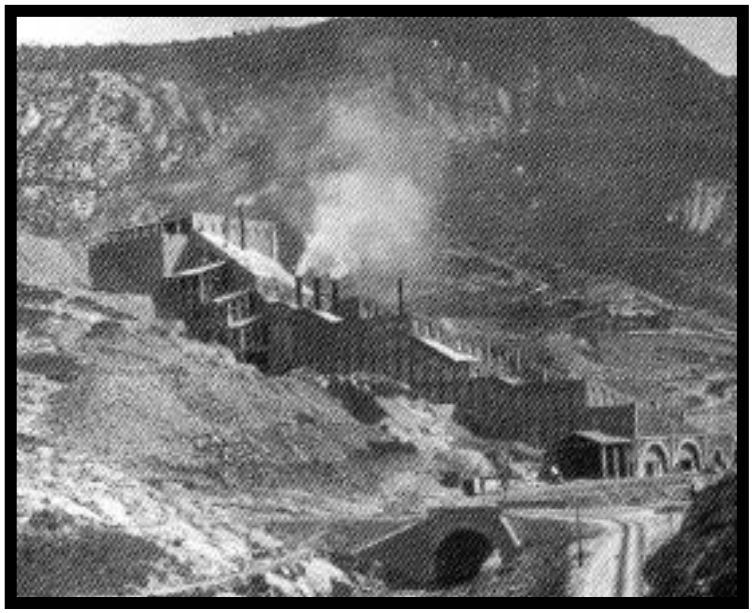
SIA Study Tour

Catalonia Spring 2004



A brief introduction to the sites we will be visiting during the tour.

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Barcelona
February, 2004

INTRODUCTION
Four aspects of the industrialization of Catalonia.

1. History: Catalonia is a part of Spain, but could easily have slipped out of it in the C17 and become a sovereign country, as did Portugal. Memory of the glory of the Medieval empire that Barcelona controlled in the western Mediterranean has conditioned Catalan politics since the early-modern period (even today, a pro-independence party is part of the coalition in the new Catalan government, the ***Generalitat***), but along with a distinct language (a blend of Spanish and French) there has always been a characteristic attitude to work in Catalonia more akin to northern than southern Europe. This is reflected in the history of its commercial and industrial development. Catalonia has traditionally viewed the rest of Spain as a market for its agricultural and textile products, while chafing over the vagaries of Spain's industrial policies, largely dictated from Madrid.

2. Resources: the geography here is very varied, with a Mediterranean climate and river system, mountains in the north and a hot, dry interior, and these factors have had a strong bearing on the industrial sectors that have thrived. The production of food has always been important, especially cereals, wine, oil and pork (ham and sausages are treated here with reverence), and all have strong local concentrations. The Catalan government in the early C20 promoted the construction of flour mills, abattoirs, wine and oil mills, leaving an unequalled agro-industrial architectural legacy. Textiles have also always been central to the Catalan economy, and though neither indigenous sheep grazing nor imported cotton leaves much in the way of built heritage, the wealth they generated is evident in the civil and ecclesiastical buildings of the towns. The history of textile production dates from the medieval period when wool was Spain's main currency earner, passes through a phase of proto-industrialization around Barcelona of printed cotton (calico) cloth, and enters into the fully-mechanized production of cotton and wool textiles from the 1830s. Terrassa (wool) and Sabadell (cotton) are the two big textile towns, and the sector is still internationally competitive, rivaling Italy and eclipsing Britain.
   Finally power: the search for autochthonous coal reserves was a major preoccupation all through the C19 but at the start of the 20th century, Catalonia still had to import almost 95% of its coal from Wales and Asturias. This was a major factor in the development of the ***colònia*** system of industrial production, of which more below. The hydroelectric potential of the Pyrenees was in consequence explored very early on, North American expertise and capital being important.

3. Building materials: not much wood and plenty of clay have encouraged construction using brick vaults, later partly replaced by structural iron and concrete. The so-called Catalan vault (***volta de maons plans***) is a traditional building system known since the C15, a light shell of thin tile-like bricks built without scaffolding or centering. It was used for vaulting large spaces, for flooring and roofs in jack arches with wood and later iron

beams, and for staircases, which are often very elegant, open structures found in all manner of house. This was the system that Rafael Guastavino took to New York and had such success with from the 1880s when he intuited the strength the vaults could achieve when built with Portland cement. From the same period in Catalonia it was used in a wonderfully expressive way by the two generations of architects who developed the Catalan Art Nouveau style known as ***Modernisme*** in both civil and industrial building, as we shall see in Terrassa and elsewhere. (To avoid confusion, the later style that is called Modernism in English is titled ***Rationalisme*** here).

4. Textile ***colònies***: A very crude summary of the evolution of the space for industrial production goes: urban workshops in the context of the putting out system (1770-1830); small urban factories using steam power (1830-1870); to large, autonomous rural industrial settlements, called ***colònies***, along the main rivers Llobregat, Ter and Cardener (1880-1970). These rivers are sometimes described as having the most intense exploitation of hydraulic potential in the world, with some 72 settlements spaced along their courses as close together as the head of water and meager flow would permit. In these isolated sites, the promoters were obliged to provide accommodation, and so the mills became embedded in small villages or company towns based on late-C18 British examples like New Lanark and Cromford.
   But it would be wrong to conclude that the ***colònia*** system grew entirely out of the high cost of coal, though the true reasons are still hotly debated amongst historians here. Water power and the need to attract and retain labor were closely followed by the desire for social and economic control and stability: in 1890, the mythical Catalan industrialist Eusebi Güell left his father's mill in Barcelona to build his eponymous (steam-powered) colony because of the chronic labor unrest in the capital.
   Whatever the reasons for the widespread adoption of the colony system, and we shall visit three different examples, this model of production has been almost entirely abandoned since the textile crisis of the 1970s. Today it is the potential for industrial heritage tourism, rather than turning turbines, which attracts most interest today.

Pyrenees pre-tour

THURSDAY

Manlleu Industrial Museum and the industrial canal del Ter and textile mills

Like many other textile centers in Catalonia, Manlleu developed into an industrial town thanks to the hydraulic potential of its river, the Ter. To take advantage of its potential, a curved weir was built across the river to divert water into an industrial or power canal nearly two kilometers in length that was excavated between 1841 and 1848 to provide a more regular and sustained water supply - 8 cubic m/sec. An area of densely spaced cotton factories developed along this canal, with seven textile mills and two other mills powered by water turbines. The first weir was of wood and was rebuilt in 1921.
The former Can Sanglas at the lower end of the canal was built in 1842, and will become the new Museu Industrial del Ter. There will be a display of the cotton mill containing various key pieces of machinery, including a ring-spinning machine manufactured in Manlleu in 1907.

Eiffel railway bridge

The whole line up the valley to Ripoll was engineered by Gustave Eiffel's company, including the steel viaduct bridge crossing the canal.

Colonia Rossinyol

A closed, rural textile colony with independent hydraulic power was the third generation of textile production in Manlleu. The cotton spinning mill was built in 1860 and extended in 1867 over a canal that fed a 600 HP alternator, the most powerful in the town. The steam engine provided backup power when the river flow was insufficient. The ensemble includes the impressive house of the proprietor, the Rossinyol family whose eldest son, Santiago, was a famous ***Modernist*e** painter and playwright. The house, chapel, school and shop testify to the conservative paternalism and self-sufficiency of the colony system.

Colònia Borgonyà de Sant Vincenç de Torelló

The Colònia Borgonyà, or Colonia dels Anglesos, was one of the most important settlements along the Ter and was famous for the involvement of the Coats company of Glasgow, Scotland, among the largest cotton spinning enterprises in the world.
Work on the ***colònia*** began in 1893 on the initiative of several entrepreneurs from Glasgow, and was initially called Nuevas Hilaturas del Ter and later renamed Fabra and Coats. The Colònia Borgonyà differs from most of the others in the style of its workers' accommodation, single-storey cottages rather than the multi-storey apartment blocks found elsewhere. It enjoyed a wide range of facilities (a family cooperative, a school, a medical service, a pharmacy, a recreation centre, a nursery, a church, a railway station and sports facilities). Its development presents one of the most interesting cases in Catalonia.
Since the factory closed in 1979, many of the inhabitants bought their own homes, and there are determined efforts to diversify and attract new commercial activities to the buildings.

FRIDAY

Farga Palau, Ripoll

The first record of a Catalan forge is from 1031, but they were most widely used during the C17 and C18. The important trades associated with the ironworks were nail and

armaments, the latter a specialty of Ripoll. The Catalan forge fell into decline due to the exhaustion of the local charcoal supplies and competition from coke-fired blast furnaces, which were introduced into Spain at the end of the C18.
Technologically it was an efficient type of bloomery furnace, capable of reducing iron ore to make 150kg of wrought iron or steel during a 6-7 hour heat. The main elements the a forge were the hearth and tilt hammer but it was the system of blowing the hearth by a trompe instead of bellows that was most characteristic. In the trompe, water falling from a small deposit concentrated air in a box behind the furnace, forcing it into the charcoal and keeping the fire hot. The bloom was passed between the furnace and the water-powered hammer until the carbon content had been sufficiently reduced. The Farga Ripoll dates from the Middle Ages and continued in use to the 1960s.

Ripoll Monastery
The Benedictine monastery of Santa Maria de Ripoll was founded in 888 by Guifré el Pelós (Wilfed the Hairy), who founded the state of Catalonia and thereby allowing the town to call itself the Cradle of Catalonia. The original tunnel vaults of the nave and four side aisles arch side collapsed in the 1428 earthquake, and subsequent rebuilding and restorations (1820s and 1880s) mean that only the cloister and façade are of historic interest. The double-height cloister was started in 1171 and the carving finished in the C15. The intensely-carved and detailed alabaster façade sets out various founding tales or myths in parallel with familiar biblical episodes, in a screen which is considered as the finest Romanesque work in Spain.

Ruins of Ogassa mining village and cement kilns
By the mid-19th century, there were still hopes of finding important coal deposits in Catalonia, but towards the end of the century they were finally abandoned. Mining of limited amounts of coal was concentrated in four main areas, of steam coal at St Joan de les Abedesses, and lignite at Berguedà, Calaf and the Baix Segre.
Coal mining in this area began in the mid-C18 but intensified under the demand created by the steam engine and railway from the 1860s. The railway arrived to Toralles in 1862 and a system of inclined planes and wagon ways carried the coal down from the mines. The peak years were from 1890s to the 1920s - Ogassa claims to have had electric light before Madrid - though mining ended only in 1967. Associated with the mines from the 1880s were cement works, using the coal and limestone deposits, and the last of these closed in 1997.

Besalú bridge
An early-Medieval fortified masonry bridge crossing the river into the town of Besalú.

St Joan de les Abadesses
Monastery founded in 898 by Guifré el Pelós for his daughter that survived natural and man-made disaster rather better than Ripoll. Its dark, heavy interior has ‘an intense, cave-like power,… a place for troglodytes to seek transcendence.’ Robert Hughes, p87).
(Time permitting)

SATURDAY
Farga del Comú, Catalan forge, Banyoles
After Ripoll, this is the only other even partially-complete Catalan forge. It was built in 1685 and was active in the second half of the C19, finally closing in the mid C20. It occupies the last head of water before the lake in the centre of Banyoles.

La Llotja del Tint

Banyoles was a dyeing centre for woolen fabrics that were being exported to Italy as far back as the 13th century. It enjoyed great prosperity in the 13th and 14th centuries but declined thereafter. Today the 15th century Llotja del Tint is a very rare example of a medieval manufactory or workshop. The interior consists of two tall rooms divided by an axial wall with three pointed arches and rib vaults divided by a false 18th century ceiling. The dye vats were dug out of the bedrock. Dye houses were tall because of the noxious fumes they produced. The dyed cloths were hung to dry under the eaves. The water for dyeing was delivered by a canal, passed through the vats and returned to the town canal.

Main tour

SUNDAY

Maritime Museum, medieval shipbuilding sheds

The Royal Shipyards

The museum occupies the former Royal Shipyards of Barcelona in the area of the old port, where the ships of the Catalan-Aragonese fleet where constructed. Though there were similar buildings around the Mediterranean this is the only one that has survived, and is a unique example of Gothic industrial architecture. Building work started between 1283 and 1328, and by 1390 the central nucleus was completed, consisting of a series of Gothic naves or sheds of stone columns and diaphragm arches under a pitched roof. The shipyards originally stood on the beach and ships could be launched directly from the eastern portals.

Various additions and alterations were carried out:

- The "New Porch" (1390-1415), two-storey building at the north corner.
- The sheds of the Generalitat, added to the medieval part in 1612-1618.
- Extension of the Gothic sheds on the opposite side from the sea (C18).

The sheds were mainly for the construction of galleys, and continued to be used for this up to the second half of the C17. From then on it was used as a barracks - ***Homage to Catalonia*** opens with Orwell lodging here - and for the defense of the city. It has held the maritime museum since 1937. Pride of place goes to a replica of the flagship of the Christian fleet that defeated the Turks at Lepanto in 1571.

Casaramona mill

This cotton mill was built between 1911 and 1912 to designs by the architect, historian and nationalist politician Josep Puig i Cadafalch. It closed soon after the general collapse of the textile trade when the 1914/18 war ended, and became a police station until its recent conversion by a local cultural foundation. It occupies one whole ***il·la***, the island block of the Cerdà plan for extending Barcelona beyond its ancient walls, and the dimensions of which determined a whole class of factory in the city. The two sheds of the factory, of brick with iron columns and Catalan vaults, are camouflaged by an elaborate neo-Gothic decoration that reminds one curiously of the Houses of Parliament in London.

Mies van der Rohe pavilion

A reconstruction made in 1986 of the German pavilion built for the 1929 international exhibition, one of Mies' last works before emigrating to America and a key piece of avant-garde European rationalist architecture. It was demolished along with most of the others at the end of the exhibition. One of the few objects in the pavilion was his famous chair design, named after the city.

Walking tour back through the Roman and Medieval city

Estació de França train shed

The terminus for Spain's first main line from Barcelona to Mataró, 40km up the coast, opened in 1848 with a station about 250m N of here. This was the terminal of the Granollers line, built a few years after, and the station only gained its current name when the line was extended to connect with the rest of Europe at the French border, in 1870. The curved layout that distinguishes this terminus was forced on the designers by the Ciutadella blocking the route north. The whole station was rebuilt for the 1929

Universal Exhibition, the competition being won by the neo-classical architect Pedro Muguruza and construction going to the emblematic Barcelona foundry ***La Maquinista Terrestre i Maritim.*** The terminus is often referred to as the last of the great iron railway vaults in Europe, built when steam trains were disappearing and taking with them the need for elevated roofs. The twin arches of the shed rise to 26.5m and are grounded on hinged bases to neutralize the thermal dilation of the ironwork. The upper part of the shed roof is made of fibre-cement. Note the excellent model of the station, just inside the ticket office, which itself contains a model of the model…

Born iron-framed market

The new Central Market was built in 1876 according to the design of Josep Fontseré, and is the most important example in Catalonia of iron construction and architecture. It was the first of a series of iron markets distributed around the new neighborhoods that were being laid out in the Eixample, the grid-plan extension beyond the city walls that was planned by Ildefons Cerdà and approved in 1860. The rectangular market covers an area of 8,000m2, with a central octagonal rotunda 31m high. ***La Maquinista Terrestre i Maritima*** was responsible for the engineering and production of the columns and other ironwork.

The market closed in 1979, and work had begun a couple of years ago on reconditioning it as the city library when archaeologists uncovered extensive remains of the town that had been flattened in 1714 by Philip V, after the siege of Barcelona, to build the Ciutadella fortress. (September 11th was already a significant date in Catalonia as it was the day the defenders surrendered, and is memorialized as the country's national day). The library project was frozen, and after a virulent debate it was agreed to conserve the excavations and turn the market into a new museum.

MONDAY

Manresa

Industry in Manresa developed after the construction of the ***Canal d'Urgell*** industrial canal in 1832 which was used by numerous mills for grinding gunpowder, flour, pumping, etc. Ribbon-making was one of the most important economic activities in the town. It began in the 18th century using silk and continued into the 19th century with cotton. Though not a spectacular industry, it was nevertheless very significant in the context of Manresa and helped develop capital for the later growth of cotton production. The other main strand to the town's industrial heritage is agriculture.

Pont Vell Romanesque bridge

Most of the 'Old Bridge' dates from the early 1960s, when it was reconstructed after being blown up at the end of the Civil War, but the bases of the eight semi-circular arches date from the C12. The central arch rises to 25m above the Cardener river.

La Florinda and La Albereda flour mills

The small water-powered flour mill was replaced in the C19 by a much larger type of mill fitted with Hungarian cylinder milling equipment and wooden tubes to move the material between the vertically-distributed processes. This verticality combined with the form of the tubular silo produced a new typology, the ***farinera,*** of which the two in Manresa are fine examples.

La Florinda was built in 1912-13 to designs by the local architect Ignasi Oms i Ponsa, and was one of the earliest Catalan instances of reinforced concrete construction. (The cement almost certainly supplied by the Asland company from the Clot del Moro works, see below). Decorated by brick and glazed tiles crossing a strong vertical emphasis created by giant order pilasters, with a raised stair tower and water tank. Now used by

the local police force.

Museu de la Tècnica de Manresa, (mNACTEC)
The industrial museum occupies one of the most original exhibition spaces in Catalonia, an underground water reservoir of 2,400 m2 built between 1861 and 1865 to provide the city with a reliable water supply and a reserve of 16,000 m3.º

Fàbrica del Panyos 'La Miralda'
Credited as the oldest recognisable modern textile mill in Catalonia. The steam engine had still not reached Spain when it was built in 1818, and it was driven by a water wheel fed from the river alongside, to make woollen cloth. The internal structure of brick diaphragm arches is derived from Medieval building customs in Catalonia. It is said to have been the largest factory in Spain.

Fàbrica Nova
The first textile mill on this site, the Fàbrica del Remei, was erected by the family of Bertrand i Serra in 1894, and was water-powered. With the success of the company a new mill was projected in 1925, alongside the earlier works, which was fitted with 1,400 looms and 80,000 spindles. It was opened in 1926 by Alfonso XVIII, a king who took a strong interest in industrial development if inaugurating factories can be taken as a guide. The company closed the works in 1989, and the city council has approved a plan to develop the site but conserve only the main mill buildings. The conservation of industrial heritage in Manresa has still some distance to go.

Parc Güell

pm: reception at the Palau del Mar, Barcelona: Museu de la Historia de Catalunya
The former Magatzems General de Comerç (General Trading Warehouses) are almost the only testimony to the old Barcelona port which moved further south during the 1980s. The typical late-C19 dock store was designed by Mauricio Garrán in 1881 and finished in 1900.

TUESDAY
St Joan Despí cardboard factory
The industrialization of this area outside Barcelona began in the C18 when the ***Canal de la Infanta*** was excavated. In the early C19 a water mill was built beside it for making ***campetx*** dye for printing calicoes, and this old mill was adapted in 1910 as to produce cardboard. The factory continuing in operation until recently and it still contains much of the machinery dating from 1913-16, as well as remains of the earlier mill. These include the wheel pit, now occupied by a Fontaine turbine, press, chimney and store from the old mill, adapted to produce the pulp that was used in the cardboard factory built alongside, and which contains the continuous cardboard machines for laying the pulp and cutting, pressing and finishing the sheets of card. Alongside is a large store with a series of eleven open drying sheds designed by Gaudí collaborator Jujol in which the damp card was hung, and the ***masia*** or owner's house.

Museo Adoberia Cal Granotes
Cal Granotes is a pre-industrial tannery. It was built in the C18 and consists of the vats in which the hides were left to be digested by lime and the upper area in which they were hung. The museum explains the disagreeable process of producing tanned leather.

Capellades medieval paper mill

The Museu Molí Paperer de Capellades is an C18 water-driven paper mill formerly known as the ***Molí de la Vila*** or Town Mill. Capellades became one of the main centers of paper production in Spain during the C18 and C19, its paper known internationally. Sixteen mills were concentrated along a canalized stream through the village, the other main advantage of which was proximity to the Camí Ral, the 'royal' route linking medieval Catalonia with Aragon and Castile which brought rags to the mills and carried the paper to the interior of Spain or the port of Barcelona. The museum was formed in 1958, and also has an international reputation both for its hand-mad products and as a centre for the study of paper.

The special typology of the paper mill was widely developed in Catalonia. Based clearly on the ***masia***, the traditional Catalan farmhouse, paper was made in the vaulted basement where the rags were first selected and chopped, beaten to pulp in vats by batteries of trip hammers operated by the water wheel, and then laid by hand into sheets of paper and pressed to squeeze out the excess water. The ground floor had a packing room, store and kitchen, and the owner occupied the first floor, distinguished by its characteristic balcony. The attic floor with all the windows was a drying loft in which the damp sheets of paper were hung till dry.

WEDNESDAY

Pont del Diable, Martorell

The Romans built a bridge here in the C1, but the frequent spring floods that Catalan rivers suffered (until the C20 construction of the dams and reservoirs further upstream,) resulted in a regular programme of bridge rebuilding. As well as Roman abutments, there are Romanesque sections of arch from after the flood of 1143, while the main arch is Gothic, rebuilt in 1286.

(We'll stop if time permits in the morning).

Martorell railway workshops of Ferrocarrils de la Generalitat followed by stream train ride to Monistrol station, below the mountain of Montserrat

The railway reached Martorell in 1858. More information on the workshops and our locomotive and carriages when we get there.

Colònia Sedó

The Colònia Sedó was one of the largest of the Catalan rural industrial settlements. Built between 1847 and 1850, it took advantage of an existing water power site of an old flour mill site on the Llobregat river. At its peak, 3,000 people worked here and 1,800 lived in the colony producing corduroy - the denim of the nineteenth century. The Colònia included spinning and weaving mills, bleaching works, whose steam engine has the emblematic spiral brick chimney; warehouses, workers' housing, a church and a school, as well as many support facilities that ensured its self sufficiency: brickworks, limekilns, foundry, builders' yard and firehouse, hospital and shops. In 1878, when the fall supplying the original waterwheel became inadequate, a second dam was built 4km upstream and the water carried by a raised, covered aqueduct across the Colònia to a 30m head above the turbines. Installed in 1899, the current Francis turbine delivered 1,400 H.P. and was the largest in Spain at that time. It was later converted to generate electricity.

The colony offered work, accommodation, and a degree of financial and social stability, in return for conformity and obedience to the requirements of the factory and its owner. From the 1870s, when the first houses were built for workers arriving from outside the area, and later on from outside Catalonia, bars and shops, school, church, nursery, cinema and theatre were added. The first flats were only 80m2 with three bedrooms,

kitchen and washroom. The complex now houses a variety of commercial and industrial activities, including the museum that explains its history and water power system.

Colònia Güell and Gaudí crypt

The Colònia Güell was one of the most ambitious of the industrial settlements established in Catalonia during the 19th century, and which characterize the industrialization of the region. It was built by an established Barcelona textile dynasty, the Güells, who wanted to escape the labor militancy that was endemic in Barcelona where their original works, the 1840s Vapor Vell (Old Mill), was located. Work began in 1890. The factory closed in 1973 and is now used by a variety of different enterprises. Unlike most of the Catalan industrial colonies, the urban plan of the Colònia Güell was clearly established from the beginning, and Guell's contribution to their history is the recognition of urban design as an instrument of social control. Eusebi Güell was Antoni Gaudí's most important patron, and in 1908 the architect began work on the extraordinary church at the Colònia for which it is today most famous.

The master plan was entrusted to Gaudí and his collaborators Francesc Berenguer Mestres and Joan Rubió Bellver. It has an L-shaped layout with the most emblematic buildings, the school and the church, at the two ends. The Colònia consists of two main sections, the factory and the village. The factory has multi-storey spinning sheds, single-storey north-light sheds for weaving, and unusual drying sheds for the dyed cloth with perforated brick walls. The village where the workforce and supervisors lived consists of various different models of house, whose size and style varied according to the status of the inhabitants. There were also schools, shops, and communal facilities and the church, of which the crypt is all the architect had finished by the time of his death.

THURSDAY

Cornellà steam pumping station

The ***Central Cornellà*** water pumping station was built by the Societat General d'Aigües de Barcelona and designed by the architect Josep Amargós i Samaranch in 1905 to improve the supply of drinking water to Barcelona. The water company Agbar is on the point of finishing its conversion into a museum of water (and still undecided if it will allow us to visit). The station contains seven horizontal engines and a boiler. The engines include four horizontal tandem compound drop-valve engines driving DC Generators, by the Societé Lyonaise, Paris 1907, rated at 440 h.p, a large horizontal twin tandem compound engine by Anciens Ateliers de Construction Vanden Kerchove, S.A. Gand, Belgique, and an Alexander Bros inverted vertical single cylinder engine dating from the second half of the C19, mounted in the grounds. The boiler was constructed by Hering Gmbh, Nuremberg, Germany in 1907.

Catalan National Railway Museum, Vilanova i Geltrú

The museum occupies the former locomotive house built at the end of the C19 in a curve around a central turntable. The collection of stream engines is one of the most important in Europe and includes the oldest steam locomotivein Spain as well as the last to run as well as electric and diesel sets, and the first Talgo (a unique Spanish train whose axels can be widened to allow it to continue on standard gauge track into France).

Cellers Cordoniu cava cellars, Sant Sadurni d'Anoia

In the nationalist rebirth at the end of the 19th century, it was common for architects as well as industrialists to draw inspiration from medieval complexes, the walled towns, cathedrals and monasteries that are the raw material for the mythical origins of Catalan

art. This is especially clear in the work of Josep Puig i Cadafalch. The Cordoniu family estate has been here since 1551. In 1890 they commissioned Puig i Cadafalch to enlarge the premises, work that continued from 1896 to 1906 and included the bottling and labeling sections, pressing room and cellars. The new buildings all have gigantic vaults spanning 9m on diaphragm arches, echoing the halls of the Royal Shipyards in Barcelona. The house that Puig built for the family has the neo-medieval forms and language typical of the architect.

FRIDAY

Museu de la Ciència i de la Tècnica de Catalunya, Terrassa

The mNACTEC represents the history of the Catalonian process of industrialization and is the national museum of science and technology. Catalonia was exceptional in Spain, and almost unique in Southern Europe, for being among the first regions to industrialize in the early 19th century. As in other countries, the textile sector had a leading role – Barcelona was already the largest European producer of printed cotton fabrics in the late-c18. The museum is the headquarters of the ***Sistema del Museu de la Ciència i de la Tècnica de Catalunya***, a network of about twenty specialized industrial sites.

The home of the museum is the ***Vapor Aymerich, Amat i Jover***, a woolen textiles mill constructed in 1907-08. It was built as a fully integrated factory where wool was processed, spun, woven, dyed and the cloth finished; all these processes took place in one north-light shed measuring 11,000 m^2. The mill was powered by a horizontal steam engine, a machine so closely associated with the textile industry here that the Catalan word for a mill, ***vapor,*** means 'steam'. In 1915, around 500 people were producing 'novelty' woolen fabrics for men's and women's clothing. Fitted with continuous (ring) spinning machines, there were 2,400 spindles for spinning the carded (long staple) wool, 3,300 spindles for spinning the combed (short staple) wool, and 1,090 spindles for twisting.

It is an outstanding example of a Catalan ***Modernista*** construction and is considered among the finest pieces of industrial architecture in Europe. It was designed by the municipal architect Lluís Muncunill who combined the Catalan vault with C19 industrial iron construction techniques in a unique and highly personal way.

In 1962, the company was badly affected by the disastrous floods of that year and finally in 1976 it closed down. It was bought by the Generalitat and the museum opened in 1984. This year it celebrates its 20th anniversary.

Walk through industrial and *Moderniste* Terrassa, the former 'City of Smoke'

The Medieval town of Terrassa grew fast during the second half of the C19 with the construction of steam mills specializing in woolen textiles. Its expansion was linked to the arrival of the main Barcelona road (1845) and the railway (1856). As well as its directly industrial heritage, there are many cultural and social buildings built by the industrial bourgeoisie from the 1880s in the ***Modernist*e** and ***Noucentise*** styles, dominated by the municipal architect Lluí Municunill. The textile crisis of the 1970s closed most of the factories but some have been reused and elements (most of them it should be pointed out are the chimneys) conserved.

The Masia Freixa (1907-10) was a small factory that the manufacturer Josep Freixa asked Muncunill to adapt as a private house.

***Casa de les Aigües* steam pumping station, Montcada**

Water was being diverted to Barcelona from the River Besòs, north of the city, in Roman times. A canal, the Rec Comtal, was excavated in the C10 to improve the supply, and it was soon being used by flour mills and, from the C18, calico mills as it crossed the plain towards Barcelona

The first galleries were dug under the river to improve the flow in the C18, and in 1879 the Barcelona municipal architect Antoni Rovira i Trias designed a new steam-powered pumping station in the ***Modernista*** style to extract river water and pump it to the city. Two vertical steam engines made by the Barcelona company of Alexander Bros. pumped 20.000 m3 a day. The ensemble includes the house of the manager, the engine house and chimney, the pump house with the three wells, filter house and ancillary buildings, all landscaped in the typical late-C19 waterworks manner.

The Sagrada Família
What can I say?

SATURDAY
Clot del Moro, ruins of *Modernista* cement works
The first cement works with modern rotary kilns in Catalonia was built in this inaccessible valley between 1901 and 1904 by Eusebi Güell, assisted by American technicians from Allis Chalmers and the Pelton Water Wheel company (see cover photo). Its extraordinary design, rendered surreal by decay since closing and being stripped of its plant in the 1970s, makes it a unique industrial site. All the machinery including the three AC kilns was moved by 13 Pelton wheels of different size, the water coming via a 4.8km tube from the source of the river Llobregate. After the first four frustrating years, the company mastered the technology and technique of making cement, and in 1908 the works was replanned and extended with the purchase of two new kilns, three times the length of the original ones. The workforce lived in the nearby village of la Poble de Lillet. The little colony includes houses for the technicians and staff, chapel, a Civil Guard detachment to protect the dynamite of the quarry, and a house closely influenced by Gaudí.

Cercs coal mine museum and miners' settlement
Coal was mined in this are for copper and iron forges since the late C18, but the first proper mines only opened in the 1850s. The difficult geology and serious problems transporting the coal out of the mountains and to the market hampered mining until a Basque industrial group bought the rail concessions and mining rights in 1995, and the railway reached Guardiola in 1904. A complex of cableways, inclined planes and rail lines brought the coal from the various workings to the railhead. Under José Enrique Olano, 53 concessions were consolidated into the firm Carbones de Berga, and mining colonies were built to accommodate the miners who began arriving from all over Spain. The area experienced boom conditions during the First World War, but it was always a centre of political activity and confrontation. One of Spain's few communist revolts was crushed by the army in 1932, the mines were collectivized during the Civil War, and the area was a hiding place for political refugees afterwards. Hard conditions were exacerbated by the stringent economic control of the companies, and gas explosions caused several tragedies. Demand for coal was dominated by the power station, built in 1929, which bought the mine company in 1965.

Baells Hydroelectric Dam
The Llogregat was dammed in 1976 by the Baells dam, 112m high and describing a 302m curve across the valley. A photographic exhibition inside the dam illustrates the work of its construction.

Stayover Tarragona	

SUNDAY

Fassina Aguadents distillery, Espluga de Francoli

The earlier, C19 mill was converted in 1900 into a barite mill, and in 1919 became the Fassina d l'Espluga de Francoli. Fassines are a typo of aguadent, an eau de vi-type liquor that was sold to America since the early C20. The distillery is undergoing conversion into a museum and our visit is by special permission of the Mayor.

Espulga wine cellers

The Celler Cooperatiu de L'Espluga de Francolí was designed by the great Lluís Domènech i Montaner and his son Pere Domènech i Roure and completed in 1913. These ***cellers*** were built throught the Priorat and Penedes wine producing areas, and many of them were influenced by Moderniste concepts of the expressive but undecorated use of structure and materials. The frequent comparisons with churches are not accidental, as the interiors of many of the larger cellers have a strongly ecclesiastical atmosphere.

Poblet monastery

The Cistercian monastery of Poblet is more of a fortified town than a religious settlement, occupying a very large area completely surrounded by crenelated walls in the middle of the fields and vineyards that have sustained it since its foundation in 1151 by Ramon Berenguer IV, Count of Barcelona. The first dozen monks arrived two years later. Work on the church began in 1166, in the austere manner dictated by the Cistercian rule. The church was the royal pantheon from the time of Pere the Ceremonious (C14). It continued to grow for hundreds of years, the architectural style evolving from the Romanesque through Gothic to Baroque. The kitchen contains a small flour mill of interest to industrial archaeologists.
Poblet is a World Heritage Site.

MONDAY

Priorat

The soils of this hilly, wooded, isolated area has always produced a very characteristic wine with a high alcohol content. But in recent years it has become very highly prized, most have the vineyards have been bought by major Spanish or international companies, and almost all the product is exported, much of it to the States.

Bellmunt lead mine

The veins of lead at Bellmunt have been worked since the Neolithic, were important in Roman times, and there was again mining here from the C16, but they were finally exploited intensely after the philoxera epidemic decimated the Priorat vineyards in the 1890s. The peek period of extraction was from 1920 to 1970, by which time plastic electric insulation had finally so undercut the price of lead that the mine uneconomic. The veins of galena are sub-vertical and run N-S following porphyry intrusions into the slate country rock. They were worked by stoping in the conventional way. The mine complex included a headstock over the mineshaft (now re-sited), a foundry with smelting furnaces and sublimation flue up the hill to a chimney, steam engine house and workshops. The ***còlonia*** for the miners was built in the village of Bellmunt from the 1920s to receive miners who came with their families from southern Spain. The ***moderniste*** Casa de la Mina was built by the mine company, Mines de Priorat, in 1905 for the owners, senior engineers and the offices and laboratory of the mine.

The visit to Bellmunt includes a tour of the underground workings.

Falset wine cellers

The architect Cesar Martinell was responsible for one of the most remarkable collection of industrial buildings in Catalonia, over a hundred wine cellars and grain stores for agricultural cooperatives that were planted strategically through the Catalan countryside in the early C20. The largest wine cellars are known as Cathedrals of Wine, for obvious reasons. That at Falset was built in 1919. Martinell was a disciple of Gaudí and forms a link between ***Modernisme*** and ***Noucentisme***, the neo-classical style that succeeded it. He was also a medieval scholar and expert in Gaudian architecture. The central nave has timber trusses on brick pilasters. The smaller side aisles contain tuns on low vaults while a line of modern stainless steel tuns occupies the centre of the cellar. The area where the grapes were brought in and the wine prepared is in an underground vault. An ingenious water tower stands over the weigh bridge at the entrance.

Tarragona tobacco factory

Designed and built in 1922 by the Compañia Arrendataria de Tabacos with the architects Roberto Navarro and Quintana Vidal in an academic Neo-classical style that echoes the royal factories of the C17 and 18 in mainland Europe. Offices flanked the entrance, stores at the opposite end and the cigarettes were made on the opposite side of the central garden space.

The factory closed in the winter of 2003 and it may not be possible to gain entrance to see the inside.

TUESDAY

Autòdrom Terramar

One of the circuits constructed in the early days of motorcar racing, with steeply-banked concrete track in the shape of a baked bean. Terramar was laid out in 1923, when the Catalan car industry, represented by firms such as Hispano-Suiza, was promising to develop in parallel with those of Italy and France. It formed part of an ambitious model or garden city project, but has fallen into decay pending a suitable project for its re-use

Mèdol Roman quarry

The large blocks of limestone, up to a cubic meter in size, were extracted from here to build the walls and amphitheatre of Roman Tarragona. It is estimated that 50,000 m3 were removed, leaving behind a natural amphitheatre of great natural beauty. The quarrymen left untouched a single monolith that stands 16m high in the center of the site.

Pont del Diable, Tarragona Roman aqueduct

The longest aqueduct in eastern Spain, 15 km long, was built in the early years of Augustus' reign to carry water from the Froncolí river to Tárraco. The pillars are of local stone laid without mortar in ***opus quadratum***. The surviving section crosses a shallow valley in 11 arches at the lower level and 25 in the upper, which can be traversed on foot.

Free afternoon to explore Roman and medieval Tarragona.