

# Industrial Heritage and Seka Paper Mill

UFTADE MUSKARA, Kocaeli University, Turkey

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Industrial heritage today is being taken even more seriously in the academic field. It is due to the instituting of heritage studies across humanities, social sciences and natural sciences and developments in contemporary archaeology. Industrial heritage is broadly defined by many specialists after Nizhny Tagil Charter (2003) as consisting of “the remains of industrial culture which are of historical, technological, social, architectural or scientific value”. Industrial sites such as the early production units and factories in Turkey are generally abandoned and forgotten; only a few of them however were preserved and museumized. Meantime, industrial heritage comprises more than just material culture, but also valuable intangible forms of heritage. In the case of factories as the products of early industrial developments in Turkish Republic during 20s and 50s, they provide us important insights about the structural alteration in culture and social life in the region. Lives in factories and their campus areas were the representation of transforming identities of young republic. Therefore, preserving and conserving of such sites should consider not just the building itself but tangible and intangible heritages values together. Temporal layers including the time when the factory was still active, when it was abandoned and spatial layers including living and working quarters of industrial sites should be equally transmitted to various targets groups. Probably the best way to accomplish this is using augmented reality applications. This project considers how augmented reality contributes to perception of visitors with maintaining cultural mediation in SEKA Paper Museum situated former pulp and paper mill in Kocaeli district. It also suggests that cultural heritage specialist today should participate more in such studies in order to design accurate substructure, interface and content.

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## Key words:

Industrial Heritage, Seka Paper Museums, Augmented Reality, New Media Tools, Heritage Studies.

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## INTRODUCTION

Industrial heritage is defined in Nizhny Tagil Charter as consisting of “the remains of industrial culture remains which are of historical, technological, social, architectural or scientific value.” [ICOMOS 2003]. Industrial archaeology meantime has been emerged as a new discipline in 1950’s. Since then it has been expanded from material studies to multi-layered studies of networks of production and distribution of industrial revolution [Casella 2005, 27]. Nowadays, it is generally accepted that industrial archaeology is both related to heritage preservation studies and industrialization [Palmer and Orange 2016, 73].

Archaeological studies provide important information on understanding and explicating industrial heritage areas. However, because of the nature of industrial heritage by its definition industrial archaeology is also concerned with social context and meaning of things. Therefore archaeological studies as heritage studies of industrial areas require interdisciplinary work in order to reveal not only the material meaning of sites, but also their role in social and cultural contexts. The heritage values and material remains related to the industrial areas could be summarized as:

- Architectural values and aesthetics of industrial buildings
- Technological values of machinery systems
- The relation of industrial area to its environment, etc. its surrounding campus area and the connection with city
- Both its social-cultural and economic-political context within the city and nation.

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Author's address: Department of Conservation an Restoration of Cultural Properties, Kocaeli University, Anıtpark, Turkey; e-mail: uftade.muskara@gmail.com

Industrial heritage comprises more than just material culture, but also valuable intangible forms of heritage. These tangible and intangible heritage elements of wider social and cultural significance as part of the records of people lives provide an important sense of history and identity.

Industrial heritage areas are usually in conflict with contemporary living quarters and social dynamics of the city, therefore preserving such complex sites as a whole for longer terms is connected to the concept of sustainability. Although there has been a general agreement on the theoretical framework of sustainability, practices are still contradictory [Landorf 2009, 495]. Indeed, sustainability could be evaluated under “cultural-social sustainability, sustainable development and financial sustainability” sub-titles especially for the heritage sites examples of adaptive re-use in order to maintain sustainable heritage management [Landorf 2009; Pozo and Gonzalez 2012; Falconer 2006; Bergeron 2012; Özdemir 2009].

Regarding to the aim of sustainable management, preservation and conservation planning phase of industrial areas requires an interdisciplinary approach for including different layers of heritages values and could be consisted of following stages:

- The consideration of the location of heritage site: whether its current situation is within urban areas or it is in rural context.
- The examination of machines in the industrial complex
- Documentation of historical pictures, objects and records
- Architectural analysis for diagnosis of deterioration mechanics and decay situation
- Decision of re-use or re-habitation areas
- Suggestion for the theme of re-use.
- Designing display elements and tools.

As a distinctive example for industrial heritage sites in Turkey, Seka Paper Mill is presented in this article. The development of Seka Mill is analyzed in its historical process to realize its contribution to the memory and heritage of the city and identify the various layers of heritages values. Then conservation and transformation of Seka Paper Mill into Paper Museum are evaluated with regards to principles of industrial heritage and sustainability. “Augmented reality” (AG) technology is considered as an alternative way of representation of heritage values in accordance with the contemporary museology and exhibition techniques. Test results of Seka Paper Museum AG demo application and public survey of who have used the demo is presented in last part.

## SEKA PAPER MILL

Seka Paper Mill was constructed in 1936 within the city of İzmit-Turkey [Dölen 2015]. The media of those days identified paper with civilization and there were celebrations in the city upon the first paper production (Fig. 1). Likewise in the case of other factories as the products of early industrial developments in Turkish Republic during 20s and 50s, Seka provides us important insights about not only the economic growth trends, but also the structural alteration in culture and social life in the region.

After the production has started, the activities in education, which have been initiated as transferring of experience and knowledge from German engineers to their Turkish colleagues continued as vocational courses in 1939. By 1941, in-service training activities have become more organized and students were encouraged to study abroad. Vestibule school in 1944 and elementary school in 1945 were founded in the complex in order to provide formal learning [Kocabaşoğlu et al. 1996, 168-171]. Social organization activities in the factory as has been developed rapidly between 1937 and 1943 when retail society, infirmary and canteen, dining hall, movie theater, social club and playground were put in the services for the factory workers and their families who lived in the campus area [Kocabaşoğlu et al. 1996, 171-175; Dölen 2015, 430]. Moreover, the in-house communication was established with “Seka Postası” and until 1984 this newspaper created a source for the city’s social life. Seka Club Ka was founded in 1937 and had many contributions to sportive live in İzmit in various branches such as wrestling, boxing, football, basketball, and athletics, coxless and sailing.

By 80s while investments of private sector to paper industry increased, Seka Paper Mill could not take the pace in technological developments and environmental requirements. Besides, because of inefficient organization, the

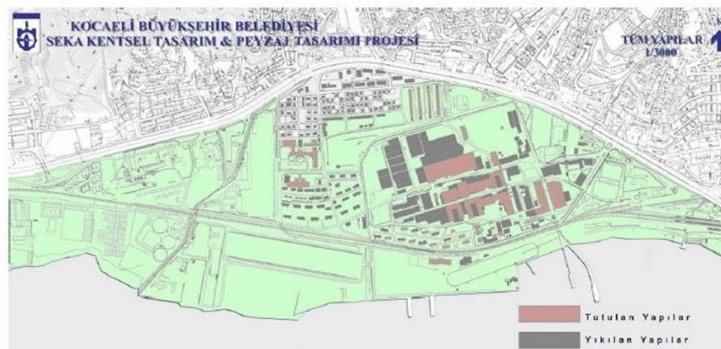
financial difficulties and increasing population in the city, the mill was privatized in 1997. The factory has an important role in the lives of workers and townspeople and people were emotionally connected to it. Therefore, when it was decided to close, there were after strong objections and strikes for almost a decade. Finally, however, production ceased in 2005 and the factory area was transferred to the Municipality on the condition that it would be use for public purposes.



Figure 1. First paper production in Seka Paper Mill. Turkish and German engineers 1936 (Seka Archive)

### Conservation and re-habitation project of Seka

Seka conservation and re-habitation project was consisted of 3 stages (Fig. 2). The first stage was completed in 2007 and was focused on the seaside. This part was transformed into a multi-purpose green space for maintaining sea line continuity [Oğuz et al. 2010, 161]. Second stage was on preserving and transformation on the area where the building complexes were located. The architectural analysis was applied to determine decay status of the buildings and conservation problems [Aydın and Kartal 2016]. According to this study, many architectural elements were applicable for re-use with little interventions. The project has initiated in 2009 for the conservation of First Paper Mill. The conservation planning was designed as transformation of First Paper Mill into Science Center and Paper Museum and aimed at preserving whole elements of building including the machines, which were still working, at their original places. However, some of the machines were sold after it was closed; therefore these areas were used as places for showcases. The project is considered to be Turkey's biggest industrial transformation project and the museum, which was opened in 2016, occupies 12345 m<sup>2</sup> of the old Seka Paper Mill. The themes presented in the museum include the manufacturing stages of paper, Kocaeli's history, the factory's history and social milieu.



Sekapark Projesi Kapsamında korunan ve yıkılan yapılar (Orijinal, 2006)

Figure 2. Re-habitation plan of Seka area is indicated in green. The buildings that are preserved are shown in red (Seka Archive)

## Evaluation of museum exhibitions

Although, the project team was not participating in the planning progress, the museum administration referred to the Department of Conservation and Restoration of Cultural Properties for consultation on the efficacy of the exhibition and consistency of design with the industrial heritage principals and sustainable heritage management. After the examination of the Museum through surveys in the museum and analysis of the documents related to the restoration project, it has been decided that there are positive elements which are in accordance with contemporary industrial heritage preservation principals as including of different layers of heritage values.

However, different themes disrupt integrity and prevent visitors to realize the authenticity of the factory and its historical and social importance:

- Some old photographs belonging to factory workers are located at the entrance of the museum and there are others scattered around the museum and placed on the lockers, however they are disconnecting from context and meaning (Fig. 3).
- Showcases present too much information, which is not interconnected to each other such as the history of the factory, history of the city and history of paper production.
- Documentaries are installed at the projection screens at various places in the museum in which people are talking about the importance of the museum in their personal lives as well as in the city's identity. However, the projection screens were placed not in accordance to visitor's route or to the displays (Fig. 4).



*Fig. 3. The entrance of the museum*



*Fig. 4. Video of oral history on the projection screen*

The life style in the Seka Paper Mill and its campus area was the representation of transforming identities of the young republic. Therefore, preserving and conserving of such heritage site should consider not just the building itself but the meaning of tangible and intangible heritages values together. Temporal layers including the time when the factory was still active, when it was abandoned and spatial layers including living and working quarters of industrial sites should be equally transmitted to various targets groups in order to express the Seka's history and identity as a whole. This would help to not only visitors to understand the story of people and story of that time, but also would increase the participant of local organizations. Probably the best way to accomplish this is using new media applications.

Zollverein Coal Mine Industrial Complex in Germany could be among the best examples for the conservation projects of industrial areas in the world. The coal mine was constructed in 1932 as a part of industrialization progress and became the well-known symbol of German industrial revolution until 1993 when it was closed. The complex shares the similar heritage values of wider social and historic significance and the destiny with Seka Paper Mill. The adaptive re-use preservation formula was applied to Zollverein Complex as in Seka. However, unlike Seka Paper Museum, the function of buildings and their surrounds has been transformed to a huge area consisting of museums dedicated to industrial heritage and architectural design, social locations for numerous leisure activities including an open pool and monumental path where the guided tours are organized. When compared to Seka,

Zollverein complex appears to be reconstructed with a more integrated approach. The industrial heritage area was designed with its surroundings to be a focal point and a symbol of heritage values as it was in the past. People visit here not only to see the exhibitions and read the information, but also to experience the site, spend time and to be together.

### New media tools and Augmented Reality for Cultural Heritage

New media is usually considered the same as digital media and technology-driven alternatives. In this respect, the relation of new media and cultural heritage could be categorized as:

- Increasing interaction between visitors and objects at display,
- Increasing the perception of archaeological sites by visitors,
- 2D or 3D reconstruction of architectural remains,
- Interactive learning in cultural heritage area,
- Using remote access to heritage sites

The common purpose of various applications is the active involvement of user who is the subject of the application. New media usage in cultural heritage field is associated with McLuhan's theory i.e. technology or new media is the extensions of man [McLuhan 1964]. However, authenticity of cultural heritage and its original texture are important factors regarding to the visitors' perception. When the application is designed to increase the sense and understanding of user, the essence of the matter, which is the story, and meaning of heritage components could be overlooked. Then the historical building for instance could be perceived as a stage for some historical games and the user of technological applications becomes a part of the design as its perception dims and the reality blurs.

Nevertheless, traditional methods of exhibition are re-shaped and the relation between the user/visitor and the object is transformed. Using digital techniques make it possible to build 3D models, reconstructions, and environments of virtual reality of archaeological sites or ancient structures and related cyber games. A better understanding of new media concept especially for cultural heritage studies with the help of interdisciplinary approaches could provide limitless possibilities for preserving, monitoring, representation and management of cultural assets.

For the case of Seka Paper Museum, to make information more easily available through visualizing the content of both temporal and spatial layers, we have concluded that probably the best and simple way to accomplish this in the real context is the application, which presents historical photographs in augmented reality (AR). However, the use of AG in industrial heritage areas is very limited as of today. One of the examples is from Newcastle Australia, which suggests AG application as a better and more holistic approach for preserving abounded industrial areas [Morrison et al. 2012]. The other one considers mixed reality consisting of virtual and augmented reality for reconstruction of power plant complex in Piestany Slovakia and the importance of interdisciplinary cooperation for industrial heritage studies [Hain et al. 2016].

## SEKA PAPER MUSEUM AUGMENTED REALITY APPLICATION

### Material and methods

The archive of Seka Museum was examined and selected photographs were grouped in four regarding to selected spaces and objects in the museum (Fig. 5). The selection of photographs related to spaces was performed considering they could be re-producible. From an archeological point of view, the objects at display should reflect the meaning and contain more information on the history of the factory and the people who used them. Therefore, for their own storytelling, some of the objects at display were chosen and matched with old photographs in which they were in use.

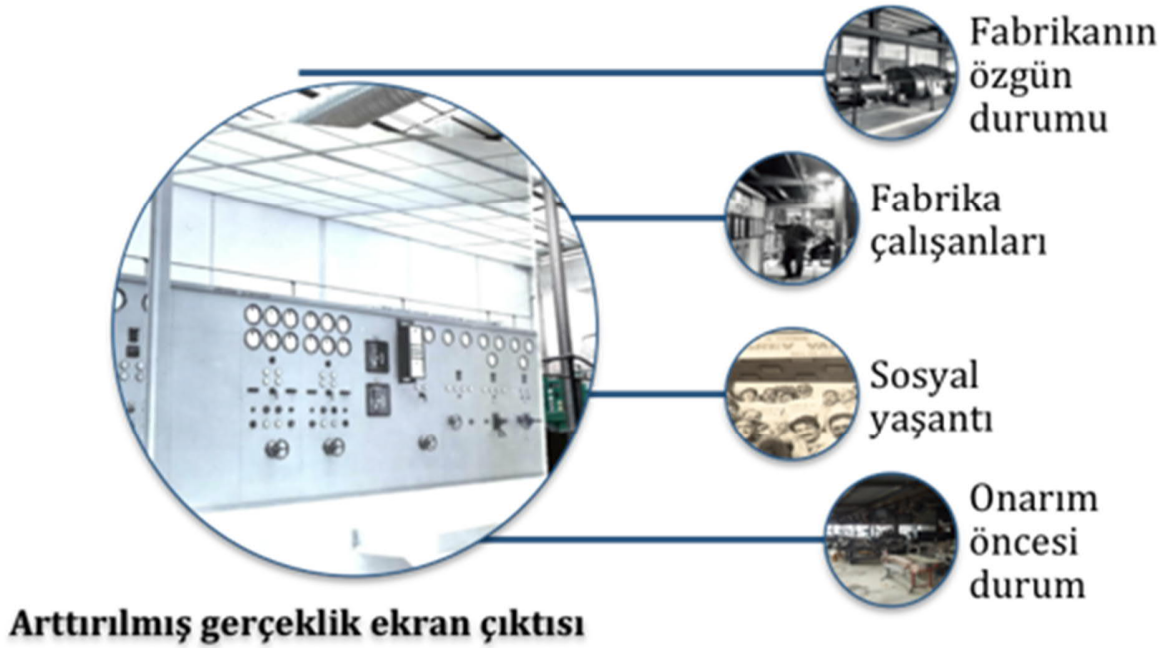


Fig. 5. Screen print of application including photographs of that when the factory still active, factory workers, social live in campus and the situation before restoration

In the application image-based tracking technique was applied. Image-based tracking uses real reference images for targets [Rainio et al. 2015]. The target images are matched with the corresponding historical photos when AR camera recognizes the scene by using real features from the images. The AR application contains a number of known target images. The images that would be used for tracking could be produced from the frontal view; however tracking could be difficult in situations where the tracking target is not planar, since in reality the recognition by AR camera works through 2D images. In order to handle this, there are several methods including point cloud image tracking, which is computationally more expensive. In this study, by using markers placed on the ground, the viewing direction of the users was limited more to the direction where the reproduced images were taken.

The aim of choosing image-based tracking is to ensure visitors/users could easily realize the differences in the spatial set up of the building due to both the abundance and restoration of the mill using old photographs as reference points.

Target images were re-produced by the students of the Photography Department of Kocaeli University from the same perspective. However, the viewing angle of visitors should match with the visual angle of AR camera. The visitor's route also should be considered, i.e. the viewing points should be within the route. For indoor places when artificial and natural lightening were both applied, determination of lighting values in the areas, where natural lightening was used, bears importance for AR application to work. Meanwhile for the objects at display the perspective is not significant.

Instead of developing an interface and designing a mobile application, when considered the purpose and ease of usage, AR application works simply with the camera of compatible devices. The Application was created using Unity game engine (version 2017.2.0f3)<sup>1</sup> and Vuforia<sup>2</sup> for Android platforms. For the ease of use, viewing points were marked with graphic images at the scene (Fig. 6-7).

Another important component of transferring the information and experience to the visitors is sound [Hain et al. 2016, 2034]. Some of the machines in the Museum are still working; however it is impossible to keep them working

<sup>1</sup> <https://unity3d.com/get-unity/download/archive>

<sup>2</sup> <https://developer.vuforia.com/downloads/sdk>

all the time. By recording the sound of the machine, we are able to synchronize the real time vision with the original situation through AR cameras.



Fig. 6. AR view of the factory environment in Galaxy Tab A

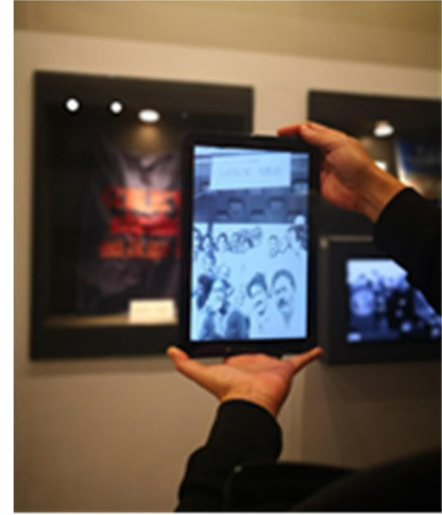


Fig. 7 AR view of the museum objects in Galaxy Tab A

## RESULTS AND DISCUSSION

50 volunteers have tested the Seka Paper Museum AR application using Galaxy Tab A (2016) SM-P580 tablet at specific viewing points inside the museum. They have selected randomly among the visitors in order to evaluate the functionality and the potentiality of the demo application. Each person has been briefly trained individually in order to explain the application and was guided throughout the museum (Fig. 8-10). The age of visitors ranged from 8 to 70 years. At the end of the augmented tour, people were asked to fill a questionnaire. The questions are aimed to gather data about age, gender and the degree of confidence in using tablet, familiarity with AR applications and opinions on demo application. The scale was ranged from 1 (strongly disagree) to 5 (strongly agree) and average value according to gender and age groups is given in Table 1.

Table 1. The Results of Survey

Gender	Degree of confidence in using tablet	Familiarity with AR applications	Seka Paper Museum AR DEMO	
			Ease of use	Usefulness
Female (n=15)	5	2	5	4
Male (n=35)	5	3	5	4
<b>Age</b>				
8-18 (n=5)	5	4	5	3
19-29 (n= 25)	5	3	5	3
30-39 (n=17)	5	2	5	4
40-50 (n=3)	4	2	5	5



*Fig. 8. Volunteers have been briefly trained individually*



*Fig. 9. Guided tour for AG application in the museum exhibition galleries*



*Fig. 10. Guided tour for AG application in the museum*



The tests results indicate that target group is using tablets, however many of them are not familiar with AR applications. The all agreed that the application very easy to use and many of them thought that it was impressive to see the old photographs at their original places and hearing the sound of machines. Some described their experiences as “traveling in time” or “seeing past in 3D”. Surprisingly, especially participants, who are over 30, were trying to turn around with tablet and see whole area in old photographs.

It is also detected that image-based tracking system used in Seka Museum is affected by changing details. In larger galleries and in wider perspectives, it is not easy to control the environment. When the place of some features at the exhibition halls, such as the trolley seen in Fig 10, could be changed after photographing them, it would be difficult for the AR camera to recognize the target image. Besides that, industrial machines have a large number of distinctive features and reflective surfaces, which both introduce challenges for image-based tracking. Visitors experienced these technical difficulties, especially when targeting the tablets or getting the right position, which was marked regarding to target image.

## CONCLUSION

Digital technologies are considered as an alternative for conventional methods for documentation and preservation of cultural heritage values and also for exhibitions in order to increase the interaction of visitors with museum objects as transmitting visually the story of the object. However the nature of the object and the nature of cultural heritage site define whether the application would be. Therefore planning and decision require collaboration with experts who specialize in the field of cultural heritage studies. For industrial heritage sites, minimum intervention has many advantageous such as easy handling and maintenance, limited costs. Besides the physical remains, industrial heritages sites include intangible heritage values of a specific place as reflecting the people’s lives and memories and days’ of glory of that area. AR application could provide a better understanding of complex industrial sites and enable sustainable management.

As one of the earliest examples of industrial revolution in young Turkish Republic, Seka Paper Mill has authentic values including its technological properties and historical value. The transformation of Seka Paper Mill into Paper Museum is a qualified example of such transformation project. Developing an AG application for Seka Paper Museum in order to provide contemporary industrial heritage preservation concept and a holistic approach for including all layers of heritage values is a new project. After evaluating the museum exhibitions and visitors’ route an AG application for the Paper Museum was offered, because the size of the area and intensity of intangible heritage values. When the feedbacks of volunteers who have tested the demo of AG application are evaluated, it is understood that the demo application has valuable potential of presenting the different spatial and temporal layers and increasing the perception of visitors. The project, however, should be developed according to the technical difficulties that were experienced depending on the spatial features of the Museum.

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