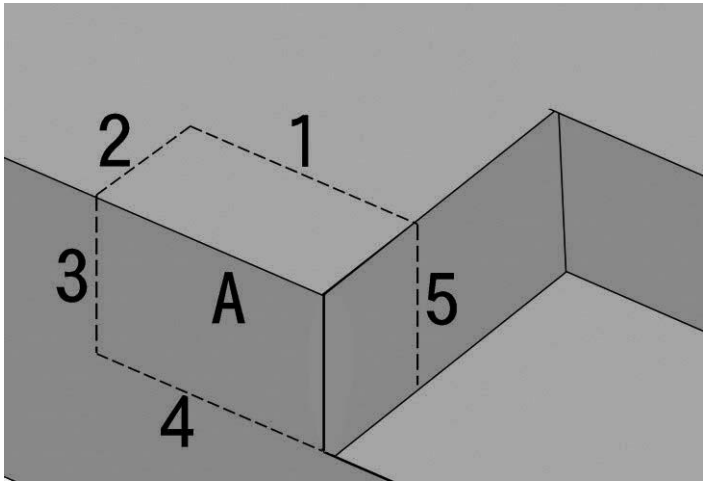

Fig. 2-4. Conceptual diagram of the preparatory stage of limestone quarrying.

dropped in unison with a shouted rhythm. This technique is used for tasks such as driving piles or leveling ground.

However, considering the material constraints of ancient Egypt, even constructing the wooden framework itself would not have been easy. For this reason, I believe that the more practical approach would have been to build square pillars made of stacked mudbricks, as illustrated in Fig. 2-3B. Mudbrick pillars could be constructed quickly, in large numbers, and with materials readily available at the site.

The next section describes how the actual fracture of the stone blocks may have been carried out.

The method of quarrying inferred from the remains found at ancient quarry sites is illustrated in Fig. 2-4. In this diagram, A represents the block of limestone to be extracted. The front side (lower left) and the right side should be understood as already quarried away.

In this situation, the preparatory work consisted of cutting grooves at positions 1, 2, 3, and 5. Position 4 corresponds to a bedding plane, but a shallow groove would also have been made there to ensure that the block would fracture reliably along the intended bedding plane.

As for the work of cutting these grooves, the use of copper chisels and

copper picks—relatively weak tools—was likely supplementary. The primary method would have been to crush the limestone by striking it with diorite hammerstones or pounding it with diorite blocks, which are harder than limestone. Rather than "cutting," the process was essentially breaking and pulverizing the rock. This interpretation is strongly supported by archaeological evidence: traces of partially worked limestone and large quantities of worn, rounded diorite hammerstones have been found around quarry sites.

In addition to the methods shown at positions 3, 4, and 5 in Fig. 2-4, it is possible that the side grooves of the limestone block were created using a technique like that illustrated in Fig. 2-5. In this method, a heavy stone is suspended and swung like a pendulum, gaining speed before striking the intended fracture surface.

The principle is similar to a playground swing: when the suspended stone reaches the vertical position, workers push it from behind, gradually increasing its amplitude. As the swing grows larger, the stone acquires significant gravitational acceleration. This allows even a stone too heavy to lift by hand to be accelerated easily, producing a powerful impact. Another advantage is that the pendulum delivers repeated blows to the same point, ensuring consistent and stable impact on the groove.

The above describes the preparatory stage of creating grooves to guide

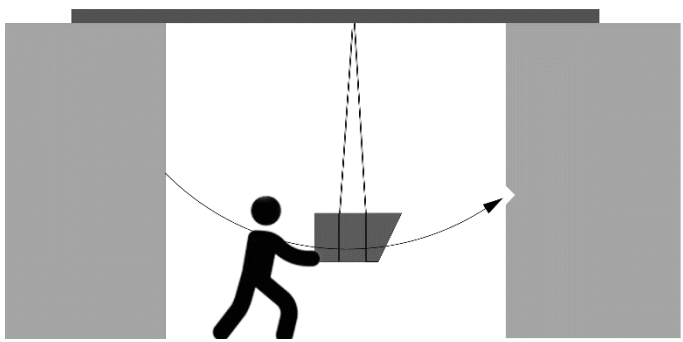

Fig. 2-5. Conceptual diagram of a pendulum device for crushing the side of a limestone block.

the fracture. However, to actually break the limestone along these grooves, an impact far greater than human strength alone could provide was required. The next section discusses the method used to achieve this fracture.

In the final stage of quarrying—separating the block from the bedrock—the most effective method is to apply a strong impact force. To illustrate this, let us assume that the limestone block to be extracted (corresponding to block A in Fig. 2-4) measures approximately 1.5 m in width, 1 m in depth, and 1 m in height. Because this is not a topic commonly discussed in general literature, I consulted a contractor who frequently performs stone-splitting work.

In Japan, there is a long tradition of placing large ornamental stones in gardens, and until about thirty years ago this was common even in private homes. I have purchased two pre-owned houses myself, both of which had large garden stones. When arranging for their removal, I asked the contractor about the actual methods used for splitting such stones.

Since heavy machinery cannot enter private residential lots, the standard procedure is to break the stone into smaller pieces before removal. The method involves drilling holes about 10 cm apart and roughly 5 cm deep along the intended fracture line, inserting iron wedges called seriya (approximately 10 cm long), and then hammering them in gradually and evenly. According to the contractor, even a stone of about 1 m^3 can be split effectively using this technique.

In ancient Egypt, of course, iron wedges were not available. However, the contractor noted that if one first created a substantial groove by striking the stone and then drove a wedge into it with sufficient impact force, the stone could indeed be fractured. When I described the yoitomake device to him, he immediately understood and remarked, “With something like that, you could split it easily.” In other words, modern practical knowledge confirms that with adequate impact energy, both limestone and granite can be broken—an insight highly relevant to understanding ancient techniques.

The contractor further stated that the grooves at positions 1, 2, 3, and 5 in Fig. 2-4 would need to be only about 10–20 cm deep, and that groove 4, if it coincided with a natural bedding plane in the limestone, could be as shallow as 10 cm. With grooves of this depth prepared, a strong blow delivered to a stone wedge inserted into groove 1 would be sufficient to detach the block. Since the total grooved area amounts to only 0.95 m^2 out of the 4 m^2 comprising the back (1.5 m^2), left side (1 m^2), and bottom (1.5 m^2), this may seem implausible at first glance.

However, this becomes understandable once we recognize that the grooves do not themselves cut the block free; rather, they serve merely as "initiators" that guide the fracture. Their function is to predetermine the fracture plane and concentrate stress along it. The actual separation occurs through the rapid propagation of cracks generated by the powerful impact applied to the wedge.

In modern Japan, the standard method for splitting stone by hand involves drilling holes and inserting iron wedges (seriya). Although ancient Egypt did not have iron wedges, it was certainly possible for them to drill holes into stone. A wall painting in the tomb of Rekhmire at Luxor, dating to the New Kingdom, depicts craftsmen using a bow drill to bore holes in wooden furniture. Moreover, traces of drilled holes have been



Fig. 2-6. Bow-drill scene from the Tomb of Rekhmire, Luxor (Metropolitan Museum of Art, Object Number 31.6.29, Rogers Fund, 1931, public domain).

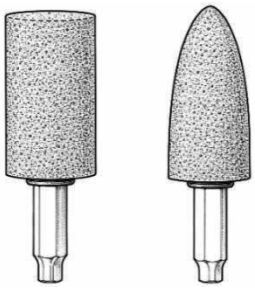

Fig. 2-7. Conceptual diagram of a mounted abrasive stone for drilling

found in the limestone blocks of Khufu's mortuary temple at Giza.

According to the contractor I consulted earlier—who frequently performs stone-splitting work—if the purpose is to create a fracture-initiating groove, drilling a series of holes at intervals of about 10 cm is actually more effective than cutting a continuous groove.

In ancient Egypt, when using a bow drill to make such holes, the stone would not have been cut directly by a metal bit. Instead, the drilling action would have been achieved by quartz sand packed at the tip of the wooden drill shaft. Because the wooden shaft is soft, the quartz grains embed themselves into the wood under pressure, effectively turning the tip into a primitive mounted abrasive stone. Although the idea of drilling limestone with a wooden rod seems counterintuitive, the presence of quartz sand makes the mechanism entirely plausible.

With these considerations in mind, I obtained a sample of limestone, No. 6 silica sand, and a 5-mm-diameter dowel made of soft willow, and carried out a drilling experiment using an electric drill.

The result, shown in Fig. 2-8, was, frankly, disappointing. After about three hours of work, the hole reached only 6.1 mm in depth (A). One thing I noticed during the experiment was that the wooden dowel wore down far less than expected, whereas the silica sand deteriorated quickly—presumably because its edges were rounded off as it rotated. I had hoped that the sand grains would embed themselves into the wood and act like a bonded abrasive stone, but that did not happen.

In the end, the process resembled polishing more than cutting. It is

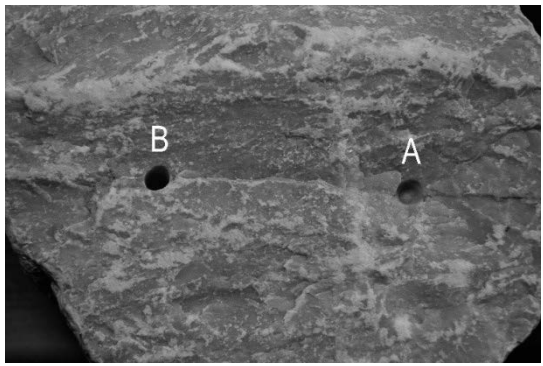

Fig. 2-8. Results of the experiment drilling a hole into limestone

possible to make a hole, but in terms of throughput, the method is hardly practical.

For comparison, I drilled the same stone using a steel drill bit: 12 mm in two minutes (B). With the metal bit, limestone powder immediately spurted out around the hole, making it clear that the material was being cut efficiently. The experiment reminded me just how soft limestone is as a rock—and how incomparable the wooden-rod-and-sand method is.

Things rarely work out exactly as they do in one's head, a fact I was reminded of once again.

If we assume a stone wedge approximately 30 cm long, inserted at position 1 in Fig. 2-4, and apply the yoitomake method shown in Fig. 2-3B—dropping a 100-kg stone from a height of 1 m above the wedge—the impact energy delivered to the wedge would be about 980 joules. If the wedge is driven in by 1 cm, the estimated instantaneous load would be roughly 10 tons.

Whether this is sufficient to achieve fracture in a single blow is uncertain, but each impact would propagate microcracks within the rock, gradually extending the fracture front. The yoitomake is inherently a device designed for repeated impacts, and through repeated hammering of the wedge, the rock would inevitably be forced into fracture by the physics of crack propagation.

However, whether the block fractures exactly along the intended

groove is not guaranteed. Limestone contains not only bedding planes but also vertical and oblique joints. If the impact energy acts more strongly along one of these joints than along the prepared groove, the block may fracture in an irregular shape. The yield rate would therefore not have been 100 percent. Moreover, the spacing of bedding planes is not uniform; even if one desired a block 1 m thick, there might not be a bedding plane at exactly that depth, and even if one existed, the fracture would not necessarily follow it as expected. Thus, it is more realistic to assume that the resulting blocks varied considerably in thickness.

An important consideration here is whether blocks that did not fracture as intended were treated as rejects. The answer to this would greatly affect the overall yield. I suspect that, rather than discarding such blocks, the pyramid construction site maintained stockyards where blocks of varying thickness were sorted and stored. (See Column 1 on page 33.)

A commonly repeated explanation in popular books on ancient Egypt is that wooden wedges were driven into grooves and then soaked with water, causing them to swell and split the limestone.

I am skeptical that this method was truly practical. While dry wood does expand when wetted, woods with high swelling ratios tend to be soft and easily crushed under hammering. Such wedges would deform before generating enough pressure to fracture limestone. Conversely, dense hardwoods have low swelling ratios and therefore cannot generate significant stress. Levering with wood or copper tools also seems implausible, given the limited strength of such materials. More importantly, static stresses from swelling or levering are far weaker for rock fracture than the instantaneous stresses produced by impact. From the standpoint of stone-production throughput, the swelling-wedge hypothesis appears unrealistic. Even if the method succeeded once, that does not imply it could be applied 2.3 million times.

3. Cutting and Polishing of Stone Blocks

The fact that limestone blocks were extracted not by cutting but by

fracture means that they could not be used in pyramid construction without further processing. Moreover, the required degree of precision differed greatly between core blocks and casing stones.

When comparing the pyramids of Dahshur and Giza individually, the core blocks show considerable variation, and the similarities are fewer than one might expect. Nevertheless, because the structures were built by stacking stones, several common requirements emerge. The upper and lower faces of each block needed to be flat and parallel to within a few centimeters, and the blocks within each course were made to a uniform height, even though the height of each course itself did not need to be constant.

The side faces often remain irregular, in some cases close to their fractured state. However, in the Pyramid of Khufu, it is clear that even the core blocks received a degree of rough dressing.

Casing stones, by contrast, formed a tightly interlocking shell that provided structural integrity. Their required precision reached the millimeter scale, and the outer surfaces—exposed to sunlight—were likely polished to a near-mirror finish to create a reflective sheen.

Since the extraction process produced fractured surfaces rather than cut ones, the resulting faces—except along bedding planes—would inevitably have had irregularities on the order of 10 cm. Even bedding planes would not always separate cleanly.

Thus, before true cutting could begin, the first step must have been to knock off protrusions and roughly shape the block. This was probably done by pounding with dolerite hammerstones, a method widely accepted in conventional Egyptology.

In the cutting stage, traditional explanations emphasize hand tools such as copper chisels and quartz sand. I have long questioned this view. Relying solely on impact risks producing unintended large cavities due to microcracks or heterogeneous rock composition. Eventually, one must transition to filing, chiseling, and abrasive finishing using quartz sand.

In Japan, whetstones are ubiquitous, and the association between

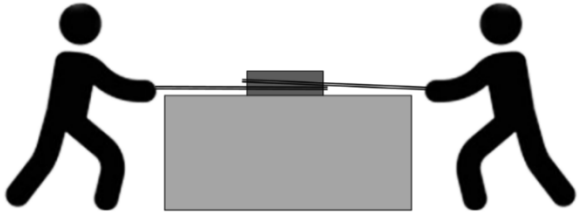

Fig. 2-9. Conceptual diagram of finishing stone with stone

sharpening and the use of abrasive stones is immediate. Coarse to fine whetstones are readily available. This led me to consider whether the Egyptians might have finished stone surfaces by rubbing stone against stone.

When sharpening a blade on a whetstone, one presses the blade firmly against the stone, especially during coarse grinding. If one were to finish stone using stone, it would be more efficient to rely on the weight of the stone itself rather than human force during the coarse-grinding stage.

Fig. 2-9 illustrates a hypothetical method in which a roughly dressed block of granite—or another hard stone—is used together with quartz sand to finish the surface of a limestone block. Two workers pull a rope alternately, causing the granite block to slide back and forth across the limestone surface. Since limestone has a Mohs hardness of about 3, while granite and dolerite range from 6 to 7, and quartz sand used as an abrasive is also around 7, the limestone surface is gradually worn down, whereas the granite tool experiences relatively little degradation. In other words, the granite block possesses sufficient durability to function effectively as a polishing tool.

The principal advantage of this method is that it allows large, flat surfaces to be finished efficiently.

Fig. 2-10 presents a hypothetical large-scale application of the same principle. Stones A, B, and C represent the blocks to be finished. D is a slope constructed of sun-dried mudbricks. After stone A is hauled to the top of the slope, it is slid across stones B and C, thereby shaving down the protrusions on its underside. If the inclines of stones B and C are kept

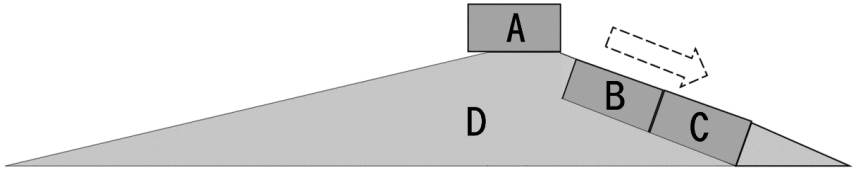

Fig. 2-10. Conceptual diagram of a method for finishing quarried stones using a slope

gentle, stone A will not slide uncontrollably; instead, workers can pull it with ropes and control its movement.

Although this method requires a sizable setup, I believe that such production equipment would have been entirely reasonable in a process that needed to mass-produce stone blocks on the order of one million units.

At the end of this chapter, I would like to comment on the jigs and tools proposed here. These are ideas I developed based on what would have been "useful to have," and I cannot claim that they actually existed in ancient Egypt. However, in modern mass-production environments, such jigs and tools often arise naturally from the ingenuity of workers on site—a manifestation of the continuous-improvement mindset known as kaizen.

Fig. 2-11 illustrates a jig designed to level the outer face of a casing stone, thereby facilitating the polishing process. The slope angle of each

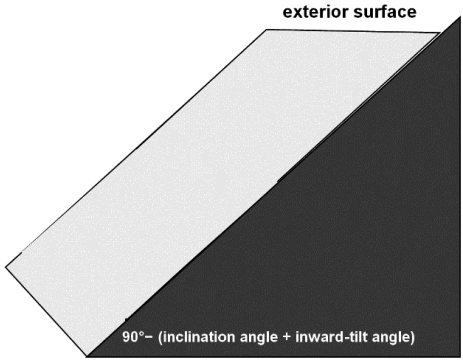

Fig. 2-11. Jig for finishing the casing surface

pyramid was essentially fixed for that particular monument, and when inward-leaning courses were employed, the inward tilt angle was likewise predetermined. Inward-leaning masonry creates a structural condition in which the weight of the stones pulls them toward the interior, producing a highly stable configuration—a technique commonly used in stone walls even today.

However, when casing stones must be produced in large quantities, it is far more practical to polish the surface in a horizontal orientation rather than working directly on the complex compound angle defined by the pyramid's slope and the inward tilt.

Fig. 2-12 illustrates a device designed to flip large stone blocks. Core blocks could weigh as much as six tons, and turning such masses over by human power alone—using levers or ropes—would have been extremely difficult. In the figure, the block is first hauled to the top of the slope and then allowed to slide toward the limestone block at point C, which serves as a pivot. When the sliding block strikes point D, its momentum is converted into a rotational moment, causing it to flip over and fall toward point E. In this way, gravity is used to reverse the upper and lower faces of the block.

Given that quarrying and dressing were carried out daily on a massive scale, it is likely that even more innovative, unique, or large-scale mechanisms and techniques were devised at the work sites.

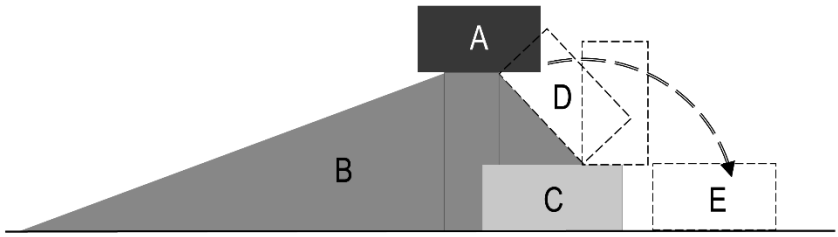

Fig. 2-12. Equipment for flipping stone blocks

Column 1. The Thickness of Pyramid Core Blocks Was Not Uniform

Visitors to Khufu's Pyramid at Giza will know that the thickness of the core blocks is far from uniform. The lowest courses consist of very thick blocks, and although the blocks generally become thinner toward the top, the change is not a simple monotonic decrease.

Petrie measured the thickness of each course in detail, and his drawings—reproduced in Fig. c-1—clearly show that the block thicknesses are irregular. Notably, the blocks in the 19th course and those above the 35th course are significantly thicker. This may reflect intentional adjustments made to accommodate the internal structural design. Even in the higher courses, however, the thickness varies considerably, and the pattern is neither continuous nor regular. Nevertheless, the horizontal planes of each course are maintained with great precision.

Limestone fractures horizontally along bedding planes, as expected for a sedimentary rock, but in practice the stone does not always break cleanly along the intended plane. Some blocks would have ended up thicker or thinner than desired.

I suspect that at the actual quarrying sites, large quantities of such "off-spec" blocks were stockpiled, and that the heights of the courses were determined based on the available stock. For example, although the core blocks near the base of the pyramid are extremely thick, blocks that fractured thinner than expected may have been stored and later used in the upper courses.

Significant time must have been spent preparing the construction site—grading the approach roads, leveling the bedrock foundation, stockpiling sun-dried mudbricks for ramps, dredging Khufu's harbor, and building jetties. Quarrying and stockpiling of core blocks likely began very early, and by the time large-scale stone setting commenced, a substantial inventory of blocks would already have been accumulated.

To maintain construction throughput, it was essential to avoid halting

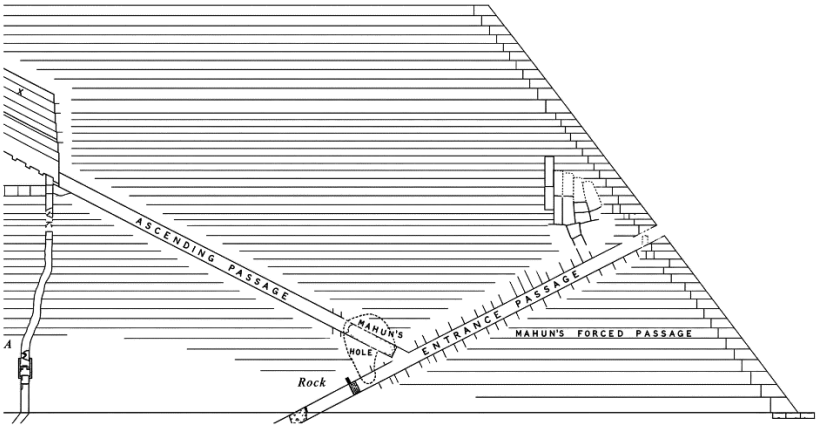

Fig. C1-1. Heights of the stone courses of the Pyramid of Khufu (traced from Petrie, The Pyramids and Temples of Gizeh, 1883)

downstream processes due to material shortages. For this reason, it is unlikely that quarried and dressed stones were sent directly to the building site without intermediate storage. A large stockyard must have existed.

It would be as unreasonable as a restaurant running to the butcher only after a customer orders lamb. A restaurant can apologize and offer an alternative dish, but pyramid construction could not proceed if the supply of stone ran out.

The pyramid project combined a massive stone-production operation with a large-scale civil-engineering site. It is therefore reasonable to assume that, just as in modern manufacturing—where factory inventory and distribution inventory buffer production and assembly—an intermediate stockyard existed between the quarrying/dressing operations and the stone-setting operations.