

# Electronic Signature System in Technology Archives Management of EPC Project

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## ABSTRACT

The paper introduces electronic signature system in technology archives management of EPC project. The cooperating in electronic signature system between design department, technology management department and archives management department is described. Archives safety in electronic signature system based on certificate authentication is also described. The paper finally introduces the electronic signature collection and management parts of electronic signature system.

**Keywords:** *electronic signature, archives management, EPC project.*

## 1. INTRODUCTION

Technology archives of EPC project mainly involves digital drawings and its related design documents.<sup>[1-3]</sup> Electronic signatures in archives system add handwritten signatures and registration stamps in technology archives. Electronic signatures have the same visual effect with paper contents. Electronic signatures can keep the facticity and integrity of electronic information.<sup>[4-5]</sup> The utilization of electronic signatures is common in archives management of EPC projects accompanied with digital design.

China United Engineering Corporation Limited introduces electronic signatures in archives management of EPC project to improve the efficiency of archives management procedure and coordination of different departments.

## 2. ARCHIVES MANAGEMENT PROCEDURE OF EPC PROJECT

### 2.1. Archives Management Procedure

Technology archives management of EPC project mainly concerns design department, technology management department and archives management department, as shown in Figure 1. Design department generates digital drawings and their related design documents as follows.

1. Designers finish digital drawings and their related design documents, self-review the designing, and authorize electronic signatures of designers. The electronic signatures of designers are the signatures of names.

2. Checkers check the digital drawings and their related design documents, and authorize electronic signature of checkers. The electronic signatures of checkers are the signatures of names.

3. Approvers review the digital drawings and their related design documents, and authorize electronic signature of approvers. The electronic signatures of approvers are the signatures of names and registration stamps.

4. Sanctifiers review the digital drawings and their related design documents, and authorize electronic signature of sanctifiers. The electronic signatures of sanctifiers are the signatures of names and registration stamps.

The system generates document list for filling automatically and the application is submitted to technology management department. Technology management department reviews the digital drawings and their related design documents to ensure the designing is compliant with regulations.

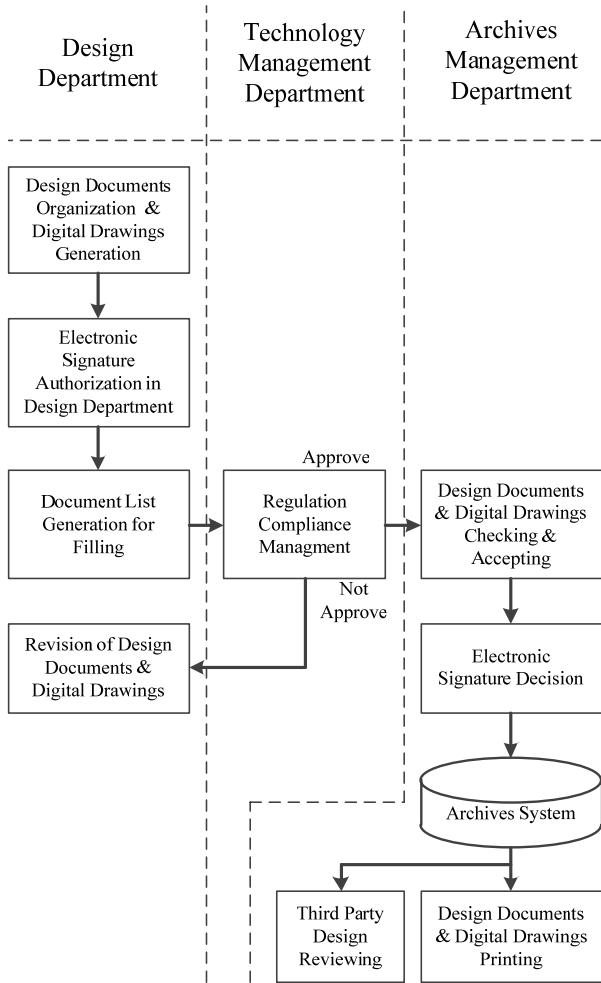


Figure 1 Archives management procedure.

Archives management checks and accepts the digital drawings and their related design documents after technology management approves the application. Archives management adds electronic signatures of design stamps or completion stamps to the digital drawings and their related design documents as the application required. The digital drawings and their related design documents are input to archives system, and can be utilized for printing and third party design reviewing.

Archives management concerns the related people in design department, technology management department and archives management department. These people are authorized to deal with different grades of issues. Super administrator may attend to deal with some special issues if routine procedure can not work well.

## 2.2. Archives Safety Management

The digital drawings and their related design documents are transmitted between design institute, design reviewing center, construction enterprises, urban construction archive, proprietors, etc. The system should

ensure the digital files can not be edited or falsified in transmission.

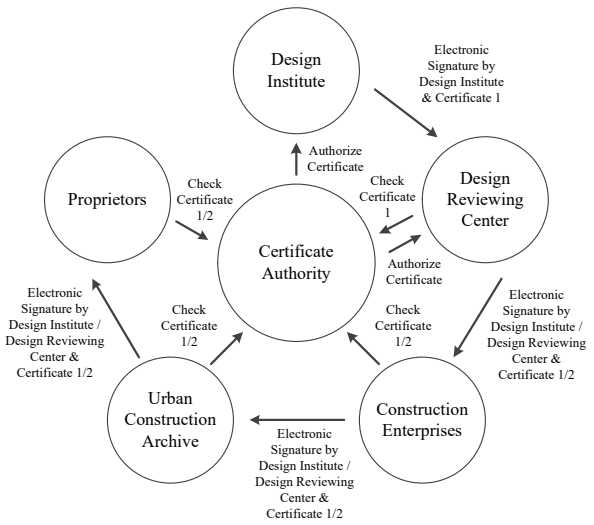


Figure 2 Archives safety management diagram.

Archives safety management is based on certificate authentication. Certificate authority send certificate 1 to design institute and certificate 2 to design reviewing center. Certificate 1 and 2 are attached to digital files with electronic signature after design institute and design reviewing center confirm. Construction enterprises, urban construction archive, proprietors receive the digital files can check certificate with certificate authority to ensure the digital files not be edited or falsified.

Archives safety management introduces electronic watermark technology to avoid copying digital drawings and their related design documents. Electronic watermark appears when the digital archives are reading. For different readers the digital archives have different electronic watermarks. If the digital archives are leaking, the managers can find the leaker by electronic watermarks.

## 3. ELECTRONIC SIGNATURE COLLECTION

### 3.1. Electronic Signature Collection

#### 3.1.1. Hand-written Signature

Designers, checkers, approvers and sanctifiers upload their basic information in archives system. The basic information includes the picture of hand-written signature. The picture of hand-written signature should meet:

1. Use black bold pen (0.7mm or 1mm thick) to make hand-written signature in A4 sheet.
2. The picture is 300 DPI, 24 digits image depth and 370×193 pixels.

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Figure 3 The picture of hand-written signature.

3.1.2. Registration Stamp

Approvers and sanctifiers upload their pictures of registration stamps in archives system. The picture of registration stamps should meet:

1. Stamp registration stamp clearly in A4 sheet.
2. 750×340 pixels.



Figure 4 The picture of registration stamp.

3.2. Electronic Signature Management

3.2.1. Authority Management

Designers, checkers, approvers and sanctifiers make their electronic signature in archives system using their personal accounts. Administrators give different personal accounts different authorities depending on positions, specialty and qualification. Authorities of personal accounts can be modified if necessary.

序号	名称	描述	默认
1	系统管理员	系统管理员	
2	总经理	查看所有信息	
3	普通用户	simpled	√
4	打印管理员	打印管理员	
5	档案管理员		
6	所长	部门领导	
7	晒图相关人员	晒图相关人员	
8	不监控角色	不提交打印	
9	总工	总工	
10	副总	副总	
11	短信管理		
12	超级打印管理员		
13	签章管理员	负责电子签章	
14	董事长	查看所有信息	
15	临时用户		

Figure 5 Authority management interface.

3.2.2. Valid Time Management

Registration Stamps have their valid times. The archives system records the valid times of registration stamps. Valid times of registration stamps is checked in

every electronic signature application. The archives system also automatically inform administrators and registration stamp possessors to update their new registration stamps.

部门名称	专业	用户名称	印章名称	有效期	
中联有限公司				出图章	2023-02-24
第一建筑工程设计研究院	结构		注册章	2019-12-31	
第三工业工程设计研究院	电气		注册章	2022-06-30	
第二工业工程设计研究院	暖通		注册章	2019-12-31	
第二建筑工程设计研究院	电气		注册章	2022-06-30	
第二建筑工程设计研究院	建筑		注册章	2021-06-30	
勘察设计院	岩土		注册章	2021-12-31	
勘察设计院	岩土		注册章	2021-12-31	
公司	发图人章		其他章	2031-07-02	
第五建筑工程设计研究院	建筑		注册章	2020-06-30	
第三工业工程设计研究院	结构		注册章	2022-12-30	
第四建筑工程设计研究院	建筑		注册章	2021-06-30	
新能源工程设计研究院	电气		注册章	2021-12-31	
公司领导	压力管道-有限老章		注册章	2019-11-12	
装备制造公司	电气		注册章	2022-12-30	
第六建筑工程设计研究院	结构		注册章	2022-12-31	
第二工业工程设计研究院	给排水		注册章	2021-12-31	

Figure 6 Valid time management interface.

3.2.3. Safety Management

Archives system must ensure the facticity and validity of each registration stamp. Archives system sends CA to registration stamp holders. The registration stamp holders must upload registration stamp with CA to keep the facticity and validity.



Figure 7 Registration stamp with CA.

3.2.4. Devices Management

Electronic signature can be done in computers and mobile devices. Mobile devices may use Wechat or Dingtalk to complete the electronic signatures. Archives system authorize some people complete the electronic signatures in mobile devices, but others just can complete the electronic signatures in computers for their responsibility of position. Administrator can authorize different accounts to use different kinds of electronic signature devices.

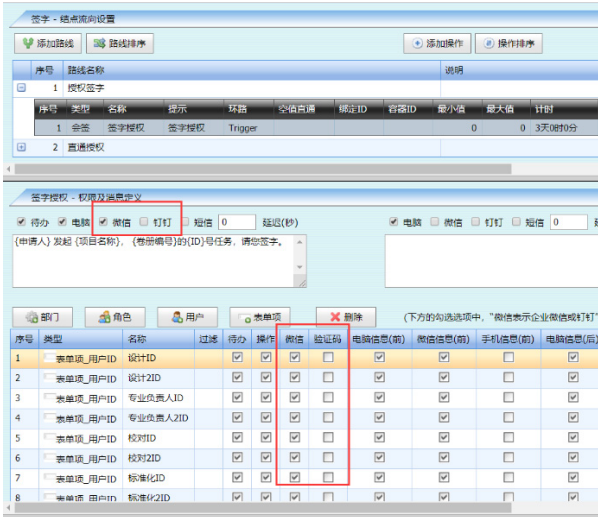


Figure 8 Device authorization management interface.

For electronic signature computers, archives system distributes codes to computers and binding with computers. Electronic signatures just can be completed in authorized computers.

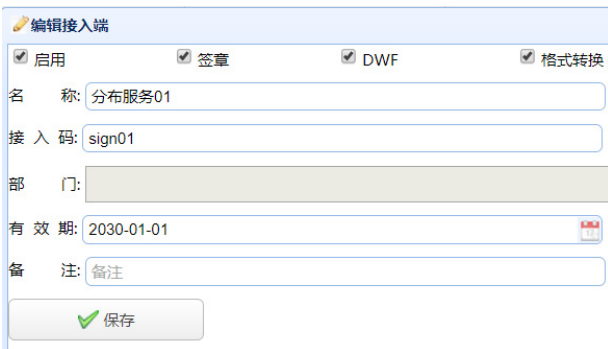


Figure 9 Device binding interface.

4. CONCLUSIONS

The paper introduces the application of electronic signature system in technology archives management. The method for archives and their safety management is described. And the method for electronic signatures collection and management are also described.

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