

# Collecting the old and the new at the Pavia Museum of Electrical Technology

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**Abstract** — In 2011 the University of Pavia celebrated 650 years from its foundation as a *Studium Generale*. During the long history of this ancient university scientific museums have been created to collect original and curious things as teaching aids. Most of these museums still exist, but their mission has changed. They no longer collect the new; they only preserve the old.

The Pavia Museum of Electrical Technology is different. Its origin is in the last two decades of the 20th century when old and new apparatus began to be collected for teaching purpose, thus continuing the original mission of a University museum. An extensive collection was soon gathered and a modern building was erected to accommodate it.

The new Museum was opened in March 2007.

The paper describes the origin and the mission of this modern museum and its special features.

**Index Terms** – University museums, museums, history of technology

## I. AN ANCIENT UNIVERSITY WITH ANCIENT MUSEUMS

The University of Pavia, in Northern Italy, is among the most ancient universities in Europe. The higher education institution already established in Pavia in 825 A.D. became a *Studium Generale* in 1361 by a decision of Emperor Charles IV, King of Bohemia, at the request of Gian Galeazzo Visconti, Duke of Milan. The foundation Charter, issued in Nuremberg on 13 April 1361, gave the *Studium* the right to grant degrees that would meet general acceptance, “enjoying all manner of privilege such as are enjoyed by Paris, Bologna, Oxford, Orleans and Montpellier”[1].

In 2011 therefore the University of Pavia celebrated 650 years of continuous existence. The University flourished particularly in the 15<sup>th</sup> century and in the second half of the 18<sup>th</sup> century. In the latter period the enlightened Austrian Government, then ruling over much of central Europe, also promoted scientific studies at the University of Pavia. A Government decision, in 1771, stated that activities in the University should be paid to the creation of libraries and scientific cabinets equipped with modern instrumentation for experimental lectures and demonstrations to the public.

Eminent professors were appointed, including Lazzaro Spallanzani (1729-1799) for natural history, Alessandro

Volta (1745-1827) for experimental physics and Antonio Scarpa (1752-1832) for anatomy.

They received special financial support from the Government to set up scientific displays and collect new materials and instruments, either prepared locally or brought elsewhere or donated.



Figure 1. University of Pavia, entrance court yard

For this purpose they had to travel to see other collections, approach private collectors and recruit technicians. The objects were then used in lectures, public demonstrations and for research.



Figure 2. University of Pavia, “Aula Volta”

This was the origin of the most and prestigious scientific collections of the University of Pavia.



Figure 3. Volta in an experiment at the French National Institute in November 1800

Soon after their foundation, however, these collections ceased to acquire new objects and became “museums” – deposit of old materials and instruments to be preserved and shown as antiquities. In 1936 the collections were incorporated into the Museum of History of the University of Pavia. In turn this Museum became, in 2005, part of the Sistema Museale d’Ateneo, the University’s museums organization established to coordinate the activities of all the various museums of the University in all fields. The Sistema Museale includes the Museum of the History of the University, the Museum of Natural History, the Museum of Mineralogy, the Museum of Archeology, the Museum of Human Anatomy and the Botanical Garden, besides other smaller collections [2].

## II. ENGINEERING AT THE UNIVERSITY OF PAVIA

Over the centuries the University of Pavia offered degrees in theology, law, arts and medicine. Although the subjects of military architecture, geometry and surveying were sometimes included in mathematics courses, first degree courses in engineering and architecture were officially introduced only by the Austrian Reform of 1771, already mentioned. Those who were granted the degree then received practical training by engineers in workshops.

In 1859, when the unification of Italy started, the new Italian Government stated that practical training courses should be concentrated in two Institutes of

Technology, one in Turin and the other in Milan. For over a century therefore the University of Pavia continued to offer only introductory courses in engineering.

In the academic year 1962-1963, by an agreement with the Technical University of Milan, originated from the Institute of Technology and founded in 1863, a full degree course in electrical engineering was established in the University where Alessandro Volta was a professor for many years. The Department of Electrical Engineering was set up in 1986.



Figure 4. Department of Electrical Engineering, entrance

## III. PLANNING A NEW MUSEUM OF TECHNOLOGY

In the last two decades of the twentieth century the Department of Electrical Engineering began to collect old and new electrical apparatus for teaching purpose. This was the basis of the Museum of Electrical Technology which thus continued the original tradition of scientific museums established in the eighteenth century which collected original and curious things as teaching aids.



Figure 5. Aerial view of the Museum of Electrical Technology



In the field of technology generally, and of electrical technology in particular, the rate of change in the past few decades has been impressive. Change is been so rapid that products become obsolete within a few years. The evidence of recent technology therefore disappears unless somebody is careful to preserve representative objects. Normally manufacturers are so busy updating their products and matching market needs, that little or no time is devoted to keeping a record of the past. This task, therefore, has to be undertaken by others, possibly public institution preserving the heritage of the past to educate future generations. This consideration prompted the Department of Electrical Engineering to collect examples of old and new technology. The collection soon grew, aided by donations from companies and individual collectors. In order to promote research on this huge heritage collection and, more generally, on the evolution electrical technology and its impact on society, in 1998 the University set up the Centro Interdipartimentale per la Ricerca sulla Storia della Tecnica Elettrica (CIRSTE), a multi-disciplinary research environment for historians, technologists and scientists.

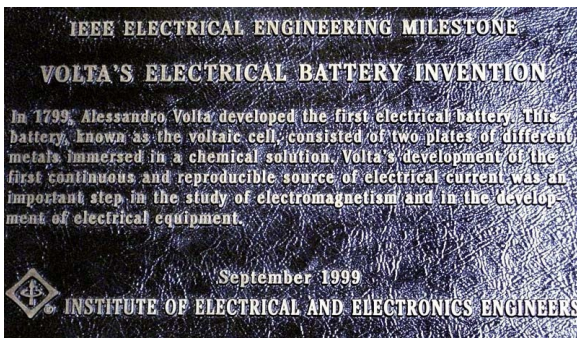


Figure 6. Volta's milestone plaque

In 1999 the Italian Electricity Board, (ENEL), decided to place on loan with the University of Pavia all the exhibits from its own Museum of Electric Energy, formerly based in Rome. In that year also the bicentenary of the invention of the electric battery by Alessandro Volta, professor of the University of Pavia, was celebrated. The University therefore decided to pay a permanent tribute to its eminent professor by establishing a new Museum of Electrical Technology. The Museum would exhibit material illustrating the progress of electrical technology from Volta to the present day and beyond. The Museum inherited the University collection and the entire Enel Museum. Two years later SIRTU, a leading company in the field of telecommunications offered on loan its Museum of the History of Telecommunications to the Pavia Museum. These three collections together cover almost every aspect of electrical technology from power to

information technology. The new Museum is therefore able to take place in its field, with the major technological museums in Europe.



Figure 7. Front view of the Museum

#### IV. THE MISSION OF THE MUSEUM

The mission of the Pavia Museum of Electrical Technology includes[3]:

- To save, restore and keep products of electrical technology, showing its evolution from the origins of electrical -industry and applications to the present time;
- To illustrate, by means of saved heritage, key moments in the history of power and communications;
- To promote study and research on the origin and development of electrical technology;
- To develop educational activities and disseminate technical culture;
- To encourage visits by school children and the public at large, helping them to become conscious of the history of the science, technology, economics and culture of their own region in a national and international context.



Figure 8. Pupils visiting the Museum

The Museum collects and exhibits both the old and the new. The permanent exhibition is accompanied, from time to time, by temporary exhibitions on specific subjects.

The Museum was established by and in the University, first of all, for teaching. The first expected visitors, therefore, are University students who find a live presentation of science and technology. Sometimes engineering education has tended to cancel, rather than to stimulate, the sense of history, and young engineers may get the impression that the technology they now are learning has no past and will never change in the future. We know, however, that today's engineers learn from past failures and successes, and that the development is based on knowledge of the past as well as of the present. Students need to form the habit of considering the historical dimension of problems they meet. Visiting a museum of technology help students understand the interaction between technology and history.

Another criticism of traditional engineering education is that generally it fails to show social and economic implications of technology. Students therefore do not perceive the social dimension of technology, i.e. how it has affected society and been affected by society. A visit to museums, where technological achievements are described in their social context, therefore can profitably support engineering education.

Finally, meeting real products of technology in a museum can help students have a better understanding of things they have seen only in books. Both books and museums contribute to a better understanding of technology.

The Pavia Museum, however, which was founded also by other public institutions, is open to the general public who, attracted by fascinating objects exhibited, are encouraged to think about the way electricity comes into everyday life.



Figure 9. Brown three phase generator in the exhibition hall

## V. THE MUSEUM BUILDING

The Museum was established in March 2000 by an agreement between the University of Pavia and the Regional, Provincial and Town administrations. Building work was completed in 2005, and the Museum opened in March 2007.

The Museum building is in the new campus of the University of Pavia and covers some 5.000 square metres. There are three main areas: two halls and a service area including a library, a meeting room and a room for temporary exhibitions.

The main exhibition hall, which is open to the general public, is laid out chronologically and shows how electricity has been produced, distributed and used for both power and communication from the first experiments to the present time. The second hall, which is intended for specialists, has most of the collections arranged by subject.



Figure 10. A view of the storage hall

In a technological Museum technology is not only exhibited but also used to show the exhibits and describe their operation in a modern and attractive way. Touchscreens and new lighting technologies are widely used.



Figure 11. Another view of the storage hall



## VI. VISITING THE MUSEUM: A TOUR THROUGH ELECTRICAL HISTORY

The main hall is divided into five sections which encourage the visitor to make a journey through the history of electricity[4]. The five sections are:

- Up to about 1880;
- The final years of the nineteenth century;
- The early twentieth century;
- The latter half of the twentieth century;
- Today and the future.

The Museum does not claim to cover everything, but it displays valuable exhibits along a fascinating journey.

The journey starts with experiments with rubbed amber and loadstone and includes an appropriate tribute to Alessandro Volta. A plaque presented by the IEEE commemorates his invention of electric battery as a milestone in the history of technology. Remarkable among the older exhibits in the communications field are collections of telegraphs and telephones. Important power objects are an Edison-Hopkinson dynamo machine and a Brown three phase generator from the hydro-electric station at Paderno d'Adda. Particularly attractive to the public are a tram of 1928, a doctor's X-ray cabinet of about 1930, the signalling control panel of a railway station of about 1940, a modern wind generator, domestic appliances of various periods and an exhibit on electricity in cars. There are exhibits on the continuing miniaturization of computers and information technology equipment. Looking to the future there are exhibits on renewable energy, and the prototype of a nuclear fusion experiment to represent the search for plentiful power.

Tours of the Museum can follow that chronological pattern, or they can be guided by a specific theme, such as "generation of power", or "telecommunications", or "electric light". School groups or other visitors on a tour are encouraged to use the interactive touchscreens. Receiving such groups is part of the mission of the Museum, and by observing them the Museum can check the effectiveness of its communication.



Figure 12. The tram in the Museum

## VII. THE ACTIVITY OF THE RESEARCH CENTRE

In 1998 the Department of Electrical Engineering set up the Centro Interdipartimentale di Ricerca per la Storia della Tecnica Elettrica (Research Centre for the History of Electrical Technology). Various other Departments of the University joined the Centre which officially became a Research Centre of the University on 17 July 1998.

The aim of the Centre is to:

- Study the evolution of all aspect of electrical technology;
- Collect, restore and study the technical heritage;
- Foster the understanding of history of technology by the public;
- Promote the teaching of the history of technology.

The Centre was generally responsible for planning the Museum, appointing the Planning Committee and caring for the collections.

Over the years the Centre has promoted studies on various aspects of the history of electrical technology and it has organized scientific meetings and events[5]. A recent event arranged by the Centre in 2009 was the Marconi 09 project, a special exhibition and a series of related lectures commemorating the centenary of the award of the Nobel Prize to Guglielmo Marconi for the development of wireless telegraphy.

## VIII. CONCLUSION

In an ancient University this modern Museum continues the original mission of University Museums: collecting both old and modern technology and using it as an aid to teaching.

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