

History of construction: An estimable resource in the actual crisis of civil engineering?

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RISE AND DECLINE —A FIVE-MINUTE HISTORY OF THE CIVIL ENGINEER

In the year 1762, the librarian of the Roman cardinal Albani, Johann Joachim Winckelmann, born in the North German town of Stendal, published a pamphlet titled «Anmerkungen über die Baukunst der alten Tempel zu Girgenti in Sizilien» (Remarks on the Architecture of the Old Temples at Girgenti in Sicily) (Winckelmann 1762). In no time, this publication became the manifesto of the young neo-classicist movement in Europe. Evaluating his own systematic research of antique architecture, Winckelmann calls it the most appropriate model for any form of architecture, including contemporary. He distinguishes clearly between the «Wesentliche» (essential) and the «Zierlichkeit in der Baukunst» (daintiness of architecture). The clear distinction signifies an abrupt turning away from the previous baroque perception of architecture. The concept of the «essential» introduces construction as a defining parameter into architectural theory. According to Winckelmann architecture results primarily from constructive considerations.

Noteworthy also is the context of his publication. Only a few years prior, in an Italian publication from 1748, one can find the term «ingegniero civile» and in 1768, the term civil engineer is used for the first time in England, where the first «Society of Civil Engineers of the Kingdom» is founded in 1771. The civil engineer is born. (Schimank 1939; Woodley 1999)

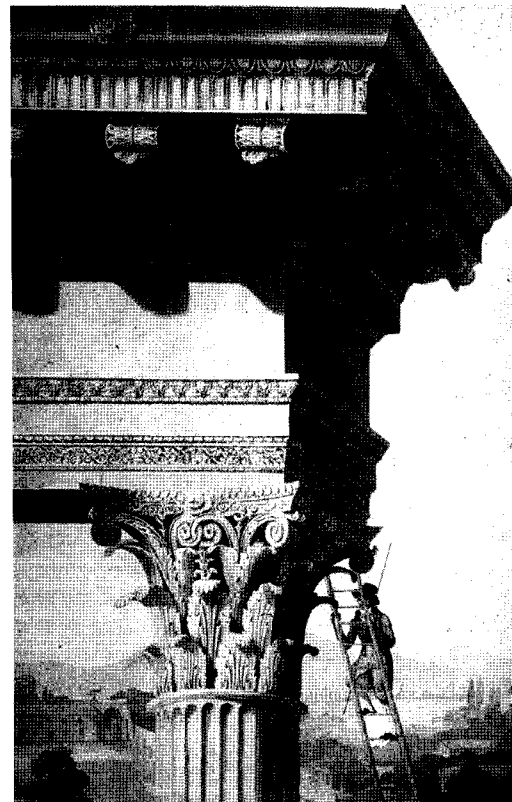


Figure 1
Student measuring the temple of Castor and Pollux in Rome,
Henry Parke, 1819

Seventy-five years later Europe has weathered the first storm of industrialization. Quite differently and in much bigger dimensions than foreseen by Winckelmann, the revolution of all social life brought about by production and labor promoted architecture's technical ties. With the new materials of the iron century, the technical and ingenious aspects take the center stage of architecture and along with them, so does the structural engineer —although the term engineer is still not used and is subsumed by the term «architect». The new self-esteem of the engineer-architect is expressed vividly in a song composed especially for the convention of German architects in the town of Halberstadt in 1845:

Wer bahnt dem Fuße sichere Wege?
 Wer zwingt den Strom, wer schützt den Strand?
 Wer legt dem Fortschritt Eisenstege?
 Wer bändiget der Städte Brand?
 Wo Wogen stürmen, Flamme leckt
 da hilft der kühne Architekt!
 (Zeitschrift für praktische Baukunst 1845)

(Who guards the foot across the ditches?
 Who forces rivers, shields the shores?
 To progress offers iron bridges?
 The city's fire tames and moors?
 When breakers storm and flames do lick
 Help comes from the bold architects!)

An additional forty-four years later, in 1889, two steel constructions of previously unimaginable dimensions, Tour Eiffel and the Galerie des Machines, are presented to stunned visitors at the Paris World Fair, which was held in commemoration of the 100th anniversary of the French Revolution. At the same time in Scotland, the Forth Bridge nears its completion. All the world talks about the work of the engineers, the tower of a height of one thousand feet, the hall that is more than 100 meters long and the bridge that spans half a kilometer without support. With every new record the esteem of the civil engineer rises. Hardly anyone can deny the fascination of the engineering products. The architect Henry van de Velde memorably summarizes the public reception of the engineer in his criticism of the Galerie des Machines: «These artists, the creators of a new architecture, are the engineers.» (Giedeon [1941] 1978, 157; Lorenz 1989).

One hundred years later in 1989, Dichter-Institute of Zurich conducts an opinion poll among young

school graduates and soon-to-be civil engineers, which is soon after publicized in the Swiss trade magazine «Schweizer Ingenieur und Architekt» (Kiener 1991). Half of the graduates who were asked classified the profession civil engineer as «out». Sixty percent of the young civil engineers deem themselves in public opinion primarily as «calculating menials» of architects. Eighty-seven percent expected to be regarded as «destroyers of nature». No more song, no more praise. The bold and innovative hero has turned into a frustrated and at best diligent administrator of an environmentally damaging and ugly infrastructure.

This five-minute history of the civil engineer and its social projection evokes far more than a sense of unease. It tells about the gain and loss of a fascination that nowadays appears alien. It is a story of the radical decline in the perception of a profession.

It is quite remarkable that in only a few decades engineers apparently managed to effectively gamble away the enormous capital of acceptance amassed by our predecessors over two centuries. Suddenly nothing less than the disappearance of the civil engineer is at stake.

That does not mean that civil engineers will not be around any longer. We will rely further on their calculations, use their technical extensions, glide elegantly across their bridges and take off from their airports. At stake is something different, at stake is the civil engineer's loss of significance in construction, the loss of their inherent culture-forming role for the built environment and its public reception. At stake is the dissolution of the engineer's profession into the meaninglessness of a technician's job.

However, it is even more remarkable how we react to this. Even though it has quite clearly been on the horizon, even though there have been admonishers and no lack of appeals to re-orientation, engineers have not addressed the problem courageously or «ingeniously». Rather they have demonstrated the inertia and stubbornness of a giant tanker in their day-to-day practice as well as in training. They continue as before in a speechless mix of resignation and spite, interpretation of regulations and blindness.

The diagnosis is clear. Civil engineering is in an elementary crisis. The direct result is the often-mourned loss of a culture of construction; the indirect result is the disappearance of the engineer. It is not difficult to reinforce the diagnosis with numerous other observations.

What has happened? In my opinion, two aspects of this crisis deserve special attention:

One aspect is, we are neglecting elementary engineering virtues, which have been developed and cultivated for centuries. Instead of adopting and transforming them for the future, we have forgotten about them.

The other aspect is, we have forgotten what it means to take responsibility.

VIRTUES

We have become skeptical towards «virtue». The word not only seems too old-fashioned; it appears too simple and pure to be used by us. Other terms have long taken its place.

One of the terms is the concept of the guiding image or «Leitbild». However, what images guide an engineer? Is it safety, speed, reliability in scheduling, effectiveness and a high level of competency? For instance, when consulting the publications of the main organization of the German building industry, one finds wordy information on today's civil engineering requirements (Wirtschaftsvereinigung Bauindustrie 2000). A civil engineer should be a competent, efficient and reliable partner, be able to work in a team, have the readiness for interdisciplinary cooperation as well as creativity, imagination and the power to lead other people and, most of all, one is expected to think holistically and act as a generalist.

That is all somehow right; nevertheless, the words quickly grow cumbersome, and where is that which is special about a civil engineer?

Let us dare to speak of «virtues». The dictionary defines them e.g. «as ideal types and images of personal excellence». According to the philosopher Hans Jonas, virtues project «the best possible being of human beings». (Jonas 1979) Virtues are smaller, more modest than large «guiding images» and wishful requirements. They stand in the second row yet they are more direct, concrete and simpler. Perhaps I like the term virtue because it alludes to tradition and something old. Virtue is directed not only towards future but also to origin.

We are familiar with common human virtues such as courage, consideration, moderation, wisdom and justice, but how about the special virtues of the civil engineer? Only a few will be listed here in quick

succession. They may also be interpreted as «attitudes for constructing» attitudes that have become rather rare today.

SIMPLICITY

Simplicity in this context implies the greatest simplicity possible as a primary criterion for optimization. Simplicity of approach should be regarded highly especially today when a sophisticated calculation technique tends to seduce us into believing we can somehow calculate everything. The best among the engineers have always known about simplicity. For instance, the ingenious pioneer of building with reinforced and pre-stressed concrete during the first half of the 20th century, Eugène Freyssinet, schooled at the École Polytechnique, one of France's elite schools, always emphasized that a



Figure 2
Spiral staircase, Francois Hennebique, about 1900

different training had shaped his engineering far more than his formal education, namely, his roots in the crafts. In the end, this helped him find simple solutions. In hindsight he spoke without respect of his time at the École Polytechnique of the « . . . Mathematicians, who saw nature through a cloud of x and y ». (Günschel 1966)

Half a century before, Johann Wilhelm Schwedler, probably Prussia's most significant engineer of the 19th century, which was altogether not short of fascinating engineering personalities, articulated concisely: «The goal is to work at each task until the simplest means for its solution have been found». (Lorenz 1999, 121; Hertwig 1930)

History teaches engineers to think in simple ways.

TANGIBILITY AND CLARITY

A culture of simplicity implies the attempt to maintain a clear model of the flow of loads and load transfer even while keeping a tangible sense of individual strains. Many cases of failure testify to that seeing both aspects clearly has become difficult, especially in an era that is capable of realizing, almost casually, once utopian distances and heights. Let us recall for example, the collapse of the railroad bridge across the St. Lawrence River near the city of Quebec in 1907, when 74 workers died in the midst of construction. Investigation of the causes revealed that a composite chord member had to have failed, apparently because of lateral torsion buckling. The designers had calculated the transversal section through linear extrapolation of comparable smaller load-bearing structures, a far-reaching fault for non-linear stability problems. They might have been more careful if they had a more tangible idea of the load of the member, as concrete as the one publicized after the catastrophe by the «Scientific American». A picture montage made clear the immense load of the failing compression member by shifting our familiar perception. The montage showed the member as a stud, whose load did not result from the rather abstract flow of force of a framework; instead, it depicted the member receiving the load of the USS Brooklyn, a 9215 ton cruiser. (Ferguson 1993 [1992])

History provides engineers with the lessons of practical experience and imparts a sense of tangible clarity.

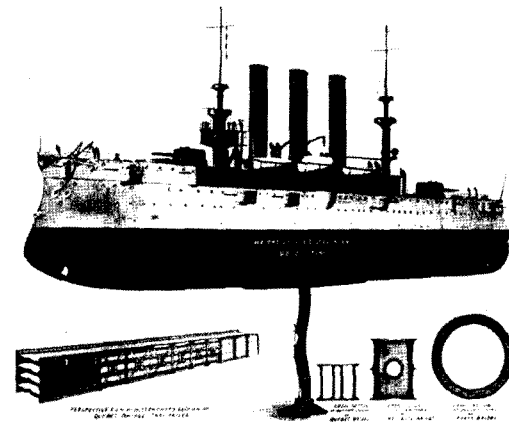


Figure 3

Bridge across the St. Lawrence River near the city of Quebec, model of the critical member as a stud with equivalent loading, Scientific American, 1908

DURABILITY

Which engineer would not claim that her or his buildings should be durable? Yet, our thinking and talking about durability has a stale aftertaste. It takes place primarily against the backdrop of material fatigue, remaining life span and write-off cycles. What we neglect is the quest for an aesthetic, a human dimension of durability and age. Is it possible to perceive aging quite differently? How does a bridge age, how a house and how a façade? Will I find patina after thirty, fifty or one hundred years or will I find rust? Many of our buildings and materials can only be new and young or they will have to be replaced. This is a contemporary concept and it fits the cultural environment of a society that propagates youth and remaining young as most noble goals. In this environment aging does not occur. Engineers must learn again to impart the dignity of aging to at least some of our work.

History teaches the value of durability.

ACCEPTANCE OF THE BUILT PAST

An engineer, who can perceive of a building only as a write-off project and has long given up on leaving traces, can hardly respect the traces of their

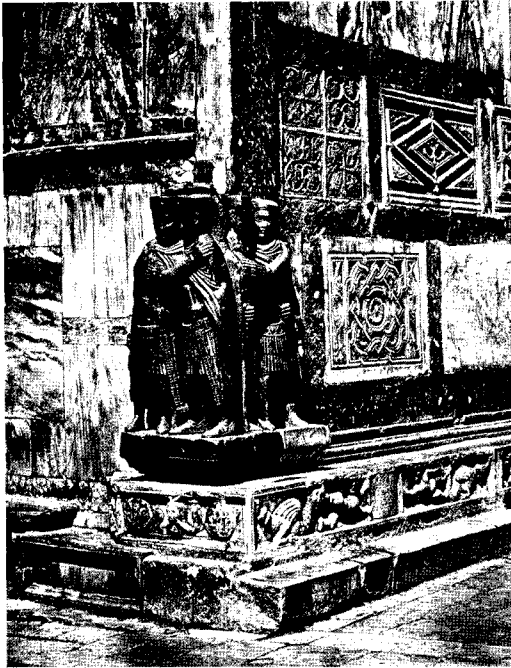


Figure 4
Venice, San Marco, Tetraches, photo by Domenico Bresolin, 1855

predecessors. For engineers in the twenty-first century it is more than ever indispensable to develop positions and attitudes such as caution and acceptance towards that which long has been built. Caution, of course, is a difficult topic for an engineer. Does not the ingenious desire to design, develop and build anew—in short to act looking forward—exclude by nature a very differently oriented philosophy of acceptance?

No! Acceptance is for engineers a technically highly interesting challenge. It stands for the willingness to engage with the existing building and its ingenious challenges. It requires investigating closely with endoscopes, sound- and radar-waves, heat- and x-rays, and most of all with a schooled eye and competence: what is the structure, the structural member or the detail able to do; when do I need to help; when may I leave it alone in good conscience?

Certainly, to dedicate oneself to the virtue of acceptance is dangerous. Suddenly there is a lot at

stake: suddenly it is about two opposing models of production, about the fundamental and very ecological question: new construction and substitute, or maintenance and repair?

Build further, do not only build anew! For centuries, architects have adopted this imperative and thus have shaped European architecture, grown on respect and acceptance. However, to accept requires knowledge and a sense of tradition and history and a sense of quality in architecture.

History is needed urgently to convey acceptance of the built past.

COURAGE TO DESIGN AND DISPUTE

Another virtue may be recalled: the courage to not only realize structures but to design them. The courage to design ingeniously implies a confession of originality, of the autonomy of the engineer. This implies a readiness for criticism, the courage to dispute; with that, in particular, engineers have an exceptionally hard time.

Let's have a look at our construction periodicals: when do we come across a productive argument or an intelligent discourse? Isolated engineers write their texts into a void, unanswered, without dialogue, a silence lasting many pages. A true dispute does not occur. Is there no demand for discussion for example about methodic paradigms or quality criteria for load-bearing or other structures? There is no construction critique!

Especially here, the history of construction technique offers a multitude of model cases. Let us only think of the pioneers of ferrocement construction such as Eugène Freyssinet, Pier-Luigi Nervi or Robert Maillart. Maillart especially, was capable of developing and realizing load-bearing structures and shapes, which impressively grew out of structure and material alone; they appeared strange at first to his era. Such courage to design requires a schooling of the eye, aside from a high level of constructive competency and implies a healthy measure of self-esteem. I cannot help the impression that there is a greater lack of both today than there was one hundred years ago.

A sense of simplicity, clarity and tangibility, carefulness in detail; acceptance of the built past, the courage to design and to dispute—many of these

attitudes and approaches make me think of one who had to understand something about constructing even if he decided in the middle of his life to change from engineer to poet. I am talking of Heinrich Seidel the Prussian designer who was responsible for the construction of Anhalter Station in Berlin. Seidel, once vividly summarized his perception of construction by saying: «Konstruieren ist Dichten!» (To construct is to write poetry). (Mülder 1997, 77) The work, the construction perceived as an artful fabric with all virtues woven in —this image may serve well as an ideal of the engineer's work.

History is indispensable in order to weave such a fabric.

RESPONSIBILITY

When speaking about responsibility, engineers think about the immediate responsibility of the architect for the secure technical success of the building. We assume that this is old hat and that responsibility has always meant liability. Maybe we even come across the codex Hammurabi, the famous cuneiform writing from Babylonia times which codified rigid punishments for breach of contract in the building business: if a house collapses and kills the son of the owner, the builder has to sacrifice his son's life etc. Then we look at our engineering contract and feel certain that our liability is a little less stringent but other than that, the thing about liability has remained the same.

HAS IT REALLY?

It appears to me that taking responsibility had a different air about it at other times. It felt different.

Let's take only the 19th century: to be an engineer in the time of early industrialization; to construct with previously almost unknown materials —it was a fascinatingly open era. One builds into a vacuum of material science, measuring theories, technical rules, regulations and norms. None of that exists. Instead, there is a spirit of departure, courage, delight and cunning and the prospect of great transactions. The engineer is liable for the success of his work from head to toe, often with an immediate financial involvement in his projects.

The list of respective heroes is long. George Stephenson's quote, «I do not know yet how to but I can tell you I will do it» (Ricken 1994) is as characteristic as the tragic family story of the Roebblings. The father John had to die in an accident at «his» East River Bridge before bequeathing the task to his son Washington A. Roebling, who himself paid with life-long paralysis for his restless immersion into the murderous labor conditions of the Caisson foundation (Steinman 1957; Farrington 1993 [1881]).

To be liable with body and soul for one's work —hardly anyone presented this attitude as fully as the icon of spirit of British engineering, Isambard Kingdom Brunel. He allowed not even an inch of personal distance from his buildings and took almost physical responsibility for success or failure of his at times, seemingly whimsical buildings. It is no surprise that Brunel's ethic of responsibility made him an enemy of standardization. In Brunel's words: «No man, however bold or however high he may stand in his profession, can resist the benumbing effect of rules laid down by authority.» (Rolt 1989, 283)

Brunel was a uniquely fascinating person and yet an emblem of a whole century. Robert Thorne titled a lecture about him «The engineer as a hero» (Thorne 1999), and recently the German poet Hans Magnus Enzensberger dedicated a poem to him:

Jede Katastrophe ein Sieg, jeder Sieg eine Katastrophe.
Soviel Energie hat nur ein Ertrinkender (. . .)

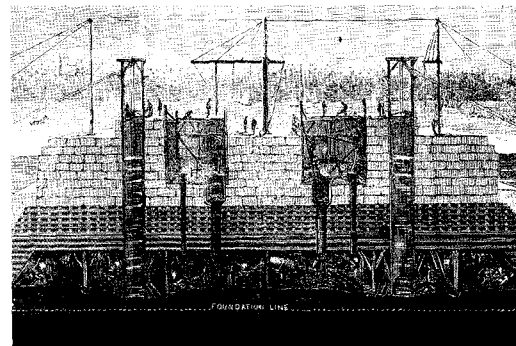


Figure 5
New York, East River Bridge, workers in the caisson, about 1880

Der große Ingenieur, klein von Gestalt: Ein Nervenriese.
Manischer Frühaufsteher, 50 Zigarren am Tag.
Von einem Projekt zum andern jagte er in seiner
schwarzen Brischka, stieg aus, melancholisch, ein
Zerstörer, der Vergils Eklogen liebte, und schrie: Ich
kann niemand brauchen, der mir dreinredet. Ich brauche
Werkzeuge. (Enzensberger 1977, 73)

(Every catastrophe a victory, every victory a catastrophe
Only a drowning man has this much energy (. . .).
The great engineer, of small build: A giant of nerves.
A manic early riser, fifty cigars a day;
Chasing from one project to another;
Melancholic, a destroyer who loved Vergil's Ecloga and
shouted:
I cannot use anyone who tells me what to do. I need tools)

We have said good-bye to heroes a long time ago,
haven't we? Deviation and not injustice marks the
crossing of borders in our standardized world. The
responsibility for the success of one's own technical
work has been reduced to a question of insurance. Do
we really believe that such a climate of irresponsible
liabilities could move the young men and women we
wish for because of their courage, involvement,
accuracy and creativity to become civil engineers?
No, responsibility then and now is not the same. The
word remains but the content has changed.

Beyond liability, another aspect of responsibility
has to be considered. We cannot get around defining
the term in the sense of *responsabilité morale*, as did
de Lalande —the responsibility, in the sense of the
duty of humans as reasonable beings, to confront the
positive or negative evaluation of our deeds. The
philosopher Hans Jonas dedicated himself to this
topic in his writing «Das Prinzip Verantwortung»
(The Responsibility Principle) (Jonas 1979).
Explicitly he pointed out that today virtues alone are
no longer sufficient. Precisely because our present
deeds cast shadows into the future that are longer than
ever before, we require a far-reaching principle,
directed towards the future.

Until the modern age every construction tightly
conformed to an ethical context. The medieval
planner and designer fulfilled his task nearly
anonymously. In the 6th century the emperor Justinian
decided that no name should be attached to the
outside of a building other than the emperor's or the
name of the person who paid for the building (Ricken
1994, 21). Only rarely, we find a hastily chiseled



Figure 6
Schmalkalden, St. Georg, anonymous master builder, about
1500

portrait of a cathedral builder hidden under the pulpit,
in the apex of an arch or at the edge of a pillar. His
responsibility was subsumed in the group's system of
values. The tasks, the goals, the rhythms were quite
clear as required by the era.

This anonymity changed in the Renaissance. Is it
chance that this change coincided with the birth of
the engineer? In 1698, Christoph Weigel published
his renowned engraving the «Ingenieur». It
illustrates clearly the whole tension of the change
which had occurred by then: the greater the pride,
the more the once neatly joined goal begins to blur
and the attached commentary is tantamount to an
intense warning: «Was hilft die Städte messen, und
Gottes Stadt vergessen?» (What good is measuring
cities when forgetting the city of God?) (Weigel
1698, pl.7)



Figure 7
Der Ingenieur, Christoph Weigel, 1698

With the age of reason and industrialization, the possibilities of the engineer grow exponentially, along with the dimensions of his buildings and the speed of their construction. In 1851, Paxton succeeds in constructing the Crystal Palace in less than a year and yet it covers an area that easily could contain St. Peter's. An enormous acceleration of all developments becomes the essential characteristic of the new era. «Becoming» replaces «being». The engineer—condemned to «the act of sovereign becoming» (Nietzsche)—is nearly breathless because of his power and suddenly the question of responsibility arises anew, unsparingly and acutely:

Responsibility as an obligation of power
Responsibility as an obligation to the future

The first response that is developed to this challenge at the end of the 18th century is well known because it is still familiar: the meaning of all ingenious action—because that is what has to be emphasized—is the domestication of the unruly nature. The new confession, the new construct of responsibility of the engineers is to diminish the laboriousness of human existence through the mastering of nature and to become an architect of a better world on this side of the heaven.

What is a civil engineer? In England in 1828, Thomas Tredgold can give an enviably clear answer: «Civil engineering is the art of directing the great sources of power in nature for the use and convenience of man.» (Ricken 1994, 11). And at the same time in Bavaria, Carl Friedrich von Wiebeking carefully develops a system of the construction sciences in five divisions whose title is tantamount to the program: «Von dem Einfluß der Baukunst auf das allgemeine Wohl und die Civilisation» (On the Influence of Architecture and Construction on the General Well-Being and Civilization) (Wiebeking 1816–19). Civilization, aménagement—these are the central goals, for which people study and teach at the new polytechnic schools in France as well as in Germany: the conquest and development of rough, unshaped and wild territories (Guillermé 1995). For that the engineer builds his well-paved roads, for that he struggles to construct his subtly thought through and mathematically calculated bridges.

The engraving, through which the biographer Samuel Smiles attempts to acquaint us with the engineer John Smeaton in 1874, seems nearly as programmatic as Wiebeking's title (Smiles 1874). Smeaton enters the history of construction especially because of his works on the development of concrete. Perhaps his most significant building is the Eddystone lighthouse, built 1756–59. The engraving tells especially how day-by-day, Smeaton—a deeply religious man—scouts out the building's progress, and eyes the small, inaccessible piece of rock on the Cornwall coast on which his great work of civilization can finally be realized successfully under unspeakable toils. The beacon is to grant secure passage to the mariners around the hostile cliffs of the storm-swept Atlantic.

The deep belief in a cultural, civilizing task is the actual cause of the triumph of the engineers in the 19th century.



Figure 8
John Smeaton scouting out the building's progress at Eddystone lighthouse, erected 1756–59

THE PRESENT SITUATION

Is the mastering of nature still a goal of an ingenious activity? Is the mastering of nature still a measure of human progress? The formula has long ago acquired a stale aftertaste. The civil engineers too, had to learn that technology, the wonderful gift of Prometheus, can turn into Pandora's box and threaten to change dangerously fast from useful medium to an end in itself.

The silly thing is that we have not succeeded in formulating and practicing new answers to the questions of the deeper meaning of our actions and responsibilities. Engineers such as Smeaton

fought for civilization, management and progress. They were fighters and in this lay their strength and quality, their attractiveness and their fame. The best students were attracted to their schools because of a hunger for infinity. Are we nothing but warriors—obliged solely to the goal of doing our work halfway decently, to do our job regardless of any goal whatsoever?

Recently a two-person play written by Esther Vilar was staged in Berlin near Pariser Platz in the ruin of the old academy of fine arts (Vilar 1998). It was highly received despite its short run. The play tells a story of the end of the cold war: An officer named Bauer, of the East German state security force, interviews the former «Generalbauinspektor», Albert Speer, who has just been released from an Allied

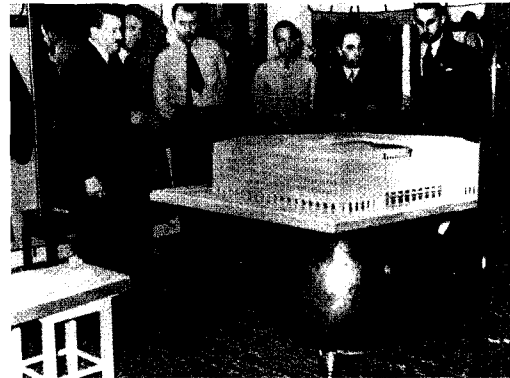


Figure 9
Albert Speer, Adolf Hitler, Joseph Goebbels discussing the model of the «Haus des Fremdenverkehrs», Berlin, 1938

prison in West Berlin and under mysterious circumstances has been invited to East Berlin. Speer had experienced a comet-like rise from insignificant, jobless architect to «Architect of the Führer» and «Reich Minister of Armaments» in the few years of the Nazi regime in Germany. In order to justify his work as Hitler's architect in the very building where the play is now staged, 50 years after 1945, Speer states a distinction which is frighteningly simple; he says to Bauer: «You are in politics and I am a manager and thus we act according to a completely different ethic. A politician follows the ethic of attitudes and the question of what is right. However, for a manager what counts is an ethic of results and the question of what is doable, and what is doable, Mr. Bauer, that will be done. Others will decide if the doable thing is the right thing.»

Certainly, men such as Smeaton, Tredgold and Wiebeking asked what is doable. Nevertheless, I cannot help the impression that they would not have refused the question of what is right. Have we somehow «unlearned» to ask that question?

PROSPECT

At the beginning of the twenty-first century, civil engineers have to decide how to construct themselves.

Only if we are able to revive old virtues, only if we are able to formulate—and teach how to live out—

credible answers to the question of responsibility of today's engineer; only if we can find the courage not to help young students to understand only the mysteries of load bearing, composite materials, soil mechanics or construction management; and only if we —beyond all fatigue- and life span projections— allow and satisfy their hunger for infinity; only then will we succeed in becoming again architects of the future. Only then, can we succeed in preventing the disappearance of the engineer.

As is the case with every serious revision this implies the willingness to question everything, our seemingly self-evident paradigms as well as our seemingly self-evident practices. This implies the unprejudiced question about the lasting quality of our buildings, which has more to do with sustainability than with quality guarantees. This implies the courage to say no and it also implies the uncomfortable thought that despite all knowledge and successes we may not have the best technology of all times at our command and we may not be the best engineers of all times.

Suddenly we are free and open for simple virtues and lived responsibility and suddenly the initially mentioned big-sounding guiding principles for future engineers make sense. From the knowledge at our command to the knowledge of orientation, . . . from linear to holistic thinking, from specialist to generalist, . . . from technocrat to becoming a sensitive engineer.

Leon Battista Alberti comes to mind, the legendary uomo universale of the Renaissance about whose far-reaching interests and abilities wondrous things have been reported. He was not only an architect and author of «De Re Aedificatoria» but also a mathematician, physicist and jurist. A very sensitive as well as successful person: the view of splendid trees makes him cry and his imperative is, «humans can do everything if only they want to». Maybe Alberti's most noble virtue lies in his playfulness. In the depth of an antique bookstore, I recently came across a book wondrously titled, «The Existential Pleasures of Engineering» (Florman 1976). Yes indeed, the pleasure of being an engineer! Traces will be left only by those who build with their hearts.

To sum it up, this means not more and not less than to define ingenious building again and always anew as a cultural task and to define us, the civil engineers, as the proper elite responsible for it.

Without knowledge and awareness of history, this process will fail. History is the key. Leo von Klenze, the famous Bavarian architect complained in the middle of the nineteenth century that the facelessness of contemporary architecture was a consequence of the absence of history from conscience. Probably he was right and probably this applies not only to architecture but also to civil engineering.

Some weeks ago, I found a saying engraved in a beam of an old half-timbered house in Mecklenburg, a little north of Berlin, written in Low German: «Man möt vont Olle liern, nieges tau maken» —To make new things, first you have to learn from the old!

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