

BULIDING MAINTNANCE AND LIFETIME OF CONSTURCTION MANAGEMENT TO AVOID RISK

Abdulwahid Saleh Alameri¹, Bipin Kumar Singh², Vikas Kumar Pandey³

¹M.Tech Scholar , ²Head of Department , ³Asst. Professor,

Construction Management in Civil Engineering, Nims University Shobhanagar Jaipur, Rajasthan, India

Abstract: Buildings are big and important part of our life, we spend a lot of money on them both in terms of building them and then operating them, which gives us one of the biggest industrial sectors, but we also spend a lot of resources on them, to build them and operate them. We need heat to warm them up, we need lights, we need to ventilate and so on. And for that we spend gas, coal, fuel etc., our natural resources that future generation also need to use, but before that we need something to build them with, concrete, clay, wood or whatever and to produce that we need also fuel and we need to disturb the land that we use for material extraction.

In this dissertation there will be explained what type of maintenance is used in building maintenance and why it is so important to maintain our buildings, then operation plan will be explained and why that is needed and the purpose of that. The focus goes into looking at the building stock in Europe with a more detailed look at the Danish building stock, it is getting older and the efficiency of the buildings are not very good and there are huge opportunities in that business in coming years. There is a renovation need of the building stock, both because of lifestyle and the energy usage, and in a way that is also building maintenance.

More or less analytical research and quantitative methodology is used to get the questions answered.

Keywords: Building maintenance, preventative maintenance, predictive maintenance, corrective maintenance, building operation, energy efficiency, building stock

I. INTRODUCTION

1.1 Problem Background

This dissertation is written as a part of the final semester for the Bachelor of Architectural Technology and Construction Management degree.

Maintenance plans and the building status and requirements in Europe are going to be the topic of this dissertation. The choice of the topic goes down mainly due to my interest in that subject after having had a practical placement where my job was to create maintenance plans for new and old buildings for Andelsboligforingen Beringsgaard.

Another reason for my choice is that I think that this knowledge gained in the process will benefit me after my studies on the market, since this subject is getting bigger and more important in Europe. The buildings of Europe are not getting younger and their energy efficiency is not getting better, that's for sure, (unless by great demolition) and the need of major renovation is not going to go away without great step in from everybody involved.

1.2 Delimitation

In this dissertation I will not be going any deeper in the subject of Facility management then just the maintenance part of it. The subject of Lifecycle costing will not be explained any further and the same with quality management. I will also not be talking about Trade and service buildings.

1.3 Problem Statement

What is so important about building maintenance?

And these research questions will be part of my investigation to answer the problem statement responsible to make it?

1.4 Research methodology

For this dissertation I have used quantities methodology and analytical research. The main method of gathering information for this dissertation is searching the internet, the main source are reports by the EU and/or other institutions. Main reports used are: "Europe's building under the microscope", an extensive overview of the building stock of Europe. Other "Danish building typologies" about the Danish building stock, then few other smaller reports and papers has been used. Information from the Danish knowledge center for energy savings in buildings and byggeskedefonden have also been used.

1.5 Dissertation overall structure

My dissertation is split into 3 main parts. This first part is more about what building operation and building maintenance is all about and the importance of it.

Second part is looking at the status of the building stock in Europe and the regulatory about the energy efficiency of buildings and the renovation need there.

The third part goes then deeper into looking how the situation is in Denmark and the need of energy renovation of the building there, and how the government is trying to get the market more active..

II. BUILDING MAINTENANCE



Figure 1: Unclean gutter a threat for the roof construction (JT Gutter Cleaning, 2013)

In general when people talk about building maintenance then usually what is meant is some aesthetical maintenance, like painting the facade, cleaning the surfaces and gutters, clean windows, sewer clean up, some minor repairs of windows and doors, just so it functioning.

Maintenance is often talked about as the Cinderella of the property world, but its importance is quite hard to deny, like cleaning the gutters or drains, that don't take much time if it's done every year, but just by doing that a costly repairs can be avoided in the future.

To explain further what building maintenance is then it is the combination of all the technical and associated administrative actions carried out during the service life to retain a structure in a state in which it can perform its required functions over its lifetime. Maintenance is an essential aspect of the environmental performance of a building. The long-lasting effectiveness of the techniques implemented during the building design stage depends on proper maintenance and care activities, such as cleaning, control, troubleshooting, repair, or the replacement of components. (European Commission, 2012, p. 489)



Figure 2: Cleaning of the facade (Restco Corporation, 2013)

2.1 Definition of maintenance

Definition of maintenance according to the European standard EN 13306, maintenance concerns the “combination of all technical, administrative and managerial actions during the life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function”.

The Maintenance management purpose is to make sure that all technical equipment is working correctly and efficiently and if in any way some part of the building is defected, it can be restored to a good condition. Usually, maintenance includes technical actions as well as administrative, managerial and supervisor.

III. SHARE SIZE OF THE BUILDING STOCK

Residential building stock of Europe is about 75% of estimated 25 billion m² of useful floor space in EU27, Switzerland and Norway, and is increasing by 1% every year. Half of the total estimated floor space is located in the North & West region of Europe while the remaining 36% and 14% are contained in the South and Central & East region. (The Building Performance Institute of Europe, 2011). More than 40% of these residential buildings have been constructed before the 1960 when energy regulations were very limited,

thereof many are 50 years and older and there are some even hundreds of years old buildings still in use. Countries that have the most shares of old buildings include the UK, Denmark, Sweden, France, Czech Republic and Bulgaria. They also had a large boom in construction in the modern From the European standard definition of maintenance can be seen that maintenance splits into two processes, one being retaining, which means any work that is carried out is to avoid failure, usually talked about as preventative maintenance. The other, restoring, or any work carried out after failure, usually talked about as corrective maintenance.

But in general there is talked about three possible types of maintenance strategies, corrective maintenance, preventative maintenance and then predictive maintenance. They are follows:

Corrective maintenance: Action is taken when system has failed and it is restored to operational status again. Usually the components responsible for the failure of the overall system is then repaired or replaced. Corrective maintenance is performed at unpredictable intervals because the components failure time is unknown. But the objective is to get the system that has failed back to operation as soon as possible.

Preventative maintenance: This strategy relies on planning maintenance action to prevent the breakdown or failure of equipment and facilities, and replace worn components before they actually fail. The main objective of preventative maintenance is to reduce the risk of breakdowns, increase reliability and equipment lifetime. With having preventative maintenance in place consequential damage and risk to users and owner is minimised. It's performed with regular intervals, and can be scheduled at a time which is convenient for building users. Preventative maintenance alone can be demanding in terms of labour and spare parts because of high number of unnecessary tasks, since all building components are inspected, even if they are in good operation condition.

Predictive maintenance:

Predictive maintenance (or condition based maintenance), is very similar to the preventative maintenance and often they are working together. Predictive maintenance consists of continuous monitoring, testing and inspecting the buildings systems in order to forecast component degradation and perform planned maintenance prior to equipment failure. Action is taken when a change in condition and/or performance of an item is detected. Building envelopes (walls, roofs, floors) and building systems (HVAC systems, lighting, plumbing system, etc.) are detailed monitored and the maintenance plan is based on that monitoring, which helps to identify which component need maintenance before they fail. Predictive maintenance and monitoring play an increasing role in building maintenance management.

Preventive and predictive maintenance work really well together in a system and are usually combined in

maintenance strategy for a building. So from now on in this dissertation when there is talked about preventative maintenance then it is talked about preventative and predictive maintenance together.

The main focus and power in any maintenance plan should be on preventative maintenance rather than corrective maintenance, although some parts could be let to run to failure like lamp lights, but larger more complex and important items, such as ventilation units or a structural element should not be let to run to failure. Buildings are costly and valuable assets and need to be looked after to maintain their value and performance.

In fact the importance of preventative and maintenance cannot be overemphasized, and behind that are many good reasons.

IV. REASONS FOR PREVENTATIVE MAINTENANCE

With preventative maintenance in place building appearance can be kept up and extend its life, it will also preserve the originality of the building, the original fabric is kept in place as there is not extensive restoration work performed, just small scale work.

That leads to reduced need or will even remove the need to have a major repair project for the building, which is good because major repairs can be disruptive and costly in terms of fabric and finance.

It can also be said that preventive maintenance is part of making the building active in sustainable activity, cause all old and new buildings contain so called embodied energy, which is all the energy that was used in the process of constructing the building and extracting and producing the materials for it. By keeping existing buildings in good shape, the need for new materials is reduced and therefor the energy used in that process.

Furthermore with preventative maintenance in place it can be made sure that everything possible is done so buildings, or more importantly historic buildings are passed down to future generations to come. Without the old historic buildings in Europe, it wouldn't be the same, they give identity and characters to the places and cities that we live in. Many believe they enrich our quality of life.

Quote "It is for all these buildings, therefore, of all times and styles, that we plead, and call upon those who have to deal with them, to put Protection in the place of Restoration, to stave off decay by daily care, to prop a perilous wall or mend a leaky roof... thus, and thus only can we protect our ancient buildings, and hand them down instructive and venerable to those that come after us." Unquote (William Morris, SPAB Manifesto 1877)

Last but not least is the employment factor of maintenance. Maintenance gives employment because of how many specialized or big some tasks are, like cleaning the chimney

or changing the windows, and that needs special skill or know how to perform the job properly which is essential to make sure that other damage won't occur later on, or sooner than expected lifetime of the repair.

V. CONCLUSION

Maintenance is not only something that has to be thought about after the building has been constructed and handed over to the client. In the European building sector, maintenance and repair activities can account for up to 40-60% of the building construction cost. This reveals the need for improvement in durability during the building design.

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