“The History of Stucco
By Dennis Rose”
The History of Stucco
From Ancient Times

- The term *Plaster* has roots in Old English, Greek and Latin and means “to coat, dab on or cover with a dressing.”
- *Stucco* is an exterior plaster for structures.
- Stucco has been in use over 9000 years.
The Earliest Stucco Materials

- Roman and Egyptian Stucco, for example, was extremely durable and waterproof.
- Ancient stucco chemistry relied on chemical bonds in addition to hydration and was, in many ways, a far superior material to modern stucco.
MODERN STUCCO:
Portland CEMENT + AGGREGATES + WATER

- DURABLE
- SANITARY
- FIRE RESISTANT
- LOW MAINTENANCE
- LOW COST
- EASILY MADE
- ATTRACTIVE
- PLASTIC WHEN FIRST MIXED
What is Portland Cement?

A fine gray powder that reacts with water to bind aggregates; it is manufactured by grinding to a powder a mixture of iron ore, shale or clay, & limestone; the powder is then baked in a kiln to dry completely; after drying, the product is packaged for shipment.
Portland cement owes both its name and origin to Joseph Aspdin, a British stone mason.

Aspdin's quest for a manufactured counterpart to natural or Roman cement - a crude formulation of lime and volcanic ash used as early as 27 BC - led to his discovery and patent of Portland cement in 1824.

Aspdin heated a mixture of finely powdered limestone and clay in a small furnace to produce hydraulic cement - one that would harden with the addition of water.

He named his invention “Portland cement” not only to distinguish it from Roman cement, but also as a marketing tool.

Concrete made from his new cement resembled a highly prized building stone quarried on the Isle of Portland off the British coast.
Rotary Kiln

Sources of $\text{Al}_2\text{O}_3$ and $\text{SiO}_3$

Sources of $\text{CaO}$

Sources of $\text{Fe}_2\text{O}_3$

Temperature °F

Drying
Bound water lost
Limestone converted to lime
Fusion of mix
Crystallization

Stage

Temperature

212
1380
1800
2650
2370

cooling

Slate, Shale or Clay

Iron Ore or Pyrite

Chalk, Oyster Shell, Marble or Limestone

Shale or Clay

Sources of $\text{Al}_2\text{O}_3$ and $\text{SiO}_3$
Primary Components of Cement

SiO$_2$ .................................................. 17-27%
Al$_2$O$_3$ ................................................ 3-10%
Fe$_2$O$_3$ ................................................ 0-7%
CaO ................................................... 57-70%
MgO .................................................... 0-5%
SO$_3$ .................................................. 1-2.5%
Loss On Ignition .................................... 0.5-4%
Insoluble Residue .................................. 0-1%
With the addition of a small amount of gypsum, the Portland cement is ready for shipment to concrete producers and then to construction sites.
PORTLAND CEMENT STUCCO

- Portland cement stucco is also called **Hard Coat Stucco, One Coat Stucco** or **Traditional Stucco**

- Historically, Hard Coat Stucco is applied in three separate coats; each coat is permitted to cure for up to two weeks; final thickness averaged from 3/4 to 2 inches

- Stucco application has evolved to save time, labor and material; the process and blend is called **One Coat Stucco**
Chemical Formulas: Limes & Limestone

- **CaO**
  Calcium Oxide or Quick Lime

- **CaO.H₂O** also **Ca(OH)₂**
  Hydrated Lime
  Mason’s Lime, Slaked Lime, Agricultural Lime

- **CaO.CO₂** also **CaCO₃**
  Calcium Carbonate
  Limestone, Chalk, Marble, Tums, Oyster Shell
TWO TYPES OF STUCCO CLADDING

TRADITIONAL HARD COAT STUCCO or One Coat Stucco

- Portland cement based
- Does not use a layer of foam insulation, except for trim bands
- May be covered by a synthetic finish, paint or plaster.

SYNTHETIC STUCCO

EIFS (Exterior Insulated Finish Systems)

- May be Portland cement based
- Uses a layer of rigid foam insulation board
- Covered with a synthetic finish
ONE COAT STUCCO: **OCS**

- Custom blend of Portland cement, sand, extenders, fiber reinforcement & modifiers
- Designed to save material by functioning as an exterior cladding in thicknesses ranging from 3/8" to 1-1/2"
- Designed to save time & labor by reducing the time required between trowel passes from weeks to only days or perhaps hours.
Stucco Product Types

Field Mix Design
- Applicator secures Portland cement, sand, & perhaps lime or pulverized limestone & water
- Manufacturer may supply optional fibers & liquid modifier
- *Total Wall Liquid Acrylic additive and bagged fibers*

Bagged Concentrate
- Manufacturer supplies dry mix in bag containing Portland cement, fibers, lime, limestone, & modifiers
- Optional liquid modifier available from manufacturer
- Applicator secures sand & water
- *Total One Coat Concentrate*

Bagged Pre-sanded Design
- Manufacturer supplies all dry ingredients in bag
- Optional liquid modifier available from manufacturer
- Applicator only supply water
- Sometimes, a dry modifier may be in bag, eliminating liquid option
- *Total One Coat Pre-Sanded*
TYPICAL FIELD MIX SITE
MODERN STUCCO OVER WOOD FRAME AND SHEATHING
MODERN STUCCO ON A CONCRETE HIGH RISE STRUCTURE