ARCHITECTURE

EHLINGER & ASSOCIATES **FOURTH QUARTER 2020**

Ehlinger & Associates extends Seasons Greetings to all of our friends who receive the newsletter. Merry Christmas, Happy Hanukkah, and Happy New Year.

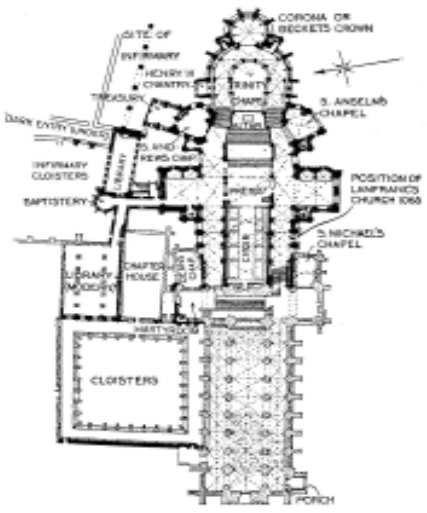
Canterbury Cathedral, Kent, United Kingdom

This issue's limited edition print of a sketch by Ladd P. Ehlinger, AIA is of Canterbury Cathedral in Canterbury, Kent, United Kingdom. The cathedral was originally founded in 597, rebuilt between 1070 and 1077 by the Normans, and greatly altered and enlarged in the 12th century in the Gothic style in response to a fire. The east end, where the Quire (Choir) is, was extensively altered in 1175-1184 to accommodate pilgrims visiting the shrine of Thomas Becket, the Archbishop of Canterbury, who was murdered in the cathedral in 1070 by four knights of King Henry II in response to Henry's plea: "Will no one rid me of this turbulent priest?" Thomas Becket opposed most everything that Henry II wanted to do.

In 1377 the nave (main body of the church) was demolished and rebuilt with cloister vaulting as it is today. In 1538, Becket's shrine was demolished by Henry VIII. In 1660 extensive repairs were made after Puritan damage to the entire complex - horses were actually stabled in the Nave. In 1834 the northwest tower was rebuilt, and in 1954 the Library was rebuilt repairing WWII damage.

The Master Mason who did most of the rebuilding of the Quire in 1175-1179 was a Frenchman, William of Sens, who was relieved after an injury from a fall from the scaffolding. He was replaced by one of his assistants, known as "William the Englishman".

The Archbishop of Canterbury is the head of the Anglican Episcopal Church. St. Augustine first arrived in 597 to found the cathedral. He dedicated it to Jesus Christ, the Holy Savior. The cathedral was part of a Benedictine monastic community known as Christ Church, Canterbury, which lasted until Henry VIII.



There were actually a total of five Archbishops of Canterbury that have been murdered. The first was the Archbishop Aelfheah who was taken hostage by Danes in raids in 1011, and subsequently killed in Greenwich in April 1012. The second was Thomas Becket in 1170. The third was Simon Sudbury in 1381 by beheading.The fourth was Thomas Crammer, who was convicted of heresy and put to death by burning in 1555. The fifth and final was William Laud, who was executed in office for unknown reasons in 1645. Because the Archbishop of Canterbury is the head of the Anglican Episcopal Church of England, he is naturally the center of attention of the media and the public, and especially so when the Archbishop takes controversial positions politically such as advocating Communism as some recent Archbishops have done. Thankfully, the Queen does not use assassination as a means of political and religious control as her predecessors did.

Ladd P. Ehlinger, AIA

2200 Houma Blvd., Metairie, LA 70001-1399 (504) 455-8911 3109 Ivy Ave. SW, Huntsville, AL 35805-4698 (256) 534-1900

Robotics and A.I. in Construction

Perrin Ehlinger, AIA

The construction industry is finally ripe for an automation revolution. Until recently, robotics have been too limited, and their programming too primitive to be of much use in construction.

While many tasks in construction are repetitive and performed to a predetermined tolerance level, seeming to be a perfect candidate for robotics, it has been difficult to automate construction for a couple of reasons:

First, a number of tasks often happen simultaneously on a construction site, with workers from different specialties dancing around each other at the same time. Until recently, it has been difficult to make robots that can work safely in close proximity to people.

Second, the programming of robots has never been flexible enough to account for real-world conditions, nor easy enough to modify when obstacles are encountered. Advances in programming languages and in A.I. learning algorithms have expanded self-programming capabilities and simplified problem solving, where robots can be competitive and safe in field conditions.

The advancement of robotics in other areas of automation, and reduced costs of robot components, sensors, and mass production have brought prices down enough where construction robots can be competitive.

With a growing shortage of skilled labor in the construction industry, it has become a perfect storm where robots will soon disrupt the construction industry in a number of ways:

1. Operating & Maintenance Costs

While the cost of robots are still very high, recovering those costs can be rapid, as robots can work longer hours than people, without tiring, and without making costly mistakes. Much less labor will be needed to perform the same amount of work.

People won't be replaced - they will still be needed to make decisions the robots can not, as well as to service those robots.

2. Health & Efficiency.

With robots replacing repetitive tasks, and robotic augmentation of humans, there will be far fewer injuries, both from accidents and stress, occurring on construction sites.

Robots designed to lift heavy building materials safely in close proximity of people, and wearable exoskeletons that augment worker's strength will both protect people, and increase their performance by removing much of the exhaustion of material handling.

3. Custom Design and Field Construction

As large scale 3D printing comes of age, it will help remove the need for transporting and assembling large pre-fabricated components, as they can be formed on-site with base materials.

3D printing also allows for design customization and construction techniques that can not easily be achieved with pre-fabricated components.

4. Construction Management

The advances in A.I. and image recognition have allowed computers to become construction managers. They can monitor progress, efficiency, and safety, in real time during a project.

Armed with cameras and information, these A.I.'s can assist with coordination and scheduling of job tasks between professions, generating a more efficient, seamless, and safer construction environment.

Altogether, the construction industry is poised for this robotic and A.I. revolution; it will be here faster than we think!

Youtube videos.

To watch these videos, use the link:
youtube.com/watch?v=
and then type in the codes provided below.

Robotics:

Layout & Measurements: FAMJpijwQnQ
Site Excavation: 6oqEKyseu2U
Rebar Placement: x1BqTq1h5BQ
Rebar Tying: P_Oph4wDi38
Concrete Screeding: sdutoJfgxe0
Masonry: 6s17IAj-XpU
Painting Robot: aK6Q0AxyA00

Human Augmentation Machines

CMU Mules: l0c314NLY0M
Exoskeletons: efrQBl6DwZA

3D Printed Construction

Concrete: eIVl3gmswhM
Scaffold Span Systems: nrdQrpiLJMQ
Steel: sMRWqTlvJHc
Stone Carving: wc8j60rloiM

A.I. Construction Management

Project Administration: asN1FsRZ6B4

A.I. in Architecture

1. Parametric Optimization

The architectural profession is also being affected by different A.I. applications. Autodesk is working on a project called Dreamcatcher, which will take a given design, and then do optimization redesigns based on the parameters entered.

This might become ideal for reducing the cost of a design that proves overbudget. It could also help optimize the use of structural materials, or the weight of the building, or even the fit of a building into a difficult space, and then provide a number of possible solutions to choose from.

2. Stylistic Design

A team from Harvard has been training A.I.'s in different types of architectural styles (ie: Modernism, Baroque, etc.), and letting it translate designs from one architectural style to another. The studies occur in three dimensions, so it can become an exercise in understanding many of the massing and space differences between the styles of architecture applied to the same plans.

3. Adaptive Life Safety / Code Analysis

Being based on fixed rules, life safety and code analysis might seem like one of the easier tasks for A.I. to accomplish, but when review and inspection often disagree on interpretations, it's truly a complicated task during design. It's a task that has to be iterated every time a design change is implemented. Making one change to conform to a code often involves several other changes for different compliance reasons.

But A.I. will soon be up to the task, and it will be able to do it during the design process, notifying about potential problems, and even suggest different solutions.

Will A.I. eventually replace the architect? To some degree, it's possible. Design is often programmatic, and regulation restraints make it even more so. Where originality and problem-solving is not required, A.I. might very well be churning out warehouses, strip-malls, and lifeless apartment designs without any human intervention, sent straight to a team of robots to assemble and 3D Print.

But A.I. will always be psuedo-creative, and without human involvement, the results will always fall into the uncanny valley: the places and spaces created solely by them will always be slightly unsettling and unfamiliar, and thus ultimately unwanted.