Parker's Roman cement 1796.

Recent developments and research into the production and use of Natural Cements.

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Most of our work involves the conservation of sculpture, architectural ornament and fine historic surfaces.

For example;

C16th trefoil arch terracotta arch and niche (one of a conserved pair) on a pencilled brickwork fireplace.

St. Georges Church, Colegate, Norwich.

West Door, South spandrel, limestone and flint flush-work panels; details before and during conservation.

C15th carved spandrel depicting George and the dragon.

Conservation by “lime method” and selective replacement.

Cast Roman cement key stone in Woodbridge; probably by James Pulham, early C19th. (an example of the use of Roman cement, not a Swann project).

Roman cement: …..Revision sheet.

What does it normally look like? Brownish porous cement mortar

When was it invented? 1796, by Rev James Parker, Isle of Sheppy, England.

How was it produced? In a kiln similar to, or the same as, a lime kiln

Why was it a cement? Because it was ground and not slaked.

Why was it special?

Because nothing else set so quickly and so potentially hard as this material. Typically it was set in 10-20minutes.

What was it used for?

Arch tunnels (eg Thames tunnel, Brunel), Stucco, Casting & similar applications.

Mainly in the C19th, especially in England before 1860.

Classification:

Roman cement is a natural cement.

Natural cements are distinguished from the artificial cements, especially high temperature calcination cements, such as Portland cement by two main factors:

1. They are calcined at lower temperatures 800-1100 degrees C.

2. They are formed from a single source raw materials (such as septaria or a marl) and do not require grinding before calcination.

[Grinding is used in artificial cement production to ensure close combination of calcium, alumina and silica which might be contained in different materials such as chalk and clay.]

Surviving Natural cement kiln at Sands End on the Yorkshire coast where nodules were extracted from the lias formation (as a by product of alum extraction) to form Mulgrave or Yorkshire cement.

This is possible one of the few or only surviving natural cement kilns in the UK.

Hainford Church,

Norfolk. 1838-40.

Roman cement pinnacle.

Stucco and brick mortar.

1.Is the existing palette of conservation binders suited to the repair and restoration of Roman cement stucco and ornament?

2. Can we match Roman cement with existing binders or do we have to reproduce Roman cement in order to accurately duplicate it.

3. How did craftsmen work with quick setting materials and how did the methods of working influence the use of the materials?

4. What and where are the important historic references for the early use of cements in England.

No way, not in 20 mins.

Lion Casting (in Roman cement) from former White Lion Hotel, Eye.

Conservation after breakage into over 100 pieces.

Conservation with pure prompt and prompt lime blend mortars.


Matured
SLAKED LIME

ROMAN CEMENT.

TO uſe this CEMENT, mix it up with Water to the Conſiſtence of a thick Paſte, and apply it immediately; previouſly taking Care to clean and moiſten the Bricks or Stone on which it is to be laid. Wet no more at a Time than can be uſed in 10 or 15 Minutes. After it has once ſet, it will not be fit for Uſe again. Good trowelling, juſt after it has hardened, is generally uſeful. Never lay it on old Mortar, nor White-waſh, nor Wood. One Part of CEMENT mixed with Three Parts of Lime, and Three of Sand, will make a very hard Mortar; but, if the Quantity of each of the latter be leſs, particularly of the Lime, the Mortar will be proportionably ſtronger, and better calculated to reſiſt Water.—To make STUCCO, add One Part of CEMENT to One or Two Parts of Sand, and uſe it, *as in all other Caſes*, immediately.

NICHOLS *and* SON, *Printers,*
Red Lion Paſſage, Fleet Street.

Turn over

Vicat Prompt render trails (prompt /sand renders), Hadlow, March 2007.

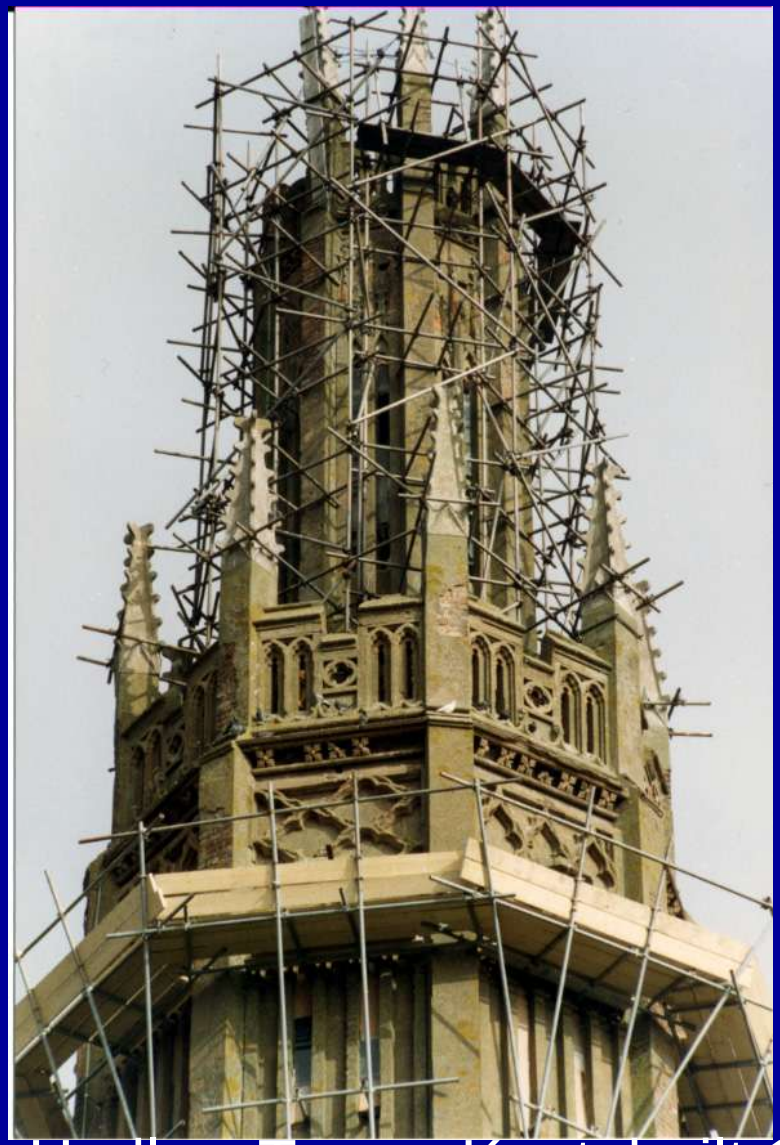
Vicat prompt render trials (prompt sand renders), March 2007, Hadlow.

Rocem Krakow workshop (October 05);

Casting led by Atelier Christian Gurtner, Vienna.

Lilienfeld (Austrian) cement, trial production from electric kiln, by Rocem.

Rocem recommends: Cement 2 : 1 aggregate; 0.65 w/c ratio.



Hadlow Tower, Kent, built 1835-38, with the lantern now dismantled (right), added in 1840. (Vivat Trust/Thomas Ford Partners).

Hadlow tower; historic casts;

1. Cast composed of different layers and qualities of mortars
2. Brick or tile used within the body of a cast.
3. Coarse cast materials looses it's surface to expose a rougher surface (common with many casts).

Hadlow Tower; small part of spirelet cast (right) and complete replica for mould making.

Cast in Nov 2007; photo Nov 2008.

Hadlow Tower;

Repair and conservation of rosettes using elements of different origin (ie. from different castings).

Method; setting elements together in face squeeze mould.

Hadlow rosette; conserved using prompt sand mortar for filling voids and prompt shelter coat for surface finish.

VICAT EXPERIENCES

						Prompt
	Hadlow prompt	S. Swann render samples		Hadlow Tower Render		Natural
	mortar	Hainford church	Kedleston	fine mortar	coarse mortar	Cement
N=° LMM	63350	70028	70029	70233	70234	61176
soluble silica	6.6	5.25	3.56	2.2?	3.75	15.45
% natural cement*	42.72	33.98	23.04	14.24	24.27	100.00
density (kg/l)	2.03	1.913	1.855			/
water porosity	19.78%	23.54%	25.37%			/
water absorption	9.70%	12.80%	13.90%	18.1%	16.0%	/
size aggregate	0 – 3 mm	0 – 3 mm	0 – 1 mm	0 – 2 mm	0 – 4 mm	

Production of prompt cement at Vicat site, La Perelle, Near St. Laurent du Pont, Chatreuse Mountains.

Extraction of rock at La Perelle; 3m wide bands are inclined at a 30-40 degree incline resulting in an extensive network of tunnels and “wells” to allow the rock extraction.

La Casamuares, St Martin le Vinoux, on the outskirts of Grenoble and not far from the site of Porte De France (natural cement production from 1842). Casamuares was built from 1855 using extensive cast elements in natural cement.

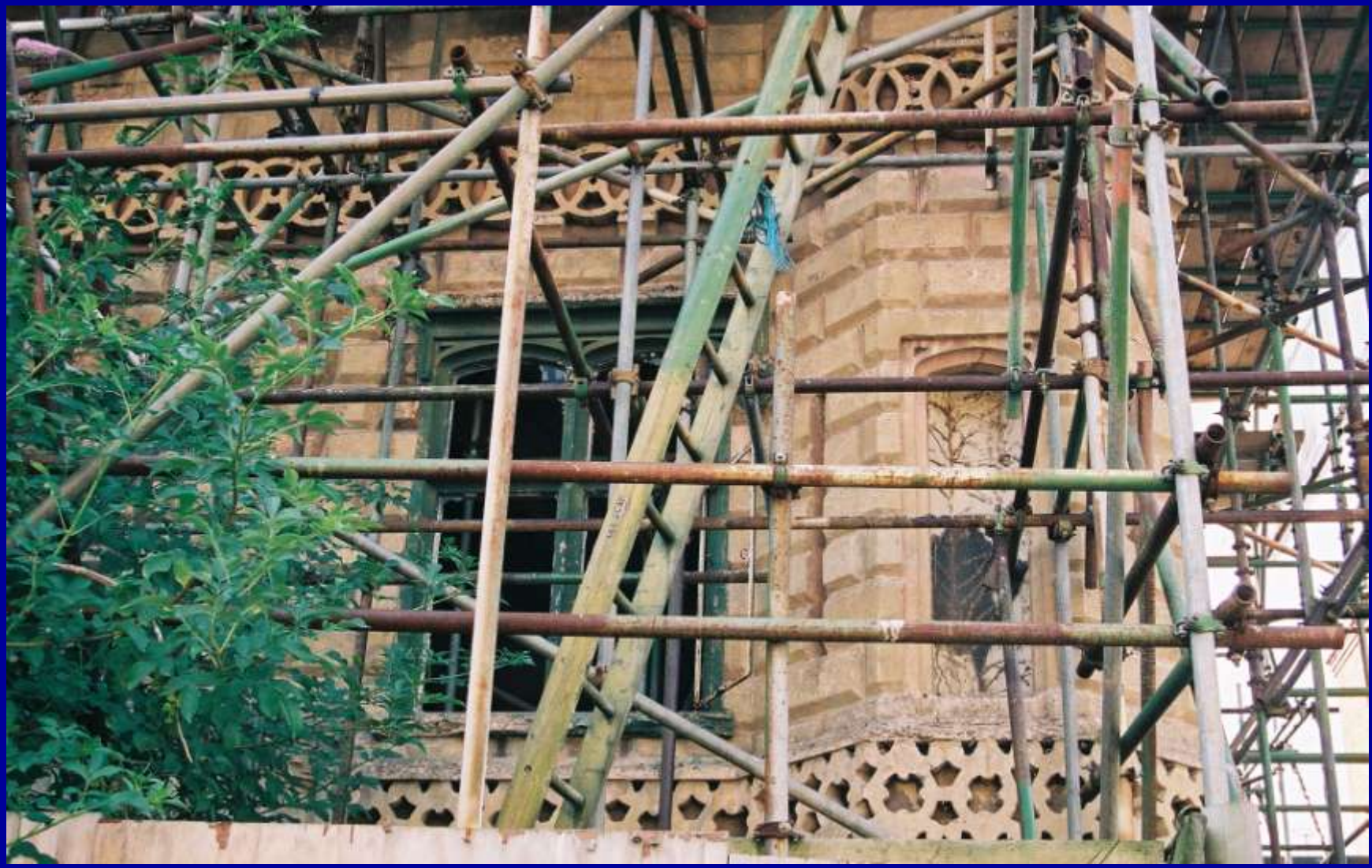
Large cast elements can be found laying around on the site of the Porte de France production.

Eglise St Bruno, Grenoble, surfaced in cast natural cement artificial stone.

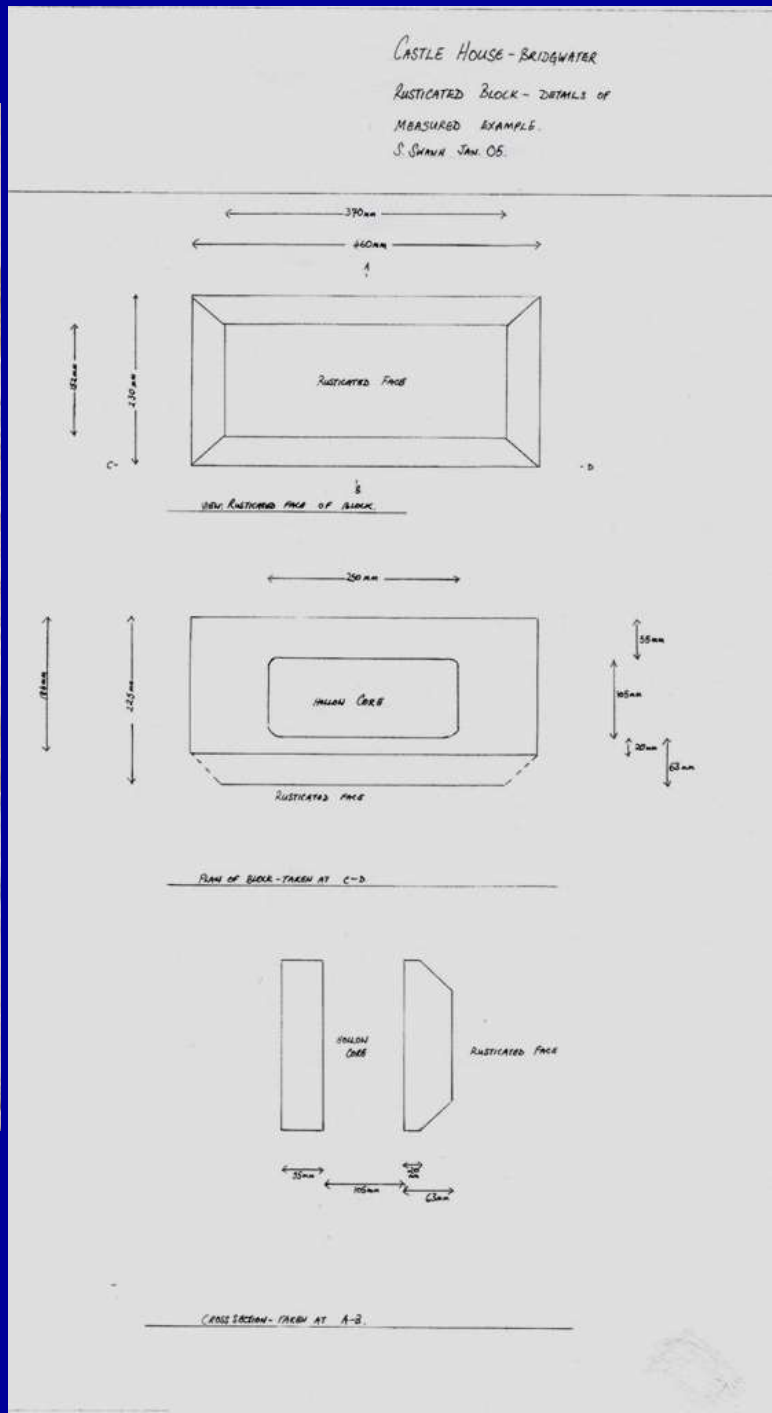
Building on Rue Nicolas Chorier in Grenoble. Façade in cast prompt cement.

Innovation and the early cements.

A quick meander through some interesting sites



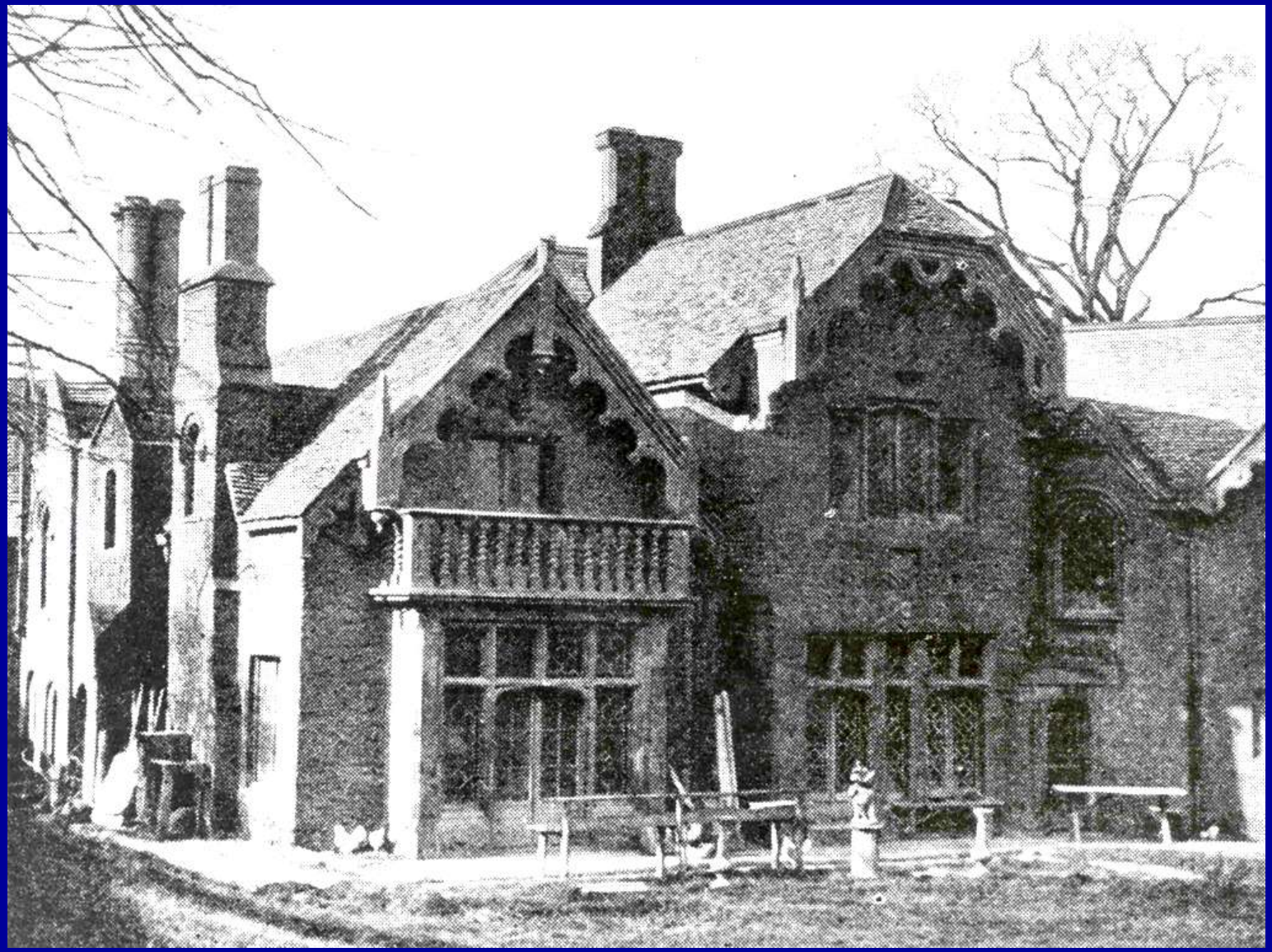
Castle House in Bridgwater, Somerset, built circa 1850 or slightly later. Castle House was closely connected with the John Board natural cement works at Dunball and it is generally believed that he built the house to an experimental design to show how versatile his cement was.



Pre-cast artificial, hollow, rusticated blocks used in construction of the façade at Castle House;

Cement coloured to imitate stone

Detail from a room at back of Castle House with original cruck system still “intact” and tile creasing used for roof covering



Bazely White House, Swanscombe, Kent; the “first” all concrete house; 1835. Built in Roman cement. Now demolished (1970?)

Westley Church: Suffolk, 1836, Lime mass concrete by William Ranger with cast ornament (composition not known).

Ranger’s precast blocks at Westley Church, Churchyard walls.

Royal College of Surgeons: William Ranger. Portico (predating the façade) in Natural Stone but the rest appears to be a mixture of stucco and casting.

Constitution Hill, Ipswich; Suspected Ransomes Artificial stone; not all such castings were based on calcareous cements or lime. Ransomes work was based on dissolving flints and precipitating a silicate binder.

Bennington Lordship; Hertfordshire;

Mock castle built by Pulham (circa 1840). Using precast decorative elements.

Castle House, Woodbridge, built 1805/09 and demolished in 1970's.

Built by Lockwood to demonstrate the use of Roman cement. Lockwood was an agent for Parker and Wyatt. Attempted to use RC on the roof laid over rafters, which failed, quite quickly.

Pulhamite; artificial rockwork formed by the Pulham family, the early examples (such as Maddresfield above) probably used Pulhams Portland stone cement (possibly an eminently hydraulic lime) while later examples such as Ramsgate (left) used Portalnd cement stucco; but Roman cement was used for the cast balustarde pedestal in the rear right of photo.

Wycombe Abbey, High Wycombe, Bucks. James Wyatt, 1804, in-situ run stucco and flat stucco window surrounds. Ornamental spandrels. Detail of RC work on East Façade.

Innovative use?

The historic street urinals of Grenoble are made with precast natural cement.

Some conclusions on the conservation of early cement ornament and facades.

1. Always analyse the binders by SEM or similar to determine the nature of the binder material. Use a competent laboratory.

2. Surface colour, and the originally intended surface colour, is a very important issue (not really covered today).

3. Surface texture and appearance must also be understood, many RC castings had very fine surface texture.

4. It is always necessary to understand how something was made, especially at this period in history when there was much experimenting with technique.

Brief List of References

- Monumental 2006; Les Ciments Natural
- L'Or Gris Du Grand Grenoble, Patrimoine Rhonaplin.
- Hydrauliskt Kalkbruk; Solve Johansson
- Roman Cement; Vol 5 of EU project Rocem.(Obtainable from Bradford Uni.)
- Properties and uses of RC. Hurst L, Const.History Journal
- Various Vicat Advice notes.