

Mimar Sinan Published in the World Wide Web

Stefan Giese

Brandenburg University of Technology, Cottbus, Germany

ABSTRACT: *Mimar Sinan* is a relatively unknown building master in Central and Western Europe but his reputation is completely different in the countries of the former Ottoman Empire. He entered history as probably the most important building master in ancient Ottoman building through his work, mostly the construction of mosques. What information can we find about him in the internet? Various databases mention him but they always seem to show him in a different light. *Great-Engineers* is a relatively new internet database that is mostly directed at students and everyone interested in the history of constructional engineering. How does this online reference work introduce the Ottoman building master *Sinan*? Is he not only the most important Ottoman architect but also a "Great-Engineer"? What are the advantages of the internet lexicon *Great-Engineers* for the user? What can an internet database do?

MIMAR SINAN

Mimar Sinan was a building master living and working in the Ottoman Empire of the 16th century. As building master to the imperial court he was appointed by high officials and the sultan's family with the construction of impressive buildings. His mosques are still focal points in Istanbul.

Above all in the last decades came out several articles and books with *Sinan* as topic. Kuran (1987), Vogt-Göknil (1993), Necipoğlu (2005) are three extensive monographs that should be mentioned here. But already in 1954 published *Ernst Egli* his book with the title *Sinan. Der Baumeister osmanischer Glanzzeit* about the Ottoman building master. That book is so essential that it is taken again and again for studies about him until today. Even this scripts *Mimar Sinan* is relatively unknown in Western countries. This is completely different from the countries of the former Ottoman Empire – especially in Turkey – where every child seems to know him and respectfully calls him *Sinan - Venerable Building Master*. He is still present not only through his buildings but also through streets and universities named after him like *Mimar Sinan University of Fine Arts in Istanbul*. *Sinan* also appears on bank notes and as sculptures.

Sinan was most likely born in 1490 and raised in the Anatolian highlands of the Ottoman Empire. His full name was *Koca Mimār Sinān Āġā*. This means something like: *Great building master Sinan, commander-in-chief of the Janissary*. He kept his title and his profession until his death in 1588. At this point he was unusually old – 98 years!

He is most famous for his mosques. When planning them *Sinan* worked with different spatial concepts. But he was most interested in creating a perfect centrally built space with one dome. To achieve this he used his project to experiment with different numbers of pillars. That's why he developed mosques with four, six – for example the *Nurbanu Sultan Cami* in Uesküdar (Istanbul, finished 1583) - or eight pillars.

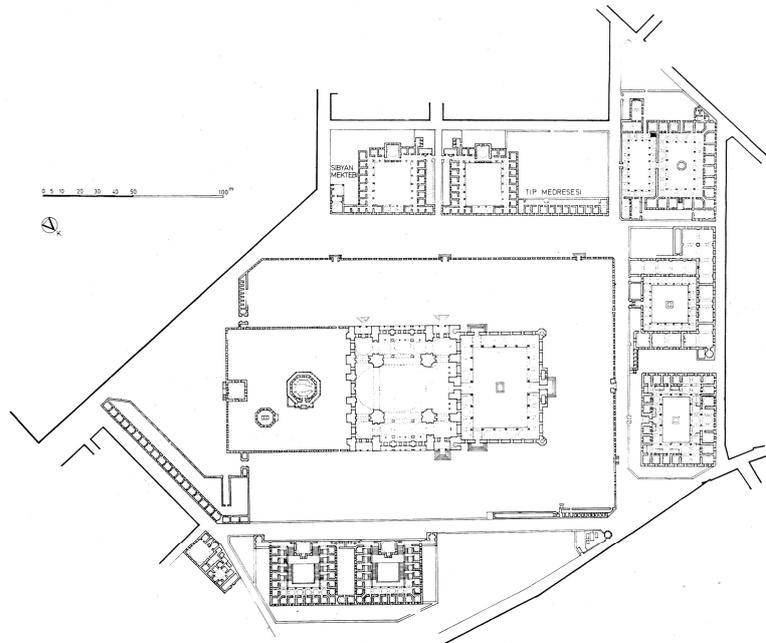
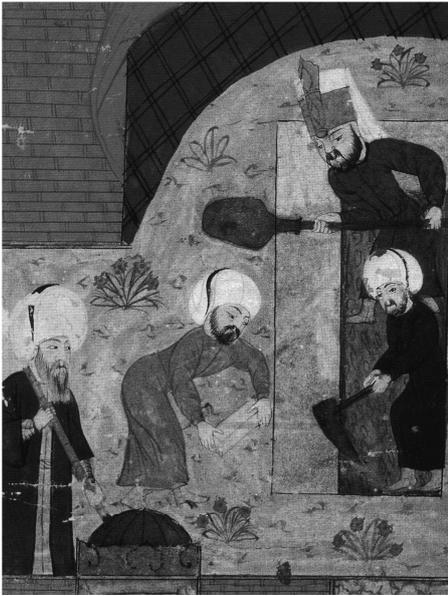


Figure 1- left: *Sinan*, bottom left of the picture, controlling the construction works for the mausoleum of *Sultan Süleyman*. Detail of an illustration of 1579. Watercolour in paper, by *Lokman*; (Necipoğlu 2005, p. 15); right: Groundplan of the *Süleymaniye Külliye*. In the middle of the facility is located the Fridays mosque with a court yard in the front side; (Kuran 1987, p. 78)

One of the mosques with four pillars is the *Süleymaniye Cami* in Istanbul. It was built between 1550 and 1557 for *Sultan Süleyman I* and became one of his main works. Together with the construction of a complete *Külliye* facility this mosque was the biggest project of its time. A *Külliye* is a combination of a Friday mosque (= *Cami*) and several other buildings that often fulfill various social functions. The *Sultan Süleyman Külliye* combines a Quran school, a public school, a medical school, a *Schifahane* (= hospital), an *Imaret* (= public soup kitchen), a *Hamman*, a guest house, shops and *Türbe* (= graves) (fig. 1).

While planning the *Süleymaniye Cami*, *Sinan* didn't include his idea of a central plan building, probably because of the client. *Sinan* constructed an axially orientated building with one main dome that is sustained by two supporting domes, just like the *Hagia Sophia* or the *Sultan-Beyazıt-Mosque* (Istanbul, 1501-1506). By referring to these examples of architecture and by trying to outperform other buildings in height and decoration *Süleyman* tried to emphasise his claim to power as sultan.

Mimar Sinan got to the perfect central plan building with the *Selimiye* – an eight-pillar mosque. He was already 78 years old when the construction of this sultan's mosque started in 1567/1568. *Süleyman's* son, *Selim II*, by getting the power as sultan, donated a Friday mosque in Edirne, a previous capital of the Ottoman Empire. The old *Sinan* used this opportunity to put all his experience in building this gigantic sultan's mosque. It was finished in 1574/1575 as a *Sinan's* masterpiece.

Just like the *Süleymaniye* in Istanbul this sacred building was erected in a *Külliye* facility on a hilltop. Through this special location, its giant dome and four minarets the building was outstanding in Edirne. A rectangular court yard with arcades was in front of the *Cami* that could be entered through three portals and had almost the same size as the mosque itself. Centrally located was a well for religious washings. The mosque could be entered from a central entrance. Next to this portal there were four other portals on the mosque walls.

It's typical in the Ottoman architecture to combine a square with a dome. That's what the ground plan of the *Selimiye* looks like. Inside this square eight giant pillars form an octagon. On top of these eight polygonal pillars there are eight arches carrying the central dome which roofs the space like a baldachin. Although the dome doesn't have tambour or a lantern it's well illuminated. The dome gets illuminated by a number of upturned windows. Furthermore the supporting domes and the shield walls - that sit at same height - have numerous windows. They can be found up to floor level what explains the equal illumination.

The square in the ground plan of the *Selimiye* – sign of centrality in the Ottoman architecture – is playfully changed into an octagon. Both forms are defined through the interaction of arch and shield wall in every level of the space. The architectural element of a shield wall was taken out of the Byzantine architecture. This makes the reference to the *Hagia Sophia* clear - like in the *Süleymaniye*. *Sinan* played with the change of architectural elements and details trying to overtop the dimensions of the *Selimiye*. To demonstrate stability he used straight lines for painting the arches. Wavy lines appear on supporting domes and arches from the same level. Another theme gets more and more important here: The *Mukarnas/ stalactites* get bigger. All these elements and the position of the dome windows seem to make the central dome hover.

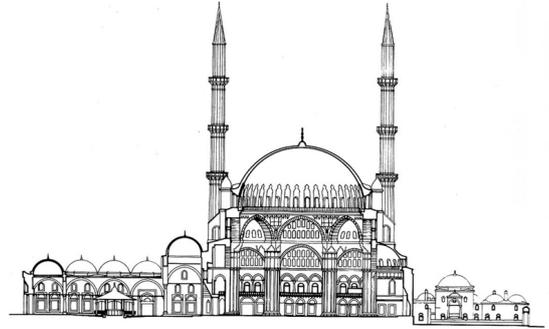
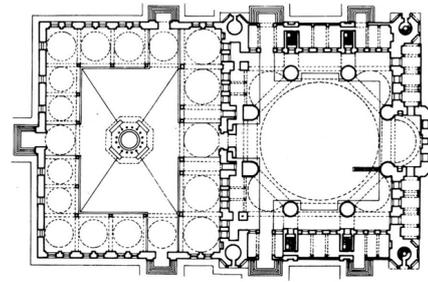


Figure 2: The Selimiye in Edirne. Birds eye view; (Necipoğlu 2005, p. 241)

Figure 3: Groundplan and section of the Selimiye; without scale; (Vogt-Göknil 1993, p. 81)

Main dome, shield walls and hemispheres form the inner space and also reflect this space exactly on the outside. The lower part of the outer skin peels away from the polygonal pillars and pushes its behaviour onto the pier buttresses.

Sinan chose a hemisphere as form for the central dome. Reason for this was its minor thrust. He built eight turrets close to the dome windows that result partly on the eight vertical pillars and partly on the connecting pier buttresses. These turrets are connected to the dome by small flying buttresses. That's how they distribute the dome's thrust onto the pier buttresses and the vertical load onto the polygonal pillars. Arches distribute vertical load onto the columns. So the shield walls just get a little load and can be kept thin and full of windows. More thrust goes onto the tension rods and the four diagonal supporting domes which carry the load outside onto the buttress-structure.

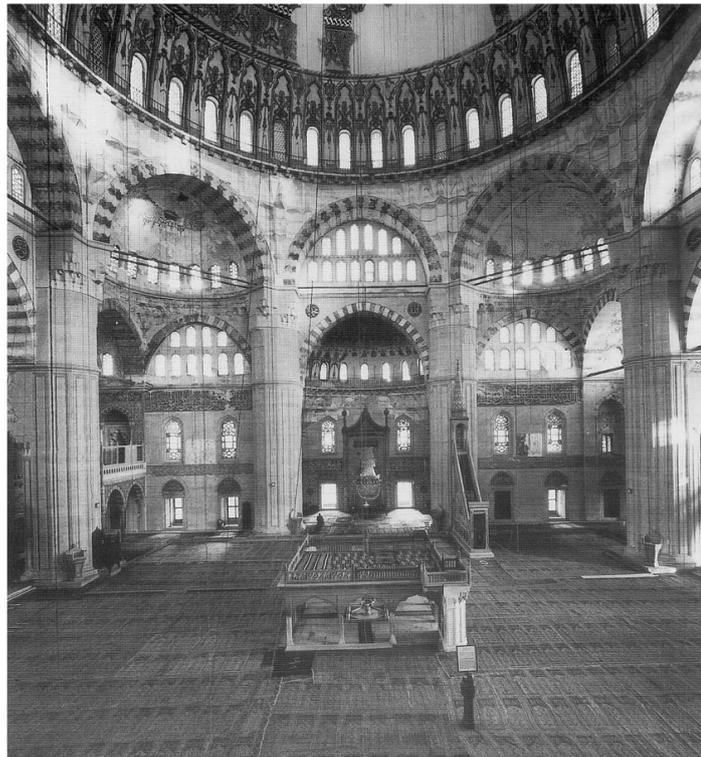


Figure 4: Selimiye's inner space viewing towards the pulpit, Kibla wall und Mihrab (holy niche); (Vogt-Göknil 1993, p. 86)

With using this method of distributing loads *Sinan* moved away from the Byzantine construction and more towards Gothic solutions. He erected a buttress-system and closes the partitions with thin walls and numerous windows. The outer wall follows the buttresses and offers enough space for galleries inside the building. Above them there is a flat rooftop that gets designed like a balcony with balustrade.

There was an Ottoman architectural style slowly developing since the foundation of the Ottoman Empire in 1301. A central space with dome and *Mukarnas* are typical characteristics for this time period. *Mukarnas* are crystalline forms that are used at the transitions between walls and vault construction. Building masters of this time have become famous less often. Like in the rest of Europe architecture must have been a kind of collective task. Just *Mimar Hayreddin* got famous as a building master to the imperial court some years before *Sinan*. *Sinan* was the first generally known Ottoman building master. He didn't try to reinvent architecture he just improved the early Ottoman style. In his work he checked the architectural details, kept, improved and extended them. His main study object was the Hagia Sophia (6th century AD, Istanbul) which he also refurbished. Studying this example of architecture he found solutions for several formal and structural problems that often remind of gothic elements. That's how he outdid existing buildings in height and importance. His work helped to fully develop the classical Ottoman style.

INFORMATION ABOUT SINAN IN THE INTERNET

Sinan seems to be the most important Ottoman building master. Although there were also the known building masters *Mimar Hayreddin* and *Mimar Mehmet Ağa* (Building master for Sultan-Achmed-Cami in Istanbul, 1609-1616) none of them was as famous as *Sinan*. Nobody formed the Ottoman architecture as he did. What information can we find about him in the internet? What do these websites teach us?

The internet is often the first choice to get information. You will get 2 930 000 hits when searching for "Mimar Sinan" in Google (21 January 2009). If the search term is just "Sinan" the internet user will find 16 600 000 page options (21 January 2009). These results also include various online databases.

One of these databases is *Wikipedia* which was launched 10 years ago with the aim to make knowledge and information generally public. That's why *Wikipedia* is available in numerous languages to collect all possible information that can be contributed by external authors. Every cultural circle has different informational priorities. So it's not surprising to find different approaches towards the building master *Sinan*. It's obvious that the information density about *Sinan* is highest in the Turkish version of the database. The German *Wikipedia* page has the second most entries about *Sinan*, followed by the French page and the English one. *Wikipedia* in Turkish and German start their *Sinan*-article with explaining his personality followed by a list of his projects. The German version sorts his projects by their site location (Istanbul, Edirne, Europe, Asia), explains them and links to more detailed architectural explanations. The Turkish *Wikipedia* website explains the different building types. Many buildings – especially mosques – have additional links to further information.

Another online database that has established over the years is *Structurae*, awarded several times already. It is called an online database for engineering art of construction, which shows its main orientation. This database is available in German, French and English and presents a collection of information about engineering structures and engineers from around the world, without limiting its view on a certain era. Like *Wikipedia* the database is being maintained by external authors. The data is relatively superficially presented in form of tables and keynotes and shows some projects and a few biographical facts. External entries don't seem to be double checked as there are obvious spelling mistakes. But the given data is easily comparable with other engineers. Various different search options link to other databases, what makes this website a good starting point for research projects.

Respect to Sinan (in Turkish: *Sinan'a Saygı*) is an online database that offers wide information about *Mimar Sinan*. It's also available in English and focuses on the building master and his projects. There you can find not only numerous descriptions but also detailed project lists, many photographs, sketches and even recommendations for study trips to *Sinan's* buildings. In 1990 a project started to strengthen the respect and recognition of *Sinan's* architectural world heritage. This Turkish website is part of that project and went online in 2006. The Turkish interest group is open for external contribution to the database.

Mimar Sinan is presented on many online databases that can be put in different categories. First group consists of websites that collect detailed information in written texts, for example *Wikipedia* (an other is *Britannica Online Encyclopedia*). Second group of websites offers short, compact information in tables form and are orientated in one topic, like *Structurae* but also *Archinform*. Third group is prepared by interest groups and make profound information available, like "Respect to Sinan".

MIMAR SINAN AT WWW.GREAT-ENGINEERS.DE

Another article about *Sinan* is on *Great-Engineers* (short: *GE*). The idea for this online database was developed at the *chair of Construction History and Structural Preservation* of the *Brandenburg University of Technology Cottbus* in 2002. The website shows articles about famous engineers, which have been prepared by students as an university project. Students were also involved in the webpage's layout.

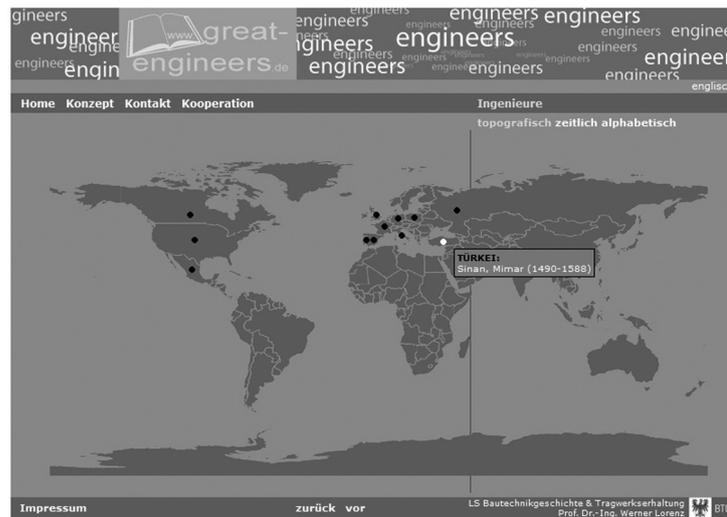


Figure 5: The topographic selected modus; (Great-Engineers)

The website has got two different stages. First one is the introductory stage that gives the user general information about the GE-project and a welcome message. Centre of this level is the choice of engineers – a sub-menu point in the main menu chapter engineers. Here you can sort engineers by alphabet, period or topography (Fig. 5) – not being limited to a certain cultural circle or historical epoch. There are for example descriptions of *Isambard Kingdom Brunel* (1805-1859; Great Britain), *Ulrich Müther* (1934-2007; GDR), *Wilhelm von Sens* (12th Century; France) or *Felix Candela* (1910-1997; Spain, Mexico). If searching by epoch or alphabet the user can already get a first impression of the personalities by a portrait. *Mimar Sinan* can be found in the topographic selected modus in Turkey. With this link you can enter the second stage of the website – the engineers level – and read the article about *Sinan*.

Why is *Mimar Sinan* in this database? Is he not only the most important Ottoman building master but also a “Great-Engineer”? What does GE tell about him?

All the engineers in this database are being introduced under the same topics. These topics form a grid that makes comparisons with other engineers easy. Every engineer’s article has a start page with a short introduction and a project photograph of the engineer. *Sinan*’s leading project is without any doubt the Selimiye Cami in Edirne.

First point is the biography of the engineer. Each CV is complemented by a topographic map, a chronological CV and a detailed main description. There are links from the map and the CV table to appropriated parts of the main description. In *Sinan*’s article the map shows the whole extend of the Ottoman Empire in 1566 when *Sinan* was building master to the imperial court of *Sultan Süleyman I*. It shows the important stages in *Sinan*’s life. A pull-down menu shows location and activity details. Northern most location is Vienna southern most is Mecca. This map makes it obvious that *Sinan* travelled a lot and got to know many different building cultures (Arabic, Christian (Byzantine), Seldshukish, early Ottoman) which he obviously studied and used as inspirations for his own projects.



Figure 6: Start page of the article Mimar Sinan; (Great-Engineers)

His biography shows that he was 48 years old when he became building master to the imperial court in 1538. Why so late? 1512 marked the first big change in Sinan's life. As son of a Christian family he had to go to Istanbul to be a Devşirme (= living tribute). He got a military education, converted to Islam and as part of the Janissary Corp fought in many battles under *Sultan Süleyman I*. Doing this he earned respect and climbed the military carrier ladder. Final honour was the title Haseki (= colonel of the Imperial Guard). Seeing this it's completely unthinkable that *Sinan* found his place in history as a famous building master.

Explanations for this can be found in his biography. Before becoming a soldier he studied the craft of a stonemason. While doing his military education he got lessons in maths and also became a joiner/ carpenter. Knowing all these skills he was appointed with various building projects while being on a military expedition for example army field kitchens, soldier accommodation, fortifications, besiegement constructions, church renovations to become mosques and bridges. He was also included in ship building and the construction of lifting equipments.

Sinan's later success was based on his experience as a building master to the imperial court and his interdisciplinary work. He was architect, engineer, urban planner and ship builder. A further reason for his success was his old age (98). So he worked for three sultans (*Süleyman I* (R 1521-1566), *Selim II* (R 1566-1574), *Murad III* (1574-1595)) all wanted to architecturally immortalize their power. They trusted him because of his patriotism and his strong Muslim belief – he did the pilgrimage to Mecca when he was 80 years old. To his work as a building master he once said: "...Just the ones who belief in Allah can do the profession of a building master properly...". This is similar to *Maurice Koechelin* (1856-1946).

Another part of the website *GE* is called projects. Just like in the biography chapter the issue is explained in tables and with a map. It shows that *Sinan* seem to have had the intention to build more than 300 buildings. This information varies in different articles about him. *Vogt-Göknil* (1993) mentions 357 projects, *Egli* (1954) 362 and *Kuran* (1987) even 477. With this possible number of realised projects he would be better than any other architect or engineer up to today. *Ulrich Müther* (1934-2007) fulfilled more than 60 buildings in his lifetime. *Felix Candela* (1910-1997) managed to finish almost 300 projects.

Sinan's project list by *GE* has been produced with information by *Egli* (1954) and has been added and changed by information of other authors. But even with these alterations many buildings can't be sorted by date. That's why all the other buildings are sorted by building type. *Sinan* worked on Friday mosques (Cami'), Mesdjid's (Mescid, beadhouse), Medrese's (schools), Darülkura's (Quran schools, Mektep, Maktap), Türbe's (crypts), Imaret's (soup kitchens), „Su ollar kemerleri“ (aqueducts), Köprü's (bridges), Karawansereien (accommodations, Caravanserai), Serails (palaces), Mahzenler (magazines) as well as Hammams. This list is surely incomplete, as he probably had more and smaller projects while working with the military and as a ship builder. *Isambard Kingdom Brunel* (1805-1859) is another example of an engineer who built bridges, ships, tunnels and even sick bays.

Sinan had projected in all Ottoman Empire. 40 locations are being shown on the map. If compared with *Matthew Clark* (1776-1846), who just worked in St. Petersburg, *Sinan* appears to have been a global player. But the map also shows that he planned most of his projects in Istanbul. 183 of them are being shown on the map. *Kuran* (1987) even notices about 319 buildings – just in Istanbul.

There are also links to some of *Sinan's* projects on the map and in the table. In written texts there are closer descriptions to some of his most important mosques like the Süleymaniye in Istanbul or the Selimiye in Edirne. For further information about his constructions there are shown examples of other building-types like bridges (Sultan Süleyman Bridge in Büyükçekmece, close to Istanbul, Mehmet Pascha Sokolovic's Bridge in Višegrad), aqueducts (Kirkçesme water distribution (fig. 7)) and a Hammam (Haseki-Hürrem-Hammam).



Figure 7: Commented projects of Sinan; (Great-Engineers)

In the website's chapter inventions (and used technologies) the user gets information and tables about *Sinan's* efforts to create the perfect central space – always compared with the Hagia Sophia. He experimented in his mosques with the pillars location and used details out of the Byzantine era, like the shield wall or the supporting dome. Furthermore *Sinan* used tension rods and flying buttresses with small turrets to take on the main dome's thrust. It seems as if he worked with Gothic elements 400 years after *Wilhelm von Sens* who was responsible for the first Gothic cathedral in France in the 12th Century (Saint Étienne in Sens, Burgundy). Another Gothic element that he used in his bridges and aqueducts is the pointed arch.

It is relatively unknown that *Sinan* also worked with ground conditions. He measured ground movements, built posts to strengthen the ground, constructed walls to protect the foundations, used waiting times for the foundations to settle, built systems for drainage and air circulation, experimented with cement, worked with expansion joints made of lead, leveled building sites and built artificial building platforms. All these methods look quite modern! His approach to outdo the Hagia Sophia was finally successful and as mentioned in one of his quotations;

“... the ones who are important building masters in Christian countries say that they are superior to the Mohammedan – because they didn't manage to get a dome like the Hagia Sophia. The allegation that it's extremely difficult to build such a dome really hurt the heart of the poor (my own heart). With God's help and sultan's blessing it was possible for me to build the mosque of *Sultan Selim* (Selimiye Cami in Edirne) that was a dome with diameter is four zira and a height of six zira bigger than the Hagia Sophia...” (footnote in: Mustafa Sa'i: *Tezkeret-ül-Bünyan*, published at Vogt-Göknil (1993), p. 18).

The old Ottoman measure of length zira means: 1 Zir'a = 75,8 cm (KURAN (1987), p. 303). The highest point of the Hagia Sophia's dome is 56 metre. Its diameter is 31 metre.

Another chapter on the *GE* website is publications. The internet database introduces the engineers literally projects. Some of them are even available as PDFs. So the user can find out that all of *Sinan's* project drawings got lost but five manuscripts survived – just two of them were known until some years ago. These two manuscripts contain his ideas about buildings and work lists that of different lengths. *Kuran* (1987) was able to use all five manuscripts. That's why it contains the most comprehensive building list (477 buildings). But there is still no mention of *Sinan's* projects, developed while serving in the army. Even this list seems to be unfinished.

The last chapter on the *GE* website is called appreciation. Everything is related to the question; Is the mentioned engineer a “Great-Engineer”? This is discussed by the author of the article and external participants. It's easy to answer this question if it's in the case of *Sinan*. *Koca Mimār Sinān Āġā* wasn't just a great Ottoman building master but also a “Great-Engineer”!

But this is not everything the website has to offer. There are two more categories. “Literature” contains a collection of additional information material and all the data used for creating the articles. “Composer” gives information to the articles' authors and a personal statement about the engineer.

www.great-engineers.de – An Outlook

All mentioned databases are collections of information. Even if a database appears to be extremely detailed there is always the need for additional literature research. The advantages of online databases are the relatively quick overview of certain topics (for example *Sinan*), the ability to show connections and the help topics to find interesting and appropriate research sources. This depends strongly on the thematically content and it's target audience.

GE is meant to be for students and people who is interested in construction history. It provides a different approach to famous engineers, their work and ideas. Most important is the ability to compare different engineers. Keys for this are the selection possibilities by the search to the engineers and the fixed grid of views on the engineer with deep information. By this references between the engineers are possible and the user of *GE* gets a better understanding to the engineer, his work and achievements, his culture and epoch-making environment. The user receives authorised and controlled information because all the articles have been produced as seminars' work at the University. Students have the opportunity to publish their work on the website and to show by this their work to a bigger audience. *GE* online database is not just a passive lexicon but also an active knowledge facilitator in construction history and scientific work.

Until now the website is just available in German. A translation of the website *GE* shall open the database to the international public. *GE* is still just a project of the BTU. But cooperation with other universities is possible. They could also offer seminars in construction history where the developed project could be published afterwards on the *GE* website.

REFERENCES

- Egli, E., 1954: *Sinan. Der Baumeister osmanischer Glanzzeit*. Frauenfeld, Erlenbach-Zürich: Verlag für Architektur.
Giese, S., 2008: *Mimar Sinan*. On: www.great-engineers.de.
Giese-Vögeli, F., 2006: *Sinan zwischen Vision und Auftragswerk*. On: www.bauforschungonline.ch/index.php?sinan_aufsatz, 07.08.2008.
Kuran, A., 1987: *Sinan. The grand old master of Ottoman Architecture*. Washington DC: Inst. of Turkish Studies.
Ludwig, W., 2007: *Der Baumeister des Islam*. *Wiener Zeitung*, 01.09.2007.
Necipoğlu, G., 2005: *The age of Sinan. Architectural culture in the ottoman empire*. London, Princeton: Princeton Univ. Press.

Saoud, Dr. R., 2007: *Sinan. A Great Ottoman Architect and Urban Designer*. On:
www.muslimheritage.com/uploads/Mimar_Sinan_Great_Ottoman_Architect.pdf, 07.08.2008.
Vogt-Göknil, U., 1993: *Sinan*. Tübingen, Berlin: Wasmuth.

Online Sources

Archinform: <http://deu.archinform.net>, 07.08.2008.
Britannica Online Encyclopedia: www.britannica.com, 07.08.2008.
Google: www.google.de, 21.01.2009.
Great-Engineers: www.great-engineers.de.
Respect to Sinan Project: www.sinanasaygi.org/en/, 21.01.2009.
Structurae: <http://de.structurae.de>, 21.01.2009.
Wikipedia: www.wikipedia.org, 21.01.2009.

ACKNOWLEDGEMENT

For their kind help and patient support I want to say thanks to *Prof. Dr.-Ing. Lorenz, Volker Wetzck* (BTU Cottbus), *Ines Triebel* and *Willie Miller* (both Glasgow).