A VITAL KEY TO INDUSTRY GROWTH IS EDUCATION

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ABSTRACT

North America is one of the most important markets for ceramic tile manufacturers. With the enormous potential for growth, it is vital to develop an educational strategy that supports sales personal at the manufacturing, distribution and retail level which will simultaneously build confidence, trust and knowledge within the professional design community and for the ceramic tile consumer.

Introduced to tile around 1875, America has largely viewed tile as a utilitarian functional building material. Seen in this light we will continue to wage a war based on price even though the field of competitors is growing deeper and victory does not favor advanced manufacturing facilities who invest heavily in Quality, Research and Innovation.

Even the speed of technological change may be working against the industry. New product developments are introduced to the market without adequate sales training leading to inappropriate use, inaccurate system specifications and project failures. Some of our most advanced products have created confusion in the marketplace and allowed lower value tile programs to compete on par by simply adopting a quality moniker.

Our history, evolution, achievements and future goals can be simply and eloquently stated. Although based on highly technical formulas and production techniques, we should endeavor to simplify the language and explain the dramatic physical and aesthetic changes that have been developed over the past twenty five years.

This paper offers one version of a training module. Training, which must start at the manufacturing level and be passed down through all channels to the market. Our industry continues to evolve with startling speed. We are on the threshold of introducing innovative new systems such as the ventilated façade, revolutionary new photo-sensitive glaze formulas, smart tile incorporating Domotic devices and third generation porcelain technologies. Building Professionals and consumers need clarity and our industry needs to provide it. Translating the defining features of quality ceramic tile into layman terms has never been more essential given the diverse variety of product, the wide spectrum of manufacturing precision and the sheer magnitude of global tile production today.

1. KEY ISSUES

- Specific changes in the production process have brought the industry to a place where the homogeneous nature of every body type can be guaranteed and graphically portrayed.
- The four distinct ranges used to classify ceramic bodies according to their level of porosity can be clearly defined and a correlation established regarding the attributes each type offers in their unique and best areas of intended use.
- Porcelain tile – the types and the intended market.
- Awareness of industry test methods and how they can be used to distinguish quality. The most basic test data indicating dimensional limitations can be used as a powerful value argument against untested tile. Without awareness of these defining parameters, value is assessed with little more than visual comparison of single samples.

The homogeneous nature of every body type can be guaranteed and graphically portrayed.

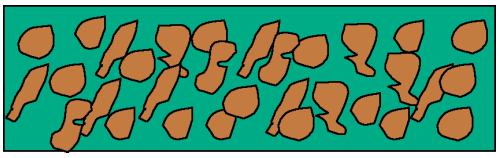


Figure 1

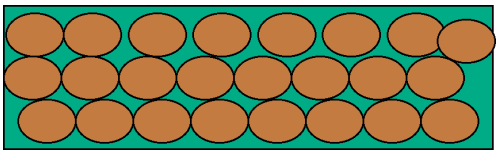
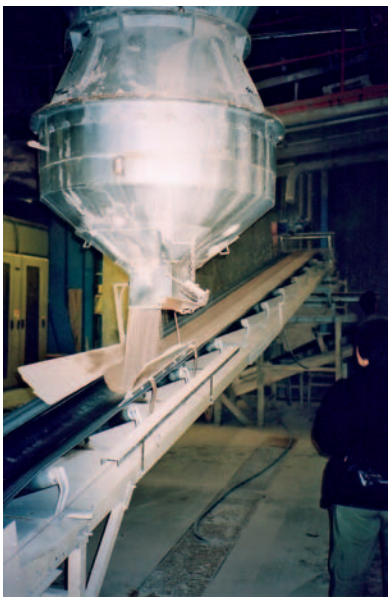


Figure 2

2. A PICTURE IS WORTH A THOUSAND WORDS!

Manufacturers using state of the art technologies such as clay atomization should realize the value of differentiating a process which alleviates a common fear of consumers. "Will my tile crack under load or when I drop something on it?" In the visual explanation shown in Figures 1and 2 consumers easily and quickly see the value of a homogeneous, dense and consistent distribution of raw materials throughout the entire body of a ceramic tile compared to the variation and irregular voids found in non atomized formulas. Removing this fear also creates an argument for using high quality, state of the art product over unreliable low technology, low cost tile.



Atomization changed the shape of the raw materials in ceramic bodies

By adding a graphic representing depicting increasing levels of compression applied at the pressing stage of production, users begin to imagine how progressively denser tiles are created with consecutively tighter pore structures. Several key observations can be made from these drawings:

- Low compression tile use less raw materials than high compression tile.
- Low compression tile use less energy than high compression tile.

- Low compression tile have a more open pore structure and therefore a higher water absorption percentage.

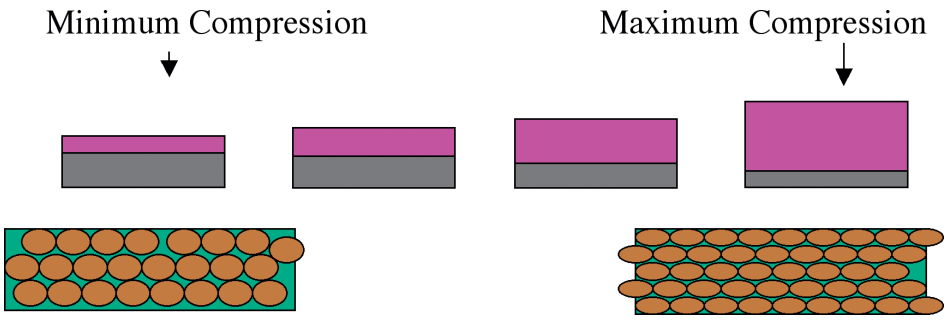
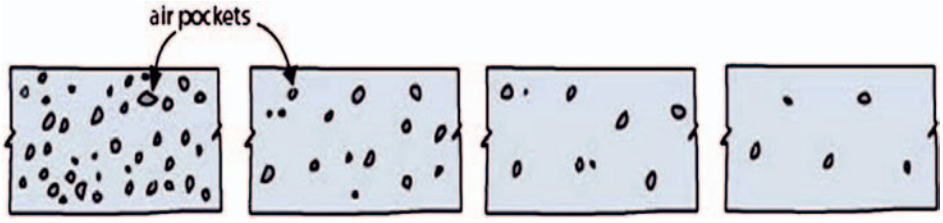


Figure 3

Only one other diagram needs to be added to explain water absorption for each tile type.

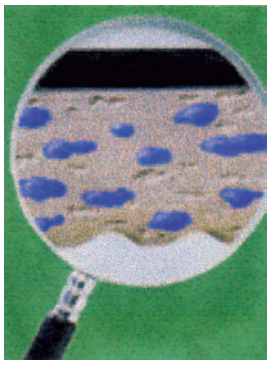


Non Vitreous *Semi-Vitreous* *Vitreous* *Impervious*

Figure 4

3. THE FOUR CERAMIC TILE BODIES AND THEIR AREAS OF BEST USE

Each category has a definable and acceptable range of allowable water absorption. Water absorption percentages provide a reliable rule of thumb for determining where a ceramic tile can be successfully used. The industry should train sales personal to know the definition of each tile and the minute technical details however, marketing to consumers should be greatly simplified.



1. Wall – (Non Vitreous Tile)
2. Floor – interior, dry areas. (Semi-Vitreous Tile)
3. Floor – interior/exterior, occasionally wet areas. (Vitreous Tile)
4. Floor – interior/exterior, areas subjected to constant water or submerged. Tile subjected to vehicular traffic. (Impervious Tile)

A graphic showing the water absorption of each tile category clearly shows the advantages and benefits of selecting a specific body type for each environment. With this level of understanding, it is easy to discuss issues such as: resistance to mold; frost resistance; compressive strength; bond capability or challenges; best cost (material, labor, energy, transportation,) and firing temperature versus stylistic options.

3.1. NON VITREOUS TILE

Figure 5

Feature: Wall tile. Water absorption range = greater than 7%
Benefit: Lower cost.
Benefit: Greater chromatic range.
Benefit: Ease of installation.
Benefit: Economy in installation materials.

- Light weight tile reduces material cost and transportation cost. Lower compression and firing temperatures reduces energy cost. High compression strength is not required for vertical applications allowing for a wide range of clay formulas. Therefore, best economies and value are attained and can be passed on to the consumer by the manufacturer-distributor-retailer.
- Wall tile can be fired at lower temperatures which allow for a wider range of potential glazes in intense, mid-range, pastel and metallic colors.
- Light and easy to cut, wall tile is easier for the mechanic to install.
- The open porosity of a tile with water absorption higher than 7% allows for a wide range of the most economical adhesives. The adhesive easily anchors into the open pore structure of this type of tile enhancing the bond between tile and substrate.

3.2. SEMI VITREOUS TILE

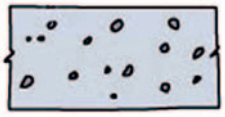


Figure 6

Feature: Floor tile, interior dry area applications. Water absorption range = greater than 3% to 7%.
Benefit: Low cost
Benefit: Wide range of chromatic & textural possibilities.
Benefit: Ease of installation

- A great majority of tile is specified for interior dry area floors such as hallways, kitchens, family rooms, dining rooms, powder rooms and main bath areas. The tile industry engineers this type of body to withstand normal residential traffic and loading while maintaining economies in material, energy and weight.
- A variety of local clay and minerals can be utilized further reducing transportation and environmental costs. Shorter firing cycles and lower firing temperatures allow for a wider range of finishes.
- Light weight, easy to cut with a manual tile cutter and can be installed with a variety of economical adhesives due to the fairly open pore structure.

3.3. VITREOUS TILE

Figure 7

Feature: Floor tile, interior/exterior, occasionally exposed to moisture. Water absorption range = greater than 0.5% to 3%
Benefit: Mold protection
Benefit: Frost resistance
Benefit: High compressive strength

- Installations that may be exposed to periodic water penetration with the opportunity to dry in between benefit from this type of tile because a minimal amount of moisture is absorbed by the tile and subsequent evaporation is quickly attained. Interior applications such as laundry rooms, main bath floors (used by teenagers), conservatory or sun-room floors, covered porches and other areas are prime candidates.
- Tile in this category when tested by the manufacturer for frost resistance can be used on exterior applications where resistance to freeze/thaw cycles is required. Locations exposed to the elements including snow and rain, are typical as long as the substrate is properly sloped and drying cycles are anticipated.
- This body balances high compressive strength with low porosity achieving reliable performance with a level of porosity that allows a wider range of adhesives; reliable bonding capabilities and most tiles in this range can be cut using manual tile cutting tools.

3.4. IMPERVIOUS TILE

Figure 8

Feature: Impervious tile, interior/exterior, areas submerged in water or subjected to vehicular traffic. Water absorption range = from 0% to 0.5%.
Benefit: Mold protection
Benefit: Frost resistance
Benefit: Highest mechanical strength

- Installations that are submerged in water or exposed to repeated moisture penetration with few or rare drying cycles in between require a tile with little to no water absorption in order to prevent accumulation of stagnant water/ moisture. The extremely low porosity of this type of body provides the required protection.
- Extreme thermal fluctuations, repeated freeze thaw cycles and other critical environmental changes that can cause pressure (expansion/contraction) in the tile body are increasingly mitigated by lowering the porosity level of the tile. All tile used in outdoor environments should be tested by the manufacturer to verify their suitability for such applications, regardless of the level of porosity achieved.
- Extremely low porosity levels in tile do not afford easy bonding. Attention and care must be taken to ensure maximum bond using industry recommended techniques such as back buttering with two part polymer enhanced mortars and adhesives.
- High compressive strength and the density of this type of tile make it the perfect choice for extreme loading situations such as: vehicular traffic; wheeled traffic; or heavy pedestrian foot traffic.

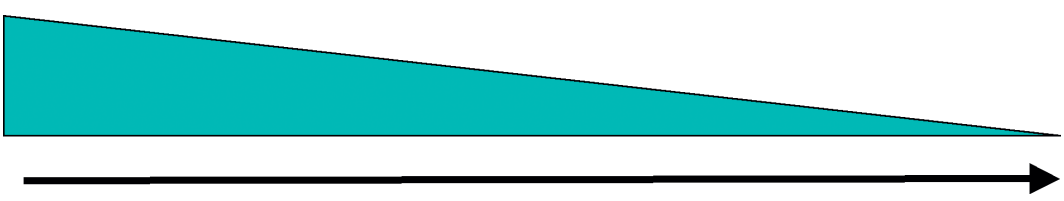


Figure 9

7% WATER ABSORPTION	3% WATER ABSORPTION		WATER ABSORPTION 0%
Lowest material cost	+	+++	+++++ Highest material cost
Lowest energy cost	+	+++	+++++ Highest energy cost
Lowest firing temperature	+	+++	+++++ Highest firing temp.
Lowest transport cost	+	+++	+++++ Highest transport cost
Lowest mechanical strength	+	+++	+++++ Highest mech. strength
Lowest frost resistance	+	+++	+++++ Highest frost resistance
Fastest production	_	_ _ _	_ _ _ _ Slowest production
Wide raw material choice	_	_ _ _	_ _ _ _ Limited choice
Wide chromatic possibilities	_	_ _ _	_ _ _ _ Limited selection
Easily bonded		_ _ _	_ _ _ _ Difficult Bond
Easiest to cut & install	_	_ _ _	_ _ _ _ Most challenging
Widest range of mortars	_	_ _ _	_ _ _ _ Specialty mortars
Fastest to install		_ _ _	_ _ _ _ Back Buttering req'd

4. BALANCE

The sliding scale of absorption from 0-7% allows the user to determine a precise level of performance to meet anticipated use and conditions: i.e. 3% vitreous tile for exterior tiling in mild weather conditions; 1% in more severe fluctuations; and a 0.2% in extreme weather conditions. A finely tuned performance based specification will give the widest range of aesthetic and price choice, delivering the best value to the user. Selecting a porosity level, lower than required, can be compared to buying a car with expensive standard features that will never be used.

This logical insight regarding our production process and the product is enough information for consumers to grasp the complexity of tile without losing them in confusing details. This empowers the user and gives them confidence when they are looking at the plethora of tile available. Many consumers are currently intimidated and even overwhelmed by the vast number of tile choices. A common worry is they will not choose the correct quality or even worse they are afraid they will be sold the wrong quality and end up with a costly mistake. Establishing trust is paramount to the American consumer. In fact American consumers spend an estimated $25 billion annually on original warranty and extended warranty products to protect themselves from unseen maintenance and replacement costs. Risk adverse, savvy consumers research products on the web until they feel confident enough to weigh and interpret the advice of salespeople. Americans do not buy product from salespeople who know less than they know.

5. PORCELAIN TILE - A PANACEA!

The industry has evolved at such a fast pace over the past 15 years that we have failed to keep the market informed about our path, transitions and achievements. Porcelain, one of the four types or classification of ceramic tile is likely the most misunderstood. We have in many cases confused rather than illuminated the consumer and we are now on a very slippery slope.

Fact: Consumers ask daily "what is the difference between ceramic tile and porcelain tile?"

Fact: Consumers ask for porcelain tile regardless of whether they are selecting tile for wall/floor, interior/exterior, wet area/dry area.

Fact: Consumers do not believe that a ceramic tile will perform as well as porcelain tile regardless of the environment or application.

Fact: Consumers consider all porcelains will perform the same regardless of the surface finish (glazed or unglazed).

Fact: Consumers assume all tile marked porcelain is equal. Therefore, lowest price is a compelling reason to buy the cheapest porcelain tile.

6. IS LIMITING CHOICE THE RIGHT MOVE?

One of the most recognized features of ceramic tile is its almost limitless diversity. The benefit to the consumer is choice. Every price, style and functional use appropriate to a wide range of environments and personal preferences are available. The mantra, "a tile for every use - a use for every tile" once celebrated this feature. However, it appears the industry has shifted from this value statement in favor of hyper promoting a single style of production – porcelain tile. In a very short period of time the porcelain label has achieved a high level of recognition among consumers. In general, users associate a guaranteed level of quality to the name. Regrettably, this has created an air of suspicion surrounding, what could now be called "common ceramic tile". This fear continues to exist because consumers are concerned that common tile may fail or that they will select an inappropriate tile. Meanwhile, it is believed that requesting a porcelain tile for every application will provide them with a guaranteed level of success.

With the introduction of glazed porcelain, the ceramic industry's understood definition of porcelain tile went out the window. Once the flood gates opened an indistinct "grey area" blossomed and the pristine definition of porcelain was stretched and compromised to an almost unrecognizable form. However, this delineation and wide range of porcelain products was not recognized by the consumer. In their mind porcelain was porcelain and any tile carrying the name was assumed to be identical. Unfortunately, indiscriminant producers have few qualms when they label non-impervious tile with the porcelain brand simply to capture a piece of this growing market. Other low technology competitors are flooding the market with low cost glazed and unglazed porcelain tile that is being specified ad hoc for both commercial and residential projects regardless of the mechanical and technical properties of the tile. Projects using porcelain tile have failed and will continue to fail due to: incorrect installation materials; incorrect installation procedures; selection of low quality glazed residential porcelains for demanding commercial environments; and low cost tile masquerading as impervious tile.

7. HINDSIGHT

Only with some historic background can the consumer truly appreciate the high technological and mechanical advances the industry has made in developing large format porcelain bodied tile. Prior to mid 1970 porcelain programs were only available in thin mosaic formats. The mosaic size easily met the needs of residential and commercial users in areas of continuous water exposure such as shower floors and swimming pools. However, when vast areas of commercial tiling or exterior paving was required, architects turned to sturdy unglazed quarry tile in order to handle the wheeled and vehicular traffic, potential edge chipping and to provide the compressive strength required. While quarry tile was used successfully through the 50's and 60's, the design community became increasing bored with the monochromatic color of "dirt" and looked at alternate materials that could deliver the light multi-hued more contemporary finish they desired. Spending millions in research and new production equipment, the industry was finally able to fill the void with large format porcelain tile in a veritable rainbow of colors. Colored porcelain clays in eight and twelve inch square format as well as colored blends known as salt & pepper or granite style porcelain were debuted and quickly became a welcome solution for high traffic areas such as shopping malls, airports, sports facilities, restaurants and other institutional projects as well as exterior balconies, decks and paved walkways.

White Kaolin clay, mineral pigments, new production equipment and technologies elevated commercial tile from functional to fashionable.

The general marketing strategy used to promote porcelain was: "it will do anything, everywhere". That was virtually the extent of training received by sales forces across the globe. During the 80's new porcelain features, such as polished, semi-polished and soluble salt striations were introduced with a similar lack of technical information. Attributes and challenges were discovered on the fly by sales personal, the design community and consumers in unison. Unglazed porcelain differed in many ways from the known attributes of quarry tile. Porcelain was:

1. A much finer, denser composition providing less surface friction and slip resistance.
2. The low porosity required premium two part mortar systems and often required labor intensive back buttering to attain minimum industry standard adhesive coverage.
3. Polished porcelain was found to be more susceptible to staining due to the open surface porosity.

4. Although resistant to staining, high contrasting grout colors penetrated surface pores and freckled certain porcelains. This led to a debate on whether a grout release coating was required prior to installation.
5. Textured, anti-slip surfaces experienced grout hazing problems when excess cement-based material became embedded in bas relief areas of the tile. Installers often resorted to potent acids which could damage the surface of the tile and weaken the surrounding joints.
6. With the advent of glazed porcelain tile, many commercial architectural sales personal were left in the dark regarding the intended target market for the product and questioned the benefits of glazing a porcelain body compared to traditional ceramic tile programs.
7. Differentiation of porcelain was virtually reduced to the single component of 0.5% water absorption and a bevy of low cost product began to appear leaving sales reps with no value argument to sell higher technology, higher cost quality porcelain tile.

The industry kept bringing new technologies to the market place without communicating the technical advantages, features, benefits and best use for this myriad and confusing mix of stone-gres, glazed ceramic tile, unglazed porcelain tile, glazed porcelain tile, and third generation colored body, powered granilla, semi-glazed porcelain tile. Depending on the chain of distribution and the information provided by the manufacture, it is amazing how many different theories, explanations and marketing hyperbola was espoused. Front line sales personal had to be extremely diligent in order to understand the variety of product coming onto the market and to discern the best market and successful use for each tile type.

It has been a bit of a rocky ride for many industry participants. Manufacturers of commercial unglazed porcelain struggled to differentiate their product from residentially targeted glazed porcelains. Sales personal questioned whether the abrasion resistance of glazed porcelains offered suitable resistance for use in heavy traffic environments-the traditional arena of porcelains. Sales personal found it difficult to distinguish unglazed product from glazed product and specified either assuming the "porcelain banner" imparted identical technical features. Mechanics installed glazed porcelain tile as if it were any other glazed ceramic tile often not aware of the low porosity or challenge to mortar transference.

Parkway Place, Huntsville, Alabama, KA Architecture

8. THE QUESTION

The industry appears to be toying with the idea of converting the majority of production to porcelain. The ramifications of this choice could be surprising. Will this one type of ceramic tile satisfy the needs and desires of consumers? Will higher profit quality porcelain tile be able to compete against lower cost porcelains flooding the market? Regardless of the road the industry chooses to travel, if the same lack of training prevails, the traditional suppliers of the US market well may not fare well. Although market share has been somewhat stabilized over the past decade, the traditional division (75% European imports) has appeared far less stable in the last twenty four months. Many factors are now affecting the status quo and the projected future supply chain is far from predictable.

Perhaps this heated competition is an opportunity, as it challenges each industrial participant to consistently re-think product, marketing and manufacturing solutions. This re-evaluation process delivers concepts and products more closely attuned to the ever changing values, needs and desires of savvy, well informed and environmentally conscious consumers. The ceramic tile industry needs a powerful well oiled communication strategy. One where the advances and technological achievements are easily disseminated to the public and the quality of industry leaders become recognizable.

9. CREATING TRUST

We should establish the level of guaranteed quality each ceramic tile in production is capable of achieving and reinforce why value is inherent in selecting the correct classification. All industry personal should be capable of: defining the environment and type of traffic anticipated; match the tile body to these parameters; and finally guide the consumer to an appropriate selection of tile designed for such use. At the present time poorly trained ceramic sales consultants concentrate on the form of the tile, pleasing the stylistic and aesthetic goals of the client, paying little attention to the functional use of the tile. Others select one type of tile for all areas or over specify, hoping that a commercial grade tile will survive anything. While this may be true, it limits the choice of the user and may not provide: best value; best price; or best aesthetics. Neither method serves the consumer well. Both can lead to tile failures or additional unnecessary costs for the client. Developing an on-going training program that is capable of percolating down through the entire chain of distribution will ensure rapidly changing technologies and vital information is passed onto the 400 million Americans we hope to convert.

10. USING INDUSTRY STANDARDS

Quality can be differentiated using the International Standard tests and procedures for identifying tile. Currently these tests are used by the industry to limit poor quality or unfair competition from competing on an equal footing. However, many distributors are not even aware that an entire battery of tests are conducted on each tile program and re-tested to ensure the quality of every subsequent production run. If they are aware of the data sheets, they can discern little information other than the tile meets standards. This gives them no ammunition against other competing ceramic tile or other competing materials. It has also not given them value arguments that can be used effectively as a marketing and sales tool.

10.1. FEAR – THE GREAT MOTIVATOR

Imagine if a distributor/retailer could say, "each tile offered on our floor has been tested to meet or exceed the industry standard for quality".

ISO 10545-2: All tile has been measured and verified to be within a working percentage for thickness which can reduce or eliminate potential tile lippage. All tile has been measured and verified to be within a working percentage for dimensional length and width to ensure an equal, straight and minimum joint width. All tile has been measured and verified to be within industry standards for straightness of sides, rectangularity, surface flatness, and surface quality. These standards ensure both the aesthetic and functional quality of every tile.

Tile sold without ISO 10545-2 has not been tested to meet these strict industry guidelines.

ISO 10545-7: The glaze on this tile has been designed for light or soft soled foot traffic. Anticipated soiling should be limited and non-abrasive. The industry designation for this type of glaze is PEI II.

Tile sold without the benefit of ISO 10545-7 has not been tested to provide the user with an indicative value for the abrasion resistance of the glaze.

ISO 10545-12: This tile has been tested and verified suitable for exterior use. The tile has been subjected to 100 rapid freeze/thaw cycles.

Tile sold without ISO 10545-12 has no proven track record to withstand thermal fluctuations. Although porosity levels may be low the internal crystalline structure of the clay matrix and the compatibility of the glaze to body interface may be adversely affected by freeze-thaw environments.

10.2. PLEASURE – THE OTHER GREAT MOTIVATOR

Other highly advanced technologies not tested by ISO standards are stylistic in nature. Many state of the art manufacturers incorporate expensive imaging, decorating and blending processes in order to deliver programs with immense pattern and color variation. Unfortunately, ceramic tile showrooms often display single tile samples or small vignettes that do not readily accentuate this quality feature. Tile data sheets could and should describe the extent of design techniques incorporated into the line.

10.2.1. Style features

Body: Custom colored porcelain body
Veining: 6 randomized roto-color laser screens
Coloration: 4 color atomized clay, 6 color glaze separation
Undulations: 8 bas relief moulds
Calibration: All tile is precision sized and edges are rectified.
Blends: 2 production lines are harmonized prior to packaging.

10.2.2. Lifestyle Features

- Chipping: Unique colored body & partial surface design incorporates glaze and body in a single layer offering deep abrasion resistance.
- Cleaning: The impervious glaze is multi-chromatic offering soil hiding protection and seals the surface porosity. This tile does not require initial sealing or on-going topical maintenance. Hot water and a neutral cleaner will remove soil and spills. Common acidic compounds such as: vinegar; milk; ketchup; wine; coffee and citrus juice will not mar, dull or compromise the surface of the glaze.
- Joint width: The rectified tile format allows for a minimum grout joint. All tiles are identically sized and final surface polishing ensures a flat non-pillowed edge detail. All tile sizes are modular and each can be combined with all other sizes. Mosaics are dot mounted to facilitate maximum mortar transference and adhesion.
- Production: Each production run is marked on the carton with specific dye lot information. Sufficient reserve material should be ordered at time of installation.

This information is in layman's terms. It tells the consumer "what it will do for me"! It clearly identifies the tile, process and technologies of the tile for the salesperson. It translates value into sales features that differentiate the tile from low cost competition. It tells the consumer why the tile costs more. It tells the architect what they are specifying, gives them comparable data and gives them confidence. This is the language of the buyer rather than the language of the producer and the industry.

11. CONCLUSIONS. LEADERSHIP STARTS AT THE TOP

While all industry players are stakeholders in the potential future growth of ceramic tile, no single sector stands to gain or lose more than the manufacturers. Double digit growth in the past seven years has encouraged production owners to risk enormous financial assets in their efforts to: increase production capacity; adopt new technology; expand production diversity; and implement overall efficiency strategies. Several lead producing countries have focused their attention on the United States acknowledging it to be their number one market. The patient attention aimed at the States has achieved reasonable growth and yet incredible future potential is still available to be cultivated.

Americans consumed approximately 2 square feet per person in 1970. That figure increased to approximately 10 square foot per person by 2002.[2] Compared to consumption in countries steeped in the historic and traditional use of ceramic tile, current US consumption has enormous room to grow. With a population of over 400 million, doubling current US consumption would translate into over 6 billion square foot of tile sold annually in the US. Achieving this lofty goal would still leave the United States with one of the lowest consumption rates especially when compared to southern Europe at over 40 square feet per person. To achieve levels even close to this figure, manufacturers must increase the comfort level Americans feel with choosing ceramic tile. The simplest question to ask is "do the players in this industry have a

clear, concise and winning leadership strategy that will expand ceramic tile use and ultimately reach this goal?" Current marketing and educational attempts have not been streamlined and designed to inform the user. Too many are filled with technical jargon and minutiae. Leadership in this area must be modeled from the top down and education must be the ultimate product developed at every ceramic tile factory.

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