By Virgil Irick

Jack Is Outside the Box!

Providing Custom-Designed Product Performance Testing to Support Usage of Cutting-Edge Designs

The TCNA Product Performance Testing Laboratory's staff receives, on average, about 20 calls a week from architects, building materials designers, specifiers and tile distributors who want to know if a product they are considering will work in a new design application. This group very frequently faces complex challenges of providing aesthetic value in their product design while meeting a number of construction challenges such as tight schedules, service and durability, as well as cost constraints. The question our laboratory often hears is, "Will my selected combination of materials and design work together to meet structural requirements and codes?" The use of products in novel applications often presents a complex need for the architect and designer, as they must be sure that the selections made for cost-effectiveness are sound in view of physical, chemical, and materials compatibility challenges. How can one explore cost-effective alternatives while being confident that the creative design chosen is well-founded regarding engineering requirements, or, if viewed slightly differently, how can you gain confidence that your "product" will meet your performance expectations?

Why Something New?

As TCNA laboratory personnel answered widely varying questions regarding materials testing, an idea grew. The idea grew by first recognizing that there are numerous theoretically and commercially-oriented questions about tile and stone properties and applications that cannot be readily answered by simply applying one or more of the 47 standard ASTM, ANSI and ISO tests listed on TCNA's testing order forms. So, clearly there are unmet needs in the industry. TCNA's management and members recognized this need as an opportunity for the TCNA laboratory to extend its services offered.

A scanning electron microscope gives three-dimensional images over a wide range of magnification, allowing examination and measurement of surface features such as cracks, pits, and inclusions. Photo courtesy of Clemson University.

What is Outside-The-Box (OTB) Testing?

This acronym, "OTB", was chosen to describe testing that falls outside the rigidly-specified testing methods spelled out in ASTM, ANSI and ISO standards to which we normally test ("The Box"). "OTB" opens a new spectrum of possibilities now available to architects, designers, etc. No longer must they limit their thinking to the established and accepted ways of testing. Now, by their working with TCNA technical personnel, lab customers can simulate service conditions and directly test them to gain confidence of the anticipated performance.

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What Are Examples of OTB Testing?

The examples below are representative of the variety of approaches used during 2006.

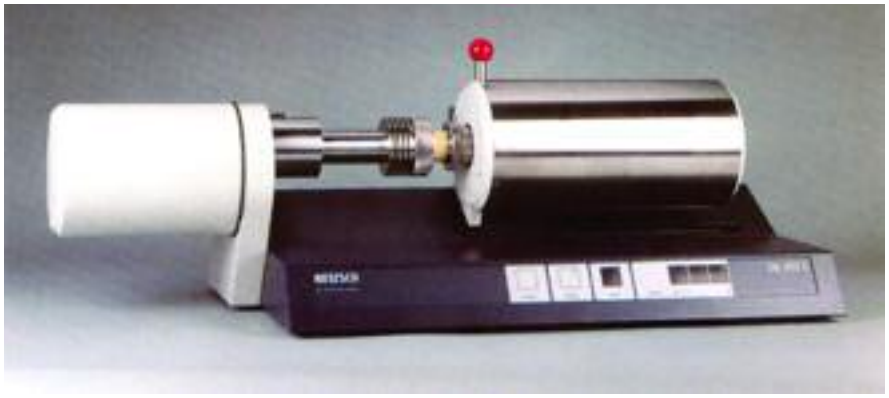
- Light reflectivity and transmission measurements of glass tiles for CA building code compliance
- Source determination of chemical contaminants in ceramic tile and natural stone flooring applications
- Special jig fabrication test and evaluation of lath systems used to install synthetic stone
- Study of micro features of tile surfaces that can affect slipperiness when wet
- Measurement and associated dependability prediction of tiled floor constructions as affected by sound reduction materials
- Special physical and chemical measurements of tile and stone

How Are OTB Challenges/Needs Handled at TCNA?

The TCNA laboratory's path to OTB testing solutions is a cooperative, "clean-sheet" working approach. There are at

least three (3) types of cooperation that can be involved in the process.

First and foremost is cooperation between a potential customer and TCNA lab personnel. There are now three graduate ceramic engineers on the laboratory staff. These professionals, plus a seasoned testing technician team, engage in discussions with potential customers to ensure a clear understanding of the problem and needs for specific types of data. Together a testing plan is designed and agreed upon. The testing process then swings into action to generate data and valuable answers.



The dilatometer measures size changes (expansion and/or contraction) with changes in temperature. This is especially important to determine if tile bodies and the glazes applied to them "fit" each other and to determine if internal stresses could be created by the firing and cooling process. (Image courtesy of the NBRC)

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The second type of cooperation is made possible by TCNA's location near Clemson University. TCNA's close proximity to Clemson allows us access to Clemson's diverse faculty in ceramics, chemistry, composites, geology, statistics, etc. and a wealth of analytical equipment, which helps keep costs reasonable.

A third type of cooperation is possible by TCNA's being able to introduce customers to one or more of its approximately 200 member companies. Assisted access to property information and other technical databases can reduce data collection efforts often required in specifying ceramic tiles.

Who Can Benefit From OTB Testing?

Small design, architectural, construction, and tile installation companies can use OTB services to support creative stone- and tile-related designs or challenges without having to make major in-house equipment or staff commitments. Medium-sized companies can easily and cost-effectively augment their in-house expertise via OTB testing by integrating the expertise of TCNA. Even large, turnkey design and construction companies will find it advantageous to have an independent, third-party laboratory validate novel materials and installation concepts. TCNA is always sensitive to its customers' intellectual property concerns and can work in several ways to ensure confidentiality of materials selections and designs.

Architects and designers pushing the envelope on cutting-edge design can turn to OTB testing to scientifically assess product performance in new designs/applications. **TILE**