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Polo Montedago, Via Brecce Bianche 12

60131 Ancona - Italy

Phone: +39 071 2204587

Email: info@artecweb.org- tema@artecweb.org

Media Partner:

Edicom Edizioni

Via I Maggio 117

34074 Monfalcone (GO) - Italy

Phone: +39 0481 484488

TEMA: Technologies Engineering Materials Architecture

Vol. 6, No. 2 (2020)

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Editorial**Bridging over bridges' sources problems***Tullia Iori*

DOI: 10.30682/tema0602i

5

CONSTRUCTION HISTORY AND PRESERVATION**“Structural fantasies” in 20th century architectural heritage:****The forgotten works of Enrico Castiglioni***Ilaria Giannetti*

DOI: 10.30682/tema0602a

8

**The use of “structural prefabrication” in the Flaminio Stadium by Pier Luigi and Antonio Nervi.
A technical-constructive study aimed at formulating guidelines for a future conservation plan***Rosalia Vittorini, Rinaldo Capomolla*

DOI: 10.30682/tema0602b

20

Italian building models in the 1950s. the Agip motels*Giorgia Predari, Riccardo Gulli*

DOI: 10.30682/tema0602c

31

Designed for machines. Italian bridges and viaducts (1965-1990)*Gianluca Capurso, Francesca Martire*

DOI: 10.30682/tema0602d

42

Methods and instruments for prefabricated housing refurbishment: the French case (1960-70)*Angelo Bertolazzi, Agata Maniero, Giorgio Croatto, Giovanni Santi, Umberto Turrini*

DOI: 10.30682/tema0602e

52

“La Fabril” resistencia’s industrial heritage: re-functional chance and managerial challenge*Daniel E. Vedoya, Claudia A. Pilar, Caterina Mele, Paolo Piantanida*

DOI: 10.30682/tema0602f

62

H-BIM objects for modern stone facing. Genesis and informative contents for the shell of the station of Messina

Alessandra Cernaro

DOI: 10.30682/tema0602g

73

Operational atlas of exposed mortars and conglomerates for interventions on the widespread architectural heritage

Sara Fasana, Marco Zerbinatti, Alessandro Grazzini, Federico Vecchio

DOI: 10.30682/tema0602h

85

Editorial

BRIDGING OVER BRIDGES' SOURCES PROBLEMS



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Tullia Iori

DICII - Dipartimento di Ingegneria Civile e Ingegneria Informatica,
Università di Roma Tor Vergata, Roma (Italy)

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To the victims of the collapse of the bridge over the Polcevera river

The collapse of the bridge over the Polcevera river on August 14th, 2018, triggered a profound rethinking of historical research in the field of structural construction. The bridge was one of the most iconic symbols of the Italian School of Engineering.

On the one hand, many doubts about its collapsing modes imposed with increased urgency the scientific effort to study and carry out thorough historical research. On the other hand, the unawareness of the value of the Italian structural heritage, as well as of its construction experimentation, and average age, made its dissemination among students and professionals, who will be involved in its future safeguarding, even more necessary.

A thousand-stages tour de force, which was started to inform everyone about the cultural identity, the technical value, and the historical significance of the School of Engineering, has not prevented a continuous, more private brooding related to the way of carrying out this research, so devoid of historiographic tradition.

Is our approach properly historical research? Moreover, where does the history of structural engineering fit into the broader overview of historiography? In 2005 Sergio Poretti included it in the history of construction, which he defined as the “*material history of architecture*”, referring to Eugenio Battisti, who already identified the art of construction as a new frontier in the history of architecture in the 1980s¹.

Nevertheless, Poretti recognized that studies on Italian structural engineering of the 1900s have never been part – or only marginally – of the history of architecture. The truth is that these studies still need an es-

sential interpretative and critical synthesis operation to reconstruct their general framework; it is also true that this synthesis, as consolidated in all the more mature historiographies, must be based on the “slow, patient accumulation of precise surveys and specialist studies”. These are tiring, strenuous micro-stories that struggle to find researchers interested in digging them out of the archives.

This is the primary concern about this research. For the usual atavistic problem: the engineer is not interested in history, in the past. He looks forward to the future, to the new.

However, in order to investigate Morandi’s or Zorzi’s intricate carpentry or Musmeci’s high-mathematical relations, it is necessary to have an engineer’s education. An advanced education able to distinguish a hinge from a fixed joint, not because it is written in the technical reports but because it is evident from the geometry of the joint itself. The engineer must be able to recognize, in the still handwritten overly synthetic calculation reports, the starting hypotheses, skip the needless passages and understand the rough core of the conclusions. Moreover, the well-trained engineer should resist the temptation of recalculating old structures with modern software, the most useless hobby for a historian (necessary only for those who have to verify and validate the current use – but this is a totally different field) and instead make an effort to read the papers through the eyes of a pre-computer engineer, without evaluating the project through modern parameters. He must, in brief, avoid the actualization typical of the “presentism” that affects traditional historiography as well. At the same time – and this is much more challenging – he has to know all the other histories connected to the construction: those of the materials, of the building site, of the construction

companies, but also the political, economic, and social issues of the country where the work has been built.

There are no Degree Courses and related “Dublin Descriptors” for these types of qualifications.

If they did exist, a branch of “Contemporary Diplomats” would undoubtedly be compulsory teaching. What are the documents we are dealing with in our research? Are they “truthful”, i.e., are they what they claim to be? What do they precisely tell us? The dramatic recent events have required further reflection on this as well.

The historical work I have carried out in the last few years has dealt with peculiar documents that are rarely interesting for other researchers. Working to reconstruct the history of reinforced concrete in Italy, I have thoroughly examined, for example, the invention patents archive from its origins to the Second World War. Not searching for a specific patent attributed to a known author, but merely going through all the ones relevant to the construction technique evolution. The history of the material has written itself: and not because the technique was a sequence of inventions but because the variation in density of patents dedicated to specific innovations has made the main stages of the entire process evident.

Moreover, most of the patents were deposited by unknown professionals who have remained so even after the investigation. Above all, in the patents there is no trace of their practical applications since they are often chimeras that are almost unachievable. Houses hanging like cloths from laundry threads – and therefore potentially unshaken by earthquakes – or hollow blocks for floors shaped like puzzle pieces, that should become resistant to tensile stress, even without rebar reinforcement. Nevertheless, from a statistical point of view, they provide a clear overview of the current debate and, therefore, the evolutionary path of the materials.

This is not the only reason for which the patent is a peculiar document: the important ones, in fact, decisive for the history of the Italian School of Engineering, those of Nervi, for example, hide more than explain, generalize instead of specifying, since the patent is intended to protect rights instead of providing instructions to those who want to copy the idea. However, for the construction historian, the patent is a “sound” document.

Other documents that crowd this research field are the official documents, protocolled, perhaps registered at the Court of Auditors. In order to find the dusty file of a contract or a test certificate, we are willing to crouch uncomfortably, in a semi-abandoned dark archive, next to a dead mouse.

Yet the 122 pages of the “Report, minutes of visit and test certificate” for the construction work on the 24th parcel of the Genoa-Savona motorway, two and a half kilometers long and including the bridge over the Polcevera, report that, compared to the contract signed in September 1961, when no one had even imagined how to build the cantilever brackets for the balanced trestles, the only project variants would have involved the use of half-inch strands instead of the 7mm cable initially planned for all prestressing operations. A few well-calibrated sentences by which the commission relieves itself of all responsibilities for the execution changes made on-site concerning the 20 preliminary drawings attached to the contract, while the final drawings would be over 400! The testing certificate has a completely different institutional scope, not that of explaining to the historian what truly happened during construction.

One more example: the drawings attached to the contract for the construction of the Risorgimento bridge had already been utterly outdated upon signing. The designer Hennebique and the Porcheddu company, in October 1909, were already working on a new and completely different project but could no longer delay the signing. Is that “contract” a fake indeed? Of course not: the amendment during construction is a constant in our databases, but whichever researcher found only those drawings (and not those that were later realized, but which would never be validated by any formal signing) could completely misunderstand the real conception and behaviour of the bridge.

There is another typical problem we are dealing with in this research: sources may have been filtered. Not necessarily what we do not find in an archive has never existed.

This is especially true for the queen of sources, the one that makes our eyes blink the very instant we find it, but which we ought to take with a grain of salt: the building site picture. It seems a contradiction: the photo

or video of the building site, when fortune shines, would seem the most incontrovertible proof of the way the work was built. Nonetheless, even the well-stocked collection can hide rather than show.

The digital scan of about 500 photographs representing the bridge construction site over the Polcevera are archived in the SIXXIdata: more than 250 of them, from the Condotte company's archive, linger from all perspectives on the temporary tie rods and the thousand work equipment – from the harp for the temporary deck prestressing to the cast-in-place form traveler – which are absent in the drawings. Nevertheless, the day after the collapse, some American newspapers published a series of photos by Mario De Biasi, extracted from their huge database, and dated August 1967. The photojournalist authored a few very famous shots, as “Gli italiani si voltano” (*Italians turn around*) and made reportages for the weekly magazine “Epoca”. De Biasi reached the 9th pile early in the morning, dangerously climbed the stay, and reached the top of the antenna. Was he authorized or helped by someone, who knows? From up there, he took some unrepeatable images that document the construction site one month before the inauguration. Five of those photos were then published in the August 13th, 1967 issue of the magazine. One important shot is missing; the one that at the deck level shows a handsome worker, striking a pose while working on one of the stays of the 9th pile, just the stay that broke first. In the foreground, we can see a sheet metal cover

wrapping the half-inch strands, which in the executive drawings are prescribed to be sheathed one by one. No document talks about this cover, no update of the drawings refers to this detail, no calculation considers this modification in progress.

Our photos skip from July 7th directly to ribbon-cutting by Giuseppe Saragat on September 4th: as if there was nothing to be documented in those two months of final acceleration of the construction site.

In short, the sources are “traces that the past has transmitted to the present and that we, therefore, find in the present”; they are not all we would like to know. And for the rest?

In the case of Polcevera, unfortunately, we have the autopsies of the bridge – the thin sections of exhibit 132 – which allow us to discover today all that has not been documented. However, we would obviously have all preferred that the bridge was still in place, perhaps after careful and timely maintenance that could have extended its life for many decades.

For all other chances, Manzoni explains: “*la Storia è costretta a indovinare. Fortuna che c'è avvezza*” (“it is a fact that History is doomed to guess everything. Luckily enough, it is used to that”)².

Notes

¹ Poretti S (2005) Storia delle costruzioni e storia dell'architettura. In: Teoria e pratica del costruire: saperi, strumenti, modelli. Edizioni Moderna, Ravenna, vol. 1, pp 25–30.

² Manzoni A, *I promessi sposi*, cap. XIII.