

# Remote Printing in the Construction Industry

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## Abstract

There is a real need to work from paper drawings at construction job sites. In today's construction industry, large format drawings are increasingly electronically available to contractors and subcontractors. Printing large format construction drawings, however, is not easy and can lead to errors due to incomplete data transferred, changes made to the drawing while printing and scaling problems. Within Hewlett-Packard a remote printing service was developed and launched that enables anyone connected to the Internet to send large format construction drawings directly to any HP printer located anywhere.

The paper discusses the players in the construction industry, their current workflow, a proposed solution and the workflow changes for the players involved.

## 1. Introduction

Markets at change typically offer new opportunities to IT suppliers, including printer manufacturers. Digitization has driven change to only part of the construction market. Architects and engineers have adopted digital technologies with the adoption of CAD in the Design phase at nearly 100%.

At the construction site, however, paper is the predominant carrier of architectural information and this is expected to remain the case for the coming time. The challenge for any IT supplier in this market is to bridge the gap between a digital and a paper-based world.

This paper focuses on large format architectural drawings.

## 2. Market and Players

The construction market is a conservative market, where change is only accepted when it makes business sense and when a proposed solution has a quick return on investment. Characteristic for the construction market is that many, sometimes hundreds, different players from many different disciplines are teaming up for one construction project. Turning such a conglomerate of players into a solid team is a real challenge and often IT solutions are expected to solve serious communication issues.

Key players in a project are owners, architects, engineers, general contractors, subcontractors and building product manufacturers. Players that support the business process with their services are reprographic houses, courier services, planrooms, collaboration sites and online planrooms.

## 3. Problem Statement

The challenge in the construction industry is to send CAD drawings instantly from architects or engineers to construction professionals: general contractors or subcontractors.

This means linking a digital CAD world with a paper-based environment, where, until recently, the most popular IT infrastructure was a mobile phone and a fax. With the increasing adoption of PCs and Internet by contractors and subcontractors, especially in the US, it is possible to send CAD drawings as an email attachment to a subcontractor or to a trailer at a construction site. The following challenges exist:

- Architects and engineers can be reluctant to share electronic files, since CAD files contain a lot of their company know-how.
- Opening a CAD file from the email and printing the drawing is not an easy task for a person without the proper CAD training. Also, since the drawing is opened in edit mode, changes can be made to the drawing. It is critical to maintain scale on the final print. Scaling the drawing down in print would lead to disastrous results on the construction site when measurements are taken from the printed drawing.
- Sending a CAD drawing can easily lead to sending a file that lacks information to print successfully. Cross referenced files, font files or pen settings can be missing when receiving a native CAD file through email. Furthermore, both sender and receiver need compatible versions of the CAD software.
- Unlike architects and engineers, construction professionals in remote offices or in construction trailers are not working with PCs the whole day. To them using PCs is for administrative or communication purposes only. There is generally a lack of time to train construction professionals in new software, so they aren't familiar with CAD application software.

As a result of the challenges above, the most popular way to distribute large format drawings is to use the services of a reprographic house or a courier service.

These services are generally slower than email, but provide a safe and secure service. Courier services provide a proof of successful delivery that can be used when problems occur.

## 4. Remote Printing Service

HP Remote Printing for AEC is a service that allows anyone with a Windows PC connected to the Internet to send prints, from any Windows application to any HP printer located anywhere.

The person sending the drawings downloads a driver that allows the printing from any Windows application to HP Remote Printing's Package Builder. In this application, the drawing printed shows up as a thumbnail and it contains all information that is needed to print successfully. In fact, from the Package Builder, a local proof print can be made on a local large format printer. More prints can be made to populate the Package Builder with thumbnails. The sender selects the drawings to put in a package that is then uploaded to a secure HP server on the web. The destinations for the package are identified by their email addresses and the "Receiver" receives an HTML email with the thumbnails of the drawings sent. One click to a PRINT button triggers the downloading, rasterizing and printing of all the drawings in the package on their HP printer.

At the receiver's end there is no need for the CAD software application, only email and an Internet browser are needed. The service works with office size printers, but was developed to work specifically with HP's Large Format Designjet printers. The sender sets the size of the output and the recipient cannot change this in order to maintain scale. Once a package is opened, the sender receives an email confirmation, and another confirmation once the package is sent to the printer. The package can be sent to multiple destinations at one time and the system ensures the same output, independent on the HP printer model.

A Receiver can also define a Sender as a "trusted sender", thus eliminating the need for confirming to print when an email arrives announcing a new package. This way the "One Click Printing Process" is reduced to zero clicks and for the Sender it is like sending to a local printer, although the printer is at a remote location and firewalls have to be crossed. The "remote print" in addition to the drawing contains an annotation, including date and time stamp, package ID, drawing ID and email address of sender and receiver.

## 5. Remote Printing in Practice

The service was introduced in March 2002 and has been tested and improved during the last twelve months. Contracting firms especially have been adopting this technology, asking architects and engineers they work with to send them updated drawings through the Remote Printing service.

As an example, a large mechanical contractor on the US west coast is using HP Remote Printing for AEC for the following tasks:

- Distributing coordination drawings minutes before a weekly coordination conference call to all involved companies in their projects
- Sending updated drawings to their job site trailers across the country
- Receiving updated drawings from architects and engineers
- Sending large project GANTT charts from job site trailers back to headquarters with updated project information.
- Sending CAD drawings from employee's home offices to the HP Large Format printer at headquarters
- Logging all information about packages sent, received and printed
- Construction professionals in the field calling from the field to check whether the drawing with certain package ID contains the latest information

## 6. Conclusion

It is possible to bridge the gap between a digital environment and a paper-based world. HP Remote Printing for AEC demonstrates that contractors and subcontractors can adopt solutions that are reliable, extremely easy to learn and use and that contain functionality that mirrors their current processes. Time and cost savings can be considerable compared to current methods of distributing large format paper drawings.

## References

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## Biography

**Len Koerts** is a Solutions Business Manager at Hewlett-Packard, where he focuses on workflow applications in technical markets. His professional focus is adding a portfolio of application to an existing hardware business. Prior to joining HP, Mr. Koerts worked as a Strategic Planner for Océ HQ in the Netherlands and in the US helping shape Océ's Wide Format application portfolio and at IBM as a Software Consultant.

Mr. Koerts received his B.S. degree in Mathematics from the Vrije Universiteit in Amsterdam in 1985 and holds a MBA from the Institut Supérieur des Affaires (HEC) and London Business School.