"Drafting an Understanding of Densified and Polished Concrete" *(ICC03E)*

Presentation Notes

Slide 1: Title Slide

This is a presentation on "Drafting an Understanding of Densified and Polished Concrete" course number ICC03E provided by Curecrete Distribution, the manufacturer of the Ashford Formula and RetroPlate System. It is valid for 1 AIA Continuing Education credit hour.

Slide 2: Course Description

This course will provide an understanding of the benefits and limitations of chemically densified and mechanically refined polished concrete. You will learn how to recognize how specifications influence the final outcome. We will conclude by discussing environments and industries conducive to densified and polished concrete.

Slide 3: Learning Objectives

Upon completion of this course, the design professional will be able to:

- Explain the densifying and polishing process and differentiate it from traditional floor coatings
- Differentiate polishing/grinding techniques and their sustainable factors
- Identify the sustainable attributes of concrete in terms of materials, indoor air quality, and energy savings and how this can contribute to earning LEED certification
- Explain the role of densified and polished concrete in passive solar design
- Identify the benefits of densified and polished concrete floors in terms of design flexibility, maintenance, energy savings, and occupant health

Slide 4: What is concrete?

What is concrete?

Take a little bit of rock, sand and water, add some cement and you've produced just about the most natural flooring and building product available. What was good enough for the Romans over 200 years ago is still good enough for us today.

Concrete is a mixture of portland cement, course aggregate, sand, water, and about 2% air. Focus will be on the most standard flooring mix design – ASTM C150 Type I portland cement.

It is important to be aware of all negative ramifications of including additives to a mix when densifying and polishing. Admixtures benefits range from improving strength, workability and cure time, to enhancing waterproofing properties of the concrete. For polished concrete it is important not to include air entrainment, and to minimize the amount of fly ash replacement for cement. You can't polish air,

and fly ash extends the strength gain out to as much as 90 days, in addition to altering the color and having reduced workability.

Slide 5: What are the considerations when specifying concrete?

What are the considerations when specifying concrete?

Well first, you need to consider whether it will be exterior or interior placement. Although we will be focusing on densified and polished floors, you might want to take note that the project in the exterior photograph had the walls densified with a modified sodium silicate prior to being placed.

It is also important to consider how the final floor be utilized. Will it be subjected to heavy foot traffic, or forklift traffic, and also how the floor will be cleaned and maintained?

Slide 6: What are the considerations when specifying concrete?

Are you adding color – either pre or post cure? Will you be chemically densifying, with or without burnishing or mechanically refined polishing? It is important to remember that there is a difference between only steel troweling and densifying, versus mechanical refinement of the concrete, which involves polishing with diamonds.

Slide 7: The Shortfalls of Concrete Hydration and the Need for Chemical Densifiers

The shortfalls of concrete hydration and the need for chemical densifiers.

Here you are looking at the physical attributes of concrete magnified 2500 times through an electron microscope. Slide 1 on left shows cured concrete prior to the addition of a modified sodium silicate densifier. Slide 2 on right shows cured concrete following densification with the addition of a modified sodium silicate densifier. Note the tightness and uniformity of the cured, densified concrete.

Slide 8: Silicates vs. Siliconates

Silicates vs. Siliconates.

Both silicate and siliconates are used to densify the concrete prior to polishing. Silicates are recommended because of their complete inorganic chemistry, and the three-dimensional crystals they form. Siliconates may be slightly more resistant to water penetration in the early months, but not over the long term because they tend to oxidize or traffic off. They are also partially organic and are not as reactive.

Slide 9: Comparison of Silicates vs. Colloidal Silica

Comparison of silicates vs. colloidal silica.

Standard silicate-based densifiers are commonly attached to sodium, potassium or lithium atoms. During the chemical interaction, the silicate reacts with the calcium hydroxide (CH) to form calcium silicate hydrates (CSH), which are the binding agent in concrete. Standard silicate-based densifiers are

worked-in with a broom in order to break surface tension and penetrate the pores and voids in the surface.

The main characteristics of this chemical reaction are:

- That it increases the strength of the concrete;
- It minimizes or eliminates dusting
- It decreases the porosity of the concrete as crystallization occurs within the pores
- And it increases the repellency of the concrete.

Silicate-based densifiers will be beneficial to a polished concrete floor as long as they are properly applied. This means that they are applied with a sufficient amount of densifier to provide adequate coverage and penetration, guaranteeing a complete reaction with the calcium hydroxide (CH). 200 square feet per gallon is recommended.

The chemical densifier needs to be formulated with enough solids to provide sufficient reaction with the open pores of a ground and polished floor.

Comparison of silicates vs. colloidal silica:

- Colloidal silica does not have to attach itself to a sodium, potassium or lithium atom to be carried into the concrete;
- Colloidal silica is a nearly pure version of silica;
- Colloidal silica is generally recommended by the manufacturers to be applied by a microfiber at 400-500 square feet per gallon.

The main characteristics of colloidal silica are:

- That they attach themselves to the concrete as opposed to having a chemical reaction;
- They do not have the ability to create a crystallization which will grow and close the pores and increase repellency.

Slide 10: What Exactly is Densified Concrete?

What exactly is densified concrete?

Densified concrete is the marriage of concrete densification and portland cement-based concrete which can be finished either by simple or hard steel troweling or burnishing. The top cream or paste is not removed.

The original densifiers were formulated to work with hard steel troweled concrete floors. They interact with the tightly consolidated “cap” of a steel troweled floor, interacting with unreacted calcium hydroxide (CH) in the near surface area. They allow for the crystallization and increased repellency of the surface, along with delivering a virtually dust free and stronger floor.

Chemical densifiers are usually specified on exposed concrete floors that have been hard steel troweled, and potentially burnished. Typical facilities to receive densifiers include warehouses, distribution centers, manufacturing plants, stadiums and convention centers.

Without a densifier they do not develop a sheen that occurs due to the increase surface hardness that occurs from the densification. Densifiers make the floor much harder, so that rather than eroding with traffic, the floor develops an attractive sheen.

Slide 11: Why Do You Specify Densified Concrete?

Why do you specify densified concrete?

Densifying agents not only lock up the free calcium hydroxide (CH) and create a harder floor, but this chemical reaction eliminates the tendency for concrete floors to degrade or dust. Ultimately the densification produces a harder floor with higher sheen, increased repellency, and virtual elimination of dusting.

Slides 12-13: Densified Concrete in Use

These are good examples of densified concrete in use. These photographs illustrate the benefits of densified concrete. Notice that the surface is free of dust and very easy to clean. It has also developed an attractive sheen from traffic and use. It is a very dense, hard surface.

Slide 14: How to Produce Densified and Polished Concrete?

How to produce densified and polished concrete?

In 1996, an established densifier manufacturer created a hybrid sodium silicate densifier and married the concept of densifying with diamond grinding and polishing to create the polished concrete industry.

Concrete densification, or internal crystallization, is the chemical reaction that occurs when the densifier reacts with the calcium hydroxide (CH) from the cement component of the concrete, creating calcium silicate hydrates (CSH). These are the binding agents within the concrete.

The initial step(s) are to grind the floor with specialized 3 or 4-headed grinding machines and industrial diamonds. Following the grinding (and possibly acid stain or solvent-based dyes), the densifier is applied. The grinding and polishing may be achieved wet, dry or a combination of wet/dry.

Examples of diamond tooling include:

- In the upper-right: a resin matrix
- In the lower-right: a ceramic hybrid;
- And in the upper-left: a metal.

Slide 15: How Densified and Polished Concrete Works

How densified and polished concrete works.

As the densifier is worked into the floor surface, it is drawn down into the floor through capillary action.

The grinding and polishing process is not a new concept. Terrazzo and stone (like marble, granite, and other stones) have been polished for years by using diamonds to scratch the floor. The lower grit diamond discs leave heavier scratches that are removed by the successive higher grit scratches until these scratches are not visible to the naked eye and leave a highly polished surface.

Marble, granite, and other stones are much harder than concrete. Therefore, in order to get the concrete floor to polish properly, with long-term results, it is imperative to use a quality densifier/hardener. The harder the floor, the more likely it is for these very small diamond polishing scratches to stay in the floor and not traffic off. The densifier is the most important variable in the concrete polishing process.

Slide 16: Benefits of Polished Concrete

Benefits of polished concrete.

Polished concrete, when chemically densified and mechanically refined produces, a natural floor that delivers aesthetics, performance and life-cycle cost savings.

Slide 17: Benefits of Polished Concrete

Concrete polishing is the marriage of concrete densification and diamond grinding and polishing.

The polishing process is a natural evolution from densifying, being just a finishing step in the initial stage of construction, to turning concrete, both existing and new, into an outstanding, high-performance floor finish, with the lowest 10-year life cycle cost of any coating or covering available.

Note the difference in appearance between the two areas of the slab. One area is steel troweled only. The other has been densified and polished.

Slide 18: Benefits of Polished Concrete

Benefits of polished concrete.

It is important to note the performance criteria:

- Increased reflectivity: 30% and beyond depending on the level of polish and tightness of the concrete;
- Increased impact resistance up to 21%;
- Polished concrete also meets ANSI standards for non-slipperiness - up to 800 grit
- Polished concrete has been shown to increase abrasion resistance up to 400%

There are a number of recognized manufacturers of silicates and/or siliconate blends. It is important to request third party verification of each product to qualify the manufacturer claims. These results can only be achieved by one particular concrete polishing system. Request independent testing from a manufacturer prior to writing your performance-based specifications for concrete polishing.

Slide 19: Standardization for Polished Concrete

Standardization for polished concrete.

The CPAA stands for the Concrete Polishing Association of America. The industry organization of professional tradesmen, along with supporting manufacturers, has created a uniform specification designation for polished concrete. The focus is on consistency and clarity, for both specifications and appearance. These slides are showing different exposure levels for polished concrete.

Slide 20: What are your Color Options?

What are your color options with polished concrete? Are you adding color either pre or post cure? Will you be chemically densifying, with or without burnishing or mechanically polishing the floor?

Integral Color:

Polished concrete can be integrally colored as in this store. With integral color there are no limitations of the color of the floor. The pigment is mixed in with the concrete at the time of batching. The color is also throughout the entire slab, therefore, if the floor is ever damaged, it is easier to repair, without losing the original color, or having to blend in a color. Integral color is the most consistent and uniform option for coloring a concrete floor.

Dry Shake Hardeners:

Dry shake hardeners are cement rich treatments that are applied onto the top of a poured and troweled floor. They rely on the bleed water from the concrete to bind them to the concrete slab surface. A cement-rich, dry, topical hardener is applied evenly to a fresh, troweled new slab. The water from the slab reacts with the hardener to create a hard, dense surface. Flatness is important, as you would quickly cut through the dry shake when polishing if you had high spots in the floor

Slide 21: Acid Stain

Acid stain.

Both of these floors received the exact same acid stain. The floor on the left had acid stained applied to bare concrete, and then received an acrylic coating. As you can see, the sealer failed and the acid stain wore off. The floor on the right is a 2-year old Mexican restaurant that received a densified and polished finish.

The increased abrasion resistance provided by the densification of the polished concrete provides the acid stain with protection from wear. Polished concrete will protect both acid stains and dyes from being "walked off".

Slide 22: St. Peter's Hospital 2002/2003 - 2015

St. Peter's Hospital.

The photographs on this and the next slide show a wonderful example of the ability of a properly densified floor to protect, not only the concrete, but also the acid stain reacted colors. No topical protection – and it stands up beautifully 12 years later.

Polished concrete works well in healthcare facilities because it does not support the growth of mold, mildew, allergens or dust mites, and it has a dust-free surface.

Slide 23: Todd Beamer High School

Todd Beamer High School.

Here is a comparison between 2003 when the floor was originally treated, and 2015. Twelve (12) years later, the concrete is still performing.

Slide 24: Dyes

Dyes.

Polished concrete can be colored with specialty dyes, which have been formulated for use with polished concrete. A vast spectrum of colors is available. Due to the translucent qualities of the dyes, the color of your concrete will affect your final perception of color. Dyes are exclusively utilized on interior projects where UV exposure is not present.

Slide 25: Cementitious Terrazzo and Integral Color

Cementitious terrazzo and integral color.

Polished concrete can be used on cementitious terrazzo as in this automobile dealer showroom shown where 20 year old cementitious terrazzo is able to breathe and shine again. In the past terrazzo was traditionally waxed and buffed to maintain the shine and protection. Grinding, densifying and polishing allows you to uncover the natural shine, color and clarity of a cementitious terrazzo. It eliminates the ongoing high cost of maintenance associated with waxing, stripping and buffing. Grinding, densifying and polishing is the long-term solution for terrazzo floors - both old and new.

Slide 26: Broadcast Aggregate or Glass and Integral Color

Broadcast aggregate or glass and integral color.

The appearance of a terrazzo floor can be achieved by broadcasting aggregate or glass into the surface of the newly poured slab. The contractor then performs heavy grinding steps to expose the aggregate or glass in a relatively uniform and terrazzo-like appearance.

Two examples are:

- Upper left: the Whole Foods in Toronto cast with large aggregate;
- On the lower-right: Russellville High School in Arkansas cast with black and red glass.

Slide 27: Options: Stencils and Engraving

Polished concrete floors are one of the most environmentally sound flooring options available today. They exemplify modern sustainable building and are becoming the "norm" for flooring in certain aspects of modern design and construction. They can be designed for rugged industrial use or to add sophistication and beauty in commercial and residential design.

Slide 28: Options: Radiant Heat

Radiant heat.

Polished concrete floors be designed with radiant heat, either electric or PEX tubing, natural, dyed or with acid stains.

Slide 29: Limitations of Densified and Polished Concrete

Limitations of densified or polished concrete.

As you look at this photograph you can see the light reflectivity created from the densification process, but you also note that without removing the laitance and opening up the floor by grinding, the visual appearance of the floor will be very mottled and irregular.

Acid resistance is another weakness. Densified or polished concrete is still concrete, and it is therefore susceptible to the effects of acid.

Densified or polished concrete is also not elastomeric, so it will not span cracks.

It will also not hide variations in the concrete color.

Slide 30: Limitations of Coatings/Coverings

Limitations of coatings and coverings.

In the past, coatings have been used to compensate for the limitations of concrete. However, coatings create an expensive ongoing maintenance program and are affected by vapor drive and pH. This is not the case with polished concrete.

Additional problems or concerns that you might experience with coatings:

- They scratch peel or chip;
- Their bond is affected by moisture;
- They are susceptible to heavy tire marking;
- They are expensive to maintain because they need to be replaced every 2-3 years;
- And they contain solvents which create an environmental concern.

Slide 31: Problems from Poor Finishing/Protection

Problems associated with poor finishing and protection.

It is necessary that all trades understand when a concrete slab is to be densified or polished as the final floor. These photographs highlight only the beginning of potential hurdles to delivering a consistent, attractive appearance.

Slide 32: Writing Proper Specifications

Writing proper specifications.

Use CSI Master Format for well written specifications.

Densified concrete is normally called out in section:

- 03 35 00 Concrete Finishing

Colored concrete and polished concrete are called out in sections:

- 03 35 43 Polished Concrete Finishing
- 03 35 43.13 Polished and Dyed Concrete Finishing
- 03 35 43.16 Polished and Stained Concrete Finishing; or
- 09 61 19 Concrete Floor Staining

Make sure that the specification is written to ensure consistency and accountability. Make sure everyone understands the specification, from office to field, and that everyone buys off on the need to follow the specifications.

Know the ramifications of changes. Everyone also needs to understand the elements of the specification that cannot be changed.

Slides 33-34: Where Polished Concrete can be Specified

Where polished concrete can be specified.

The versatility of polished concrete allows it to be specified in numerous industries. The leading concrete polishing system has been applied to well over 250,000,000 square feet. Although concrete polishing is a relatively new flooring option, it is not without precedent.

These photographs demonstrate some of the industries that are well-suited for concrete polishing: automotive, retail, schools, warehousing and distribution, convention centers and arenas, restaurants, hospitals, and even residential.

Slide 35: Sustainability and LEED

Sustainability and LEED.

This is the daVinci Arts Middle School, High-Performance Classroom Building in Portland, Oregon. It was the first public school building to achieve LEED Platinum and Net Zero classifications.

What is sustainability? In ecology, sustainability is how biological systems remain diverse and productive. Long-lived and healthy wetlands and forests are examples of sustainable biological systems. In more general terms, sustainability is the endurance of systems and processes.

Sustainability in the building environment is often associated with design or sustainable operations. In practice, it can mean several things, including that the design team considered the environmental, social, and financial impacts of their product specifications.

Another common point of reference when talking about sustainability in buildings, is the US Green Building Council, or LEED Green Building rating system that they author.

Slide 36: LEED as the Yardstick

LEED as the yardstick.

LEED, an acronym that stands for Leadership in Energy and Environmental Design, is a green building certification program that recognizes new and existing buildings which achieve dozens of individual strategies, or credits, such as providing alternative transportation amenities or reducing irrigation water use.

LEED assigns a point value to each one of these credits, which encourages project teams to strive for increasingly sustainable buildings, while recognizing that some aspects of buildings (such as energy use) are more important than others, such as bicycle parking.

At the end of the project, all the points are added together to determine the final certification level, from LEED Certified at 40 points, all the way up to LEED Platinum at 80 points – out of a 100 base-point system (110 total points, counting the 10 available bonus points).

Slide 37: Sustainability Benefits of Densified Concrete and Polished Floors

Sustainability of densified concrete and polished floors.

- Energy cost savings;
- Reduce life-cycle impacts;
- No off-gassing;

- Improved thermal comfort; and
- Increased daylighting.

Slide 38: Take the (LEED) Credit! (Minimum Energy & Optimize Energy)

Exposed concrete flooring can enable effective use of the thermal mass properties of the concrete, helping to stabilize indoor temperatures throughout the year. This allows the space to remain thermally comfortable through a wider range of outdoor conditions, and reducing the energy needs to maintain comfort when heating and cooling is required. Effective use of thermal massing strategies can even allow the use of smaller heating and cooling systems, yielding first cost savings in addition to ongoing reductions in energy use.

Slide 39: Take the (LEED) Credit! (Building Life-Cycle Impact Reduction)

Use of densified concrete flooring can breathe new life into existing concrete floors retained as part of a building reuse project

- Option 1: Historic Building Reuse;
- Option 2: Renovation of Abandoned or Blighted Buildings;
- Option 3: Building and Material Reuse and extend their useful life.

Additionally, new construction projects pursuing this credit using a whole-building life cycle assessment may be able to take credit based on the improved life cycle performance of densified concrete floors through an extended useful service life and improved performance.

Note the sustainability of the floors in these photos from 2002/2003 all the way up to 2015.

Slide 40: Take the (LEED) Credit! (Low Emitting Materials)

Concrete floors that contain no integral organic-based surface coatings, binders, or sealants are considered inherently non-emitting sources, and automatically comply with the Low-Emitting Materials credit requirements.

Concrete densifiers are completely water-based and do not contain solvents.

Slide 41: Take the (LEED) Credit! (Thermal Comfort)

Projects that use exposed concrete flooring benefit from reduced temperature swings and increased occupant comfort due to the thermal mass.

Slide 42: Take the (LEED) Credit! (Daylight)

Indoor spaces with highly reflective floors, such as densified-polished concrete, allow for increased daylight penetration deeper into the space throughout the life of the building.

Slide 43: Joints: The Effect on your Finished Floor Performance and Appearance (1)

Joints: The effect on your finished floor performance and appearance.

The primary purpose of saw cut or control joints is to transfer the load across control joints from one slab to the next.

The primary purpose of joint fillers is to support the sidewalls of the joints, and to minimize cracking and wear, due to foot or rolling traffic on the concrete slab.

The secondary purpose of joint fillers is to mitigate moisture migration, keep debris from building up and to protect adjacent slabs.

Compression, adhesion and elongation determine successful joint filling. The depth of the saw cut is generally ¼ the thickness of the slab. For the majority of densified concrete projects, polyurea is the standard joint filling material specified.

The recommended cure time of the slab prior to filling joints is one year. So when a contractor is told to install the joint filler prior to that time frame, which is generally the case, they should not be penalized when the need for joint replacement occurs down the road, due to natural shrinkage of the slab.

Slide 44: Joints: The Effect on your Finished Floor Performance and Appearance (2)

Joints: The effect on your finished floor performance and appearance.

The primary purpose of saw cut or contraction joints is to help direct the placement of the cracks that will naturally occur during curing. The photo on the right is of an actual crack formation in the curing of a slab, and as you can see, it is directly below the control joint.

Slide 45: Joints: The Effect on your Finished Floor Performance and Appearance (3)

Joints: The effect on your finished floor performance and appearance.

Typical steps in placing joints are to:

- Place the backer rod;
- Initiate joint filling with a 2-part, 100% solids polyurea; and
- Shave the finished joint.

Slide 46: Joints: The Effect on your Finished Floor Performance and Appearance (4)

Joints: The effect on your finished floor performance and appearance.

Here is a visual example of joint filling, showing the difference between using a natural gray and an un-tinted polyurea joint filler. The un-tinted tends to draw its apparent color from the color of the sidewalls of the joint.

Here is an example of a joint filling pump that mixes the material in an equal ratio coming out of the nozzle end as a 100% mixed product. This polyurea pump is capable of pumping 10-gallons of material. One tank carries the isocyanate side and the other the polyol side.

A dual plunger handgun can be used to dispense 22 oz cartridges on projects with fewer lineal feet of joints.

Slide 47: Cracks: They Do Not Have to Affect Your Finished Floor Performance and Appearance (1)

Whether a new installation, or an existing one, cracks can be present and it is advantageous, both for performance and aesthetics, to fill before polishing. Polyureas are not normally used for this purpose. Instead, use a rapid-set urethane repair product material.

Slide 48: Cracks: They Do Not Have to Affect Your Finished Floor Performance and Appearance (2)

This slide shows the shaving of the repair material generally 45-60 minutes after installation.

Slide 49: Cracks: They Do Not Have to Affect Your Finished Floor Performance and Appearance (3)

This slide shows the difference in appearance before and after the repair is made.

Slide 50: Create and Understanding of Maintenance

Create an understanding of maintenance.

The pore structure of concrete can create problems with standard detergents. Floors should be cleaned regularly with an auto scrubber. Floors should normally be cleaned at least 3-4 times per week, if not daily. Concrete etches so you may have to add extra protection in areas exposed to acids. Hydroxides and sulfates, which are found in common cleaners, can attack and soften the concrete.

Protectants, often called “guard products,” can often be used to buffer the concrete from the effects of acid.

Slide 51: Create and Understanding of Safety and Maintenance When Specifying

Safety.

When maintained correctly, densified or polished concrete floors have been shown to be one of the safest hard surfaces in regards to safety. They are rated “Acceptable” per ANSI B-101.3.

Maintenance.

Ensure that the requirement for floor protection during construction is discussed and in the specifications. Identify whose responsibility it is to protect the finish once the polishing or densification is completed. Ensure that the end-user understands the need for a maintenance program, along with planned implementation.

Is maintenance handled in-house or is it out-sourced? Meet with the manufacturer of the chemicals, along with the applicator, to establish what type of equipment is required for a successful maintenance program.

Remember that walk-off mats can be used to prevent deposits of salt and dirt – offering greater protection to the concrete.

Slide 52: Proper Maintenance Specifications

Proper maintenance specifications.

When discussing cleaners, the pH level of the cleaner is generally the first topic. It is extremely important to note that the most important relationship between the pH level of the cleaner is its relation to the pH of the floor surface. The concrete surface, after a period of curing and hydration, is generally in a range from 9-10 pH.

This pH level allows one to have cleaner with a pH of 9.5-9.9 that is specifically formulated for densified or polished concrete, and not to have it be detrimental to the floor finish. There should be no sulfates, nor hydroxides in the cleaner, as they attack concrete and can also degrade the sheen.

Slide 53: Cost Per Square Foot of Floor Coverings and Finishes Based on 10-Year Life Cycle

Cost per square foot of floor coverings and finishes based on 10-year life cycle.

Densified or polished concrete, except in extreme examples, will always deliver the lowest life cycle flooring cost of any materials or coverings over a 10-year period. Note that this third-party chart shows that densified concrete and polished concrete have the lowest cost over a 10-year period.

Slide 54: Kimbell Art Museum

Kimbell Art Museum.

One of the best examples in architecture utilizing concrete to reflect indirect lighting into a space is the Kimbell Art Museum designed by Louis I. Kahn. Diffused natural light reflects downward off the curve of the concrete vaults, gently and consistently illuminating the interior. This beautiful design reduces the amount of electrical lighting needed.

Slide 55: Pacific Audi, Torrance, CA

Pacific Audi, Torrance, CA.

This Audi dealership floor positively reflects on the owner's commitment to a clean and safe working environment.

Slide 56: Bennett High School, Salisbury, MD

Bennet High School, Salisbury, MD.

With maintenance budgets shrinking and LEED in the back of the owner's mind, the architect set out to find a flooring solution that fit into LEED requirements, would be aesthetically pleasing, and would require less maintenance than traditional VCT (vinyl composition tile). The solution was to use the existing concrete sub-floor and mechanically process and highly refine the surface to a polish with diamond abrasives for a polished concrete floor.

The consistent large aggregate exposure was achieved by seeding into the pour, and then exposing the aggregate through the use of a heavy grind.

Slide 57: California Academy of Sciences

California Academy of Sciences.

This project received the LEED Platinum award, twice, making it a “double Platinum.” The Academy is one of the largest public Platinum-rated buildings in the world, and is also one of the world’s greenest museums.

Slide 58: Bass Pro Shop

Bass Pro Shop.

Polished and dyed concrete adds a positive feel to the shopping at Bass Pro Shops.

Slide 59: Express Headquarters, Columbus, OH

Express Headquarters, Columbus, OH.

The headquarters for clothing retailer Express, in Columbus, Ohio, won the 2012 Polished Concrete Award in the Commercial category.

Stone tiles and ½-inch of thin-set had to be removed with a shaver in order to get to the bare concrete. The concrete was then ground to expose large river rock, after which a sodium silicate densifier was applied to the concrete surface, and then polished.

Slide 60: Autodesk Offices

Autodesk Offices.

This floor received the LEED Platinum award. The design of Autodesk’s San Francisco offices focused on reusing existing materials and systems. Interior surfaces were kept intact in most locations, with brick walls, concrete columns, ceilings, floors and infrastructure exposed with no new material covering - greatly limiting the total use of new materials in the project.

Slide 61: Child Development Centre

Child Development Centre.

This floor received a LEED Platinum award. It received the highest point total in the world for a cold climate building and is the largest LEED Platinum certified building in Canada. They did not want a high polish, which is why you can see the lighter polish and less shine.

Polished concrete gives the architect and owner limitless options for their floor - from different colors, to different levels of polish, and different levels of grinding and aggregate exposure. Many options create many different looks and add to the myriad of floors where polished concrete can be used.

Slide 62: JCPenney, New York City

A beautiful white, polished and densified floor helps JCPenney to deliver a new feel in its stores.

Slide 63: Sola Panel Fabrication

Solar Panel Fabrication.

This project received a LEED Gold award. 270,000 square feet of polished concrete at this solar manufacturing facility were scheduled to be installed within 45 days on a timeline. Numerous challenges were encountered along the way that created innovative solutions to issues not normally encountered.

Slide 64: Mercadona Home Improvement, Spain

Mercadona Home Improvement, Spain.

This was an old, existing warehouse that was refurbished into a home improvement store. The old warehouse never had its joints filled and they were spalled and destroyed from forklift traffic. Because of this, the joints had to be reconstructed with spall repair material, the joints re-cut and filled with a polyurea joint filler. The old concrete was ground, densified, and polished to give this customer a better-than-new floor.

Slide 65: Grocery Store, Mexico

A good example of plain, gray, polished concrete, used to create a beautiful, easy-to-maintain floor to enhance the customer experience and reduce maintenance costs to the owner.