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BRICK IN THE TWENTY-FIRST CENTURY

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INTRODUCTION

Brick is one of man's oldest manufactured products. No doubt the caveman noticed that where fire sat on a clay base it turned mud into a hard material. From there it was a short step to shape that mud and develop pottery which has been one of archeologists' principal dating methods. Pottery is remarkable for its durability, except when dropped on my tile kitchen floor.

The evolution from pottery to brick no doubt developed as need to have a durable building product in those areas that lacked readily available wood or stone. The advantages of a rectangular building product over a rough stone product are obvious. The laying of brick certainly would be easier than the laying of stone.

To produce brick, early man probably moved quickly beyond shaping it by hand to developing moulds of various kinds, pounding the mud into the moulds to form the shape and then letting it dry. In some parts of the world that is still the method of making brick today. Sun-dried or adobe brick are still common in areas where precipitation and freeze-thaw cycles are minimal.

In early Babylonian and Syrian times, brick developed in the Tigris and Euphrates areas and spread to other areas or was developed about the same time by Egyptians and other Mediterranean peoples. It also seems to have existed in China and Africa as well. As the Romans moved out through Europe they took their manufacturing techniques with them including brick making.

The other part of the masonry equation is the development of mortar, originally mud, then sand and lime and most recently Portland Cement and lime to hold the bricks apart. That's right, to hold them apart and not stick them together, although it does serve in some senses to seal the gap between the bricks. The common element with a moulded clay brick is that the size is always somewhat imprecise and when stacked up they do not meet flush hence the mortar to take up the differences.

The final part of the equation was the installation of the brick. As old professions go, laying brick is probably second only to Early brick work was likely far less precise than we have come to expect today. However early bricklayers or masons became the master builders of the medieval period, constructing the wonders of the world: castles, city walls and of course the magnificent cathedrals of Europe. Masonry, using primarily brick, has been found in virtually every part of the world, in some cases as a back up material which was mudded over and in other cases as a facing material. Its fireproof properties led to its use in fireplaces and chimneys. It even served as sewers as we can see in this slide taken of the early sewers under the cobblestones of old Montreal. Such has been the brick industry for 40 centuries.

BRICK IN THIS CENTURY

As with most other industries, the industrial revolution added considerable machinery to the brick-making process. In addition to various grinders, the forming methods were mechanized primarily with presses and pugmill extruders. Kilns became permanent structures whether updraft rectangular type kilns or down draft beehive or rectangular type periodic kilns. However at the beginning of this century, brick was still primarily limited to shades of red or brown with the odd buff available. Pressing and extrusion were replacing the soft mud process but most brick was still made locally. For example in the Medicine Hat area with a population of under 10,000 people in the period between 1900 and the first world war there were five or more brick operations going at the same time. Bricklayers were a common trade and any form of substantial construction involved multiple wythes of brick, usually a minimum two wythes and adding one wythe at the base for every additional story.

Gradually, in the period between the two wars, hollow clay tile began to replace the inner wythes of brick. However the wall was still typically a massive masonry composite wall. In the post war period changes began to happen more rapidly. Concrete block began to replace hollow clay tile due to the widespread availability of Portland cement and aggregate and the low level of technology that as required. However the walls were constructed much in the same way with clay brick facing concrete block backup. The variations on a theme began with single wythe concrete block walls becoming more widely used for industrial type buildings and cavity walls becoming more popular. Each new innovation however brought its own problems as cavity walls then required ties to join the two wythes together and tie design became a serious consideration.

On the manufacturing side some plants began to modernize by building tunnel kilns and those plants which were still using periodic kilns were shutting down by the early sixties. By the mid-sixties in Alberta, for example, there were only 4 brick operations still running whereas 75 brickyards had existed throughout Alberta in the early years of the century. The sixties also saw an explosion of the availability of colours and surface treatments ranging from whites to buffs to pinks, and flashed ranges and simulated antique brick. Research into durability issues resulted in manufacturing standards which set requirements for strength, absorption, etc.

During this period brick was evolving from a structural building product to primarily a facing product. At the same time, in the sixties and seventies, technological change was impacting the market for brick. Probably the most significant impact in terms of total volume was the introduction of the prefabricated metal fireplace which replaced literally thousands of brick on every house. Not only was it an issue of the fireplace but of course the chimney. Whereas at one time every house of any size had a fireplace and chimney built of brick, by the early eighties this had virtually disappeared on the prairies. The spinoff effect was that once the mason was no longer required to build a fireplace, brick was often dropped from the outside of the house as well.

BRICK TODAY

In 1980 I-XL manufactured approximately 90 million brick per year. In the 1990's I-XL manufactures 30 million brick. Going into the 1980's the typical brick plant in North America was designed to make 20 million brick with its tunnel kiln and extruder and hand setting and unloading. By the early 90's most new plants ranged in capacity from 60 million to 120 million with highly automated setting and unloading equipment. Currently the most recent plants even have such innovations such as robots replacing setting machines and the water seal kiln designed by Ceric. This water seal kiln provides virtually perfect atmospheric control inside the tunnel kiln.

The number of companies across North America has dwindled rapidly in the eighties and nineties as corporate consolidations have been taking place at rapid rate. The typical owner-operated plant has been giving way to multi-national corporations and today the largest brick making corporations in North America are Boral of Australia, Jannock of Toronto, the Redlands group of the United Kingdom and Acme Brick of Texas. For example, compared to I-XL's capacity of 100 million brick/year, these corporations count capacity in the 1 to 2 billion brick range. In this mature industry, manufacturing has been optimized in two different directions. There are the high volume commodity plants making one size of brick with one clay body and different face coatings to achieve the lowest possible cost, typically found in high brick use markets such as southern Ontario, the Carolinas and Texas. In western North America, plants have had to remain flexible and provide a very wide range of colours, sizes, and textures in order to meet the requirements of both residential and far flung commercial markets. I-XL is one such specialized manufacturer as we probably offer the widest range of sizes, colours, and textures in 2

different manufactured methods of any company in North America and yet it only adds up to 30 million brick.

BRICK IN THE NEXT MILLENNIUM

Well I finally got to the next century and millennium. Marketing not manufacturing is the challenge of the next century. As wall systems have become more complicated due to building science requirements and architectural designs, masonry has suffered due to its fragmented marketing approach. Whereas the steel building people and design-builders offer complete installed packages, brick and masonry generally continue to be marketed in the traditional fashion: a brick salesman might talk to an architect if he knows about the job. The architect, if they are familiar with masonry, might draw it as brick but due to a low comfort level with the technology of brick he will probably leave the actual wall design to an engineer. When the specification comes out a masonry contractor will look at the drawings (or not) and estimate what the project price should be and then arm wrestle with the manufacturers of the various components for prices and availability. In the end, with the high labour component that site installation requires and the vagaries of multi-component supply, the entire wall assembly depends on a skilled bricklayer to put it together. As we know all trades are becoming in short supply and bricklayers even more so due to the outdoor nature of the work as well as its low tech image. Recruitment into bricklaying is becoming a major problem as high school graduates prefer sexy computer oriented trades.

If I could predict the future, I would have all my money in the stock market instead of in a sock under my bed. Certainly, based on current trends, the future of brick is at best flat, at worse declining. In an era where architects have lost control of the building process, where first costs dominate everything, where schools and other institutional buildings are being tendered out to the lowest cost design builder and people are more concerned about the colour of paint in their kitchen which they can change on a whim than the exterior of their house, brick has a tough row to hoe. And yet when you boil it down, if I offered the market today a brand new product that used commonly available materials and not scarce petrochemicals, a product that was sound-resistant, fire-proof, had permanent natural colours, a product which could be site adjusted to all of the tolerances of the preceding trades and idiosyncrasy of the design, you would tell me such a product is impossible, such a product could not exist. The marketing challenge is to get that concept across. So brick in the 21st century will depend on whether the marketing departments of the brick companies can convince a distracted and techno orientated public that the product that has lasted for millenia is still the best product for the exterior of a building. On the design and installation we have to develop ways to deliver the system more painlessly. A designer or owner should be able to call for a brick exterior, pick the colour and everything else should flow seamlessly.

We have to tune up our training system. Why does it take longer to train a brick layer than a /47 pilot? Answer me that. In the good old days, you had trained bricklayers building the leads and a gang of cowboys with trowels laying brick to the line.

The marketing challenge also involves proving the life cycle cost and putting into codes the advantages of masonry: its durability, fire resistance and sound resistance. At a time when the proponents of sprinklered buildings and equivalencies claim that construction does not need to be fire-proof, I challenge them to consider their own children in the 2 or 3% of those buildings where the fire suppression techniques fail.

Brick in the 21st century will likely be manufactured in time honoured ways with the most modern of equipment gradually replacing older plants. However these plants will likely be further optimized to either high volume low cost styles or high flexibility, short product run, quick turnaround styles.

There is a revival of the periodic interest in the single wythe housing concept. In this system the single wythe of hollow clay brick is built up first and then the house is completed on the inside.

Panels and prefabrication are another area of ongoing development. I-XL has been installing prefabricated hollow clay brick fence panels systems since the early 80's. This has the advantage of construction under shop conditions despite the weather. In the spring, the panels are delivered to site and erected. This system works mainly for a repeatable design such as a fence or potentially large buildings. The concept of precast panels with brick facing has been tried numerous times and certainly has its application. Buildings were built this way in many locations throughout western Canada particularly in the 80's. Again where a large area is to be covered with a repetitious design, building the panels in the shop can speed erection time and improve installed product quality. These panels can either be laid in place to a jig or cast complete with poured concrete backing and even insulation and finish.

The ultimate extension of this is the thin brick otherwise known as brick slice or slip. One of the fastest growing building products in North America is artificial stone. Moulds prepared from actual stones are then used to cast concrete units. The units are applied with mortar to a mesh backing. If this is adequate for a cast concrete unit why not for a clay unit? Various alignment systems have been developed for these thin brick including plastic and foam systems, metal systems, concrete systems and the old stand-by, using a rope. There is also the inventor's dream, the lego brick system and various inventors are always trying to improve on the age old process with keys, pins, rods, etc.

In conclusion, the brick industry will stand or fall by the acceptability of its cornerstone product, the clay brick laid in mortar with all of its advantages and disadvantages. The product itself has been refined over millennia and despite the fact of man on the moon, of email, of Sally the sheep, people still have to live and work in buildings that are comfortable, safe, durable and aesthetically pleasing. At a time when people have built their houses of sticks and are now considering houses of straw, bring back the smart little pig.

