Technological Transformation and Architectural Development during the 19th Century

In England, the development of constructional technology was depreciated b/c of the Palladian and Neo-Classical tradition, on the one hand, and, on the other, the trend of the gothic revival.

Chiswick House, exterior view and plan axonometric (1725)

Lord Burlington & William Kent Middlesex, England

Understanding of Gothic architecture from ethical and moral standpoint in England
August Welby Pugin (1812-1852)
John Ruskin (1819-1900)

A. W. N. Pugin
frontispiece to *An Apology for the Revival of Christian Architecture in England*
London, 1843

Houses of Parliament (1840-1865)

Charles Barry (in collaboration with Pugin)

London, England

John Ruskin
The Seven Lamps of Architecture
4th ed., London, 1894, pl. III
Study of tracery
Here Ruskin compares the tracery in the cathedrals of Caen, Bayeux, Rouen, and Beauvais.

Technological Transformation in Civil Engineering in England

-Yet, the tradition of Palldianism and Gothic Revivalism were less influential in the areas of bridges, aqueducts, railway stations, and large exhibition spaces
-In these areas, technological progress was more crucial
-Engineers were exempt from the stylistic concern of dressing the structure with a historic look.
-Indeed, new types of space such as railway station were free from the concern of which stylistic dress to put on the inner structure
-Honest expression of the function of the building and the determination of the shape based upon the structural rationality.
-They may not be architecture, yet, opened the path to modern architecture.

Isambard K. Brunel *Clifton Suspension Bridge* (designed 1836; completed 1864) River Avon, England

-Designed by a famous railway engineer Isambard K. Brunel
-He drew up the plans in 1836, but it was not completed until 28 yrs. Later
-Built over the gorge of the River Avon, spans 700 feet
-One of the very first suspension bridges with giant piers

Thomas Telford *Cysyllte Aqueduct* (1795) River Dee, Wales

-Designed by a Scottish engineer named Thomas Telford in 1795
-980 ft. long & built of cast iron supported on 19 masonry piers and arches in-between

John Dobson *Central Railway Station* (1846-1850) Newcastle-upon-Tyne, England

-Conceived as a vast, luminous tunnel
-Created a curvilinear vaulting system in response to the non-linear platforms
-Used metal and glass roof, but the outer shape is in Neo-Classical style

Gare du Nord (1861-1865)

Jacques Ignace Hittorff

Paris, France

Joseph Paxton *Crystal Palace* (1851), Hyde Park London, England

-The site of the 1st world fair that celebrated industry, commerce, and the arts

-Prince Albert and Henry Cole decided to erect the largest building in the world

-The design committee held a competition for the main hall and invited the world's architects to submit plans within three weeks.

-They received 245 drawings

Joseph Paxton *Initial sketch for Crystal Palace* (1851), Hyde Park

-None were satisfactory
-At this stage Paxton, a gardener and architect, sketched his gigantic cast iron greenhouse
-Paxton’s proposal was found effective b/c of the shortage of time and the lack of proper technology if brick or stone were used

-The structure was glazed
-Elements were pre-fabricated
-“A building need no longer be a system of enclosing space within opaque surfaces, and that its structure and form could be generated by a completely new assembly system”
-a greenhouse on an unprecedented scale, a cathedral of glass
--The building itself is a spectacle for the 6 million visitors
-First erected in Hyde Park, and it was taken down and rebuilt on Sydenham hill, and later in 1936 was destroyed by fire

Medieval Court, exhibition stand at the Great Exhibition, London, 1851

Pugin and others

France

-Rational tradition

Palais du Louvre, east facade (1667)

Claude Perault

Paris, France

Marc-Antoine Laugier (1713-1769): Essai sur l’architecture (Paris, 1753)

Return to the primitive

Unadorned rational construction: functional and ethical

Purification of architecture by rediscovering the essential parts of the composition: the free-standing columns, the horizontal lintel and the rude pediment

Also praised Gothic architecture in its structural lightness that is expressed in a succession of slender columns

Marc Antoine Laugier, the primitive Hut, from Essai sur l’architecture, 1753

Regarding Gothic Architecture

-As a matter of fact, there was a rather romantic perspective of gothic architecture encouraged by Victor Hugo's important work Notre Dame de Paris (also known as the Hunchback of Notre Dame)

-this novel was set in the cathedral.

-Hugo imaginatively described the spatial experience of the cathedral, which caught the attention of people and entertained them.

-reinforced the need to restore Notre Dame.

-Viollet-le-Duc was a reader of the novel

-But, he developed his own view of Gothic architecture based on structural purposiveness or structural rationality

Eugene Viollet-le-Duc (1814-1879)
Professor of the Ecole des Beaux-Arts

Dictionnaire raisonne de l’architecture francaise du XI au XVI siecle, 10 vols, paris, 1854-68
(Detailed encyclopedia of French architecture from the 11th to the 16th century)

Entretiens sur l’architecture
2 vols, Paris, 1863-1872
Discourse on architecture

Dictionnaire raissonne de l'architecture franciase du XI au XVI siecle

Eugene-Emmanuele Viollet-Le-Duc

Eugene Viollet-le-Duc (1814-1879)
-disturbed by the inability of the nineteenth century to find its own style
-believed that the answer to the creation of the new style lies in the attitude faithful and true to the program and the structure
-theory of architecture: not a speculative aesthetic system, but rather as the result of seemingly unassailable empirical scientific research
-believed that the gothic builders retained intellectual ability of honestly and faithfully articulating programmatic and structural needs of the cathedral
-study of gothic architecture was necessary in this sense, not for the sake of copying formal vocabularies and appearances, but for the sake of understanding the intellectual procedure
-once one is awakened to this intellectual procedure, he or she must be able to create a new style reflecting the particular program and structural advancement of the 19th century

Cross section of the choir of the cathedral of Beauvais

Eugene-Emmanuele Viollet-Le-Duc

-The delicate & daring construction is “not without mistakes”

-Viollet-le-Duc claims to know the reason for its collapse in 1284

Cross sections of the eastern transcept of St. Nazaire in Carcassone

Eugene-Emmanuele Viollet-Le-Duc

Proportional analysis of the cross-section of the choir at Amiens

Eugene-Emmanuele Viollet-Le-Duc

-The interior structure of the building is harmonious b/c it follows the proportions of the same particular triangle
-Gothic is not only structurally rational, but also geometrically harmonious by adopting a triangle in composing the section and interior space

Vertical supporting elements

Eugene-Emmanuele Viollet-Le-Duc

-Derived from the principles of the elastic Gothic skeleton construction
-iron now takes on the functions of supporting and covering

Market building on iron supports

Eugene-Emmanuele Viollet-Le-Duc

Market building on iron supports

(detail)

Eugene-Emmanuele Viollet-Le-Duc

-The new building material, iron, not only allows the breaching of wider distances than stone arches, it is also more economical

Design of a large hall with iron skeletal arches

Eugene-Emmanuele Viollet-Le-Duc (dates)

Henri Labrouste
reading room of the Bibliotheque Sainte-Genevieve
Paris, 1839-51

Henri Labrouste
Bibliotheque Sainte-Genevieve, Place du Pantheon, Paris, 1839-51

-Labrouste emphasized the role of the library as modern institution, whose relation to contemporary society replicated that of the Church of the past
-Library as secular church, secularization of society and transferring traditional role of religion to other secular institutions
-Long space with twin naves divided by columns
-Its modernity was represented by modern techniques replacing masonry columns with cast iron

-The modern interior is set w/in an austere stone façade
-The exterior: Classical, yet w/out portico
-The façade expresses the functional role of each element: for example, the small windows of the ground floor – book stacks, the huge windows of the reading room with small ventilation openings in the lower part of the window panels
-Simultaneously, the adoption of writing: a list of famous authors of the books contained w/in the library appear on the window panels
-The façade can be read as the functional expression of the inside

Anatole de Baudot *St. Jean Montemarte* (1894-1904) Montemartre, Paris, France

-Anatole de Baudot, a pupil of Labrouste and Viollet-le-Duc

Anatole de Baudot *St. Jean* (1894-1904) Montemartre, Paris, France

-Reinforced concrete skeleton is exposed
-The translation of the Medieval prototype w/modern material and constructional technique
-This church illustrated his ideas on the use of the new material, within an aesthetic approach influenced by neo-Gothic rationalism

The Paris Exhibition (1889) Bird's-eye view of the exhibition Paris, France

Paris Exhibition in 1889
-Was staged by the third Republic to celebrate the centenary of the 1789 Revolution
-The Eiffel Tower marked the entrance
-A few yrs. after the 1900 exhibition, all the buildings were destroyed apart from the Eiffel Tower

The Machine Hall *The Paris Exhibition (1889)*

Dutert (architect) & Contamin, Pietron and Charton (engineers) Paris, France

-A huge space 1380 ft. by 380 ft (an unprecedented distance)., height is 140 ft. at the apex
-A structure of 20 steel arches established a central nave and two aisles, leaving a vast area of free, uninterrupted space
-An art of enclosing, creating a luminous space w/out any apparent limits
-The beams that support the gallery span 380 ft. and shrink into thin pts. at their base
-Permitted the installation of large industrial machines

-The visitor could see the operation of the machines from the gallery
-It was said that the visitor could “take in at a glance the infinite variety of appliances devised by modern science to serve the worker” and the “bold movement of the graceful curves soaring through the air, like wings of a bird in flight” was also praised.
-A harmonious Temple to the Machine
-The hall was demolished in 1910

The Eiffel Tower (1884-1889)

Gustave Eiffel

Paris, France

-984 ft. tower
-A means of impressing visitors adopted by the Third Republic
-The tower was a triumph of mathematical calculation
-Carefully calculated the effect of wind and made an amazingly light structure

The Eiffel Tower (1884-1889)

Gustave Eiffel

Paris, France

-Arches in the lower part served no structural function, but for the aesthetic consideration to reassure the eye by visually supporting and biding the four legs
-Its transparent, soaring frame reflects all the moods of the Parisian sky

Arts and craft Movement
-a response to the decline in the artistic quality of machine-made objects
-the recognition of the lamentable condition of industrial capitalism by which the artist was alienated from the product of his labor

Major figure of Arts and Crafts Movement
William Morris (1834-96)
-influenced by Pugin and Ruskin
-"the 'corruption of nineteenth-century styles' would be counteracted by inspired craftsmanship . . . An authentic architecture would be achieved through the direct expression of pristine moral virtues."
William Curtis, *Modern Architecture*, p. 48
-in 1861, he set up the firm of Morris, Marshall, and Faulkner to create a context for artists to relearn the various crafts under conditions as near as possible to those of the various medieval guild

The Red House (1859)

Philip Webb (for William Morris)

Bexley Heath, England

The Red House, plan (1859)

Philip Webb (for William Morris)

Bexley Heath, England

The Red House

-The question of “What is a House?” In the midst of the industrial development

-Modernization—the formation of urbanity & its negative impact upon living quality

-The question of dwelling as a social response to the living condition that was becoming defied

-The return to the simplicity and naturalness of the medieval house

-Also was a return to the vernacular: the vernacular was to be rediscovered as the locus of authentic dwelling of imitation

-This return is expressed in an architecture made up of freely-distributed volumes, not regulated by pre-given aesthetic norm
-The plan is also freely-distributed, not following a pre-given aesthetic concern
-This reflects the internal organization of the building – a kind of rejection of the division b/t the inside and the outside dressing
-In this sense, a criticism of eclectic approach and stylistic approach, also a rejection of the classical system as a priori formal system to be imposed upon a residential architecture
-The classical system was being adopted for the urban residences (think of Chiswick House) But it was also something of a revivalist architecture in that the medieval and the vernacular were the objects of imitation

Chiswick House, exterior view and plan axonometric (1725)

Lord Burlington & William Kent Middlesex, England