

An Engineering Success:

There have been many successes in engineering quality of thought and ingenuity throughout history. These achievements have led to great innovations and new technologies, but have also brought the world great wonders and mysteries. One such achievement and example of great critical thinking is that of the Great Pyramids in Egypt. These structures not only baffled people for centuries with their immense designs and grandiose scale, but to this day are still considered an impressive feat compared to modern standards.

What is so impressive? Not only are these structures still intact, but it has been debated for many, many years on their methods of construction. It is impressive alone to create such grand structures that remain in the most part whole, but to create such mystery as to how they were created no doubt invokes a sense of wonder. The techniques and methods of transporting materials the ancient Egyptian engineers utilized have often been speculated and tested, with many different theories arising through years of study. Throughout my lifetime, I've heard of many different theories of the construction techniques, but now the main theory suggests the use of sleds to haul the rock over sand, using water to stiffen the sand allowing the sleds to glide easier.

It is remarkable to think of the skill and thought needed to use the math and engineering concepts used in the building of the pyramids with the aid of modern technology. One such aspect of our thought processes in modern times was evident in many of the theories suggested. The tendency to overthink and over-engineer can be quite easy today with material and technology more readily available. Explanations for how the pyramids were built could and where often more complicated than needed, with some examples using countless numbers of human labor for material transportation and slingshots to project material higher on top of the pyramid. This compared to sleds and water.

Comment [M1]: Premise- The construction of the Great Pyramids was a great and wonderful achievement.

Comment [M2]: Problem- How were the Pyramids constructed?

Comment [M3]: Conclusion- Is there evidence for this claim?

Comment [M4]: When were the Pyramids built? Are there older structures that are still intact? Where do they rank in terms of size?

Comment [M5]: Debated by whom?

Comment [M6]: POV

Comment [M7]: POV- anecdote

Comment [M8]: Whose theory? What evidence is there that this is the most accepted theory?

Comment [M9]: POV

Comment [M10]: Is it known what sort of planning went in to the construction of the Pyramids?

Comment [M11]: Conclusion- Today's engineers tend to overthink and over-engineer.

Comment [M12]: Whose? Is there evidence against these claims?

Comment [M13]: Assumption- The construction methods of the Pyramids were simpler than many people think.

Paraphrase of the Great Pyramids engineering success:

The Great Pyramids are impressive monuments that have stood the test of time. These structures would be difficult to build even with modern technology, which makes their construction with ancient technology even more impressive. Though it is easy to speculate about spectacular construction and engineering methods that may have been possible, it is most likely that the construction methods were quite simple.

The main purpose of this passage is to discuss the construction techniques used to build the Great Pyramids. The author injects some of their own sense of wonder into the discussion.

There is no direct evidence cited aside from an anecdote about the different theories about the construction that have been offered over the author's lifetime.

There is no reasoning offered for the conclusions given.

The author recognizes competing theories regarding the construction, but dismisses them without providing evidence against them.

The author concludes that the construction techniques were most likely simple, but doesn't give evidence in support of that claim.

Explanation of Issues - 1

Evidence - 0

Conclusions - 1

An Engineering Failure:

On July 17, 1981, the second and fourth floor walkways of the Hyatt Regency Hotel in Kansas City, Mo collapsed, falling upon a party being held in the hotel lobby below. 144 people were killed, with over 200 more injured. The failure was caused by many factors in conjunction with the actual structural failure that caused the collapse.

The investigation into the disaster revealed many instances of critical thinking failures and poor organizational practices. While the hotel was still in construction, the roof of the hotel atrium collapsed due to failures of the roof connections. The engineering firm associated with the project had requested to be present during construction, but the request was ignored by the hotel owning corporation in order to avoid additional costs. The original walkways engineering design was also modified by the fabricators, a change that led to the collapse and a change the fabricators say was communicated to the engineering firm and approved. That alleged approval was denied by the engineering firm.

Whether the design change was approved or not, the result was disastrous. The original design only allotted for 60% of the minimum load per Kansas City code anyway, having the second floor walkway connecting to the ceiling via rods, and the fourth floor walkway supported by beams. However, the change made by the fabricating contractor resulted in only 30% of the minimum load capacity, having the fourth floor beams supporting the fourth and second floor walkways, with the second floor walkway hanging from fourth floor walkway by the rods. Both the original design and modified design called for bolts at the beams' welded point, further weakening the structure.

Compounded by negligence of both the engineering firm and fabricating contractor, the design was flawed and doomed from the start. Failures and problems during the construction of the hotel should have indicated a failed process, but professionalism was lacking on both sides. Poor communication was also a factor. The fabricators, concerned by the design, should have done a better job of indicating the dissatisfaction with the engineering firm, and the engineering firm should have made itself more accessible. This would have also been easier to accomplish if the hotel owning corporation would have placed more emphasis on safety rather than money, and had allowed the engineering firm to oversee critical construction processes. There was no indication that anyone involved tried to think of the ramifications of each action, and there was certainly no indication that critical thinking skills were employed.

Comment [M14]: Problem

Comment [M15]: Premise- The structural failure was inevitable due to the following factors, indicating systematic failures in critical thinking

Comment [M16]: Assumption- The roof collapse is related to the walkway collapse. Used as evidence of systematic critical thinking failure.

Comment [M17]: Assumption- The presence of the engineering firm would have increased safety. Used as evidence that money was valued higher than safety.

Comment [M18]: Is there evidence that this change is the primary cause of the collapse?

Comment [M19]: Where in the structure did the failure occur?

Comment [M20]: Conclusion- Compounding errors made by both teams caused the failure.

Comment [M21]: POV

Comment [M22]: I thought the engineering firm requested to be present during construction.

Comment [M23]: Assumption

Paraphrase of Hyatt Regency Engineering Failure:

The 2nd and 4th floor walkways of the Hyatt Regency Hotel in Kansas City collapsed due to poor planning and a lack of communication among the engineering and construction teams and the project management. The engineering of the walkways did not meet minimum safety requirements, and changes made to the construction plans compounded this error, causing a catastrophic failure. Proper communication and an emphasis on safety would have made this disaster easier to avert.

The author clearly states that several factors contributed to the failure of the walkways. The author seems mostly unbiased, but towards the end assumes that no actor made any attempts to rectify the situation.

The author gives many facts that are directly related to the discussion.

The author reasons that the two main design flaws might have caused the failure on their own, so the combination of the two compounded to overcome any safety precautions that were in place. This reasoning is supported by the evidence given.

The author does discuss the two belligerent viewpoints regarding the fabrication change and the management's perspective of valuing money over the engineering team's presence at the construction site.

The author logically concludes that several factors together caused the failure, but he assumes that no actor on either side made any attempt to solve the problem during the construction phase.

Explanation of Issues - 2

Evidence - 2

Conclusions - 2