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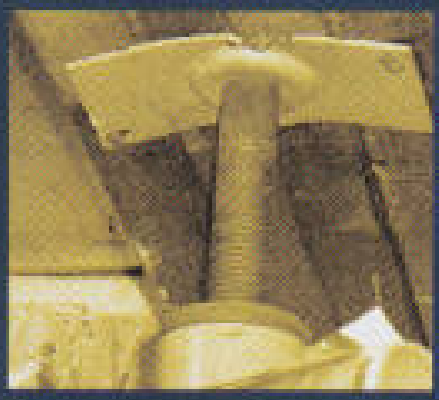

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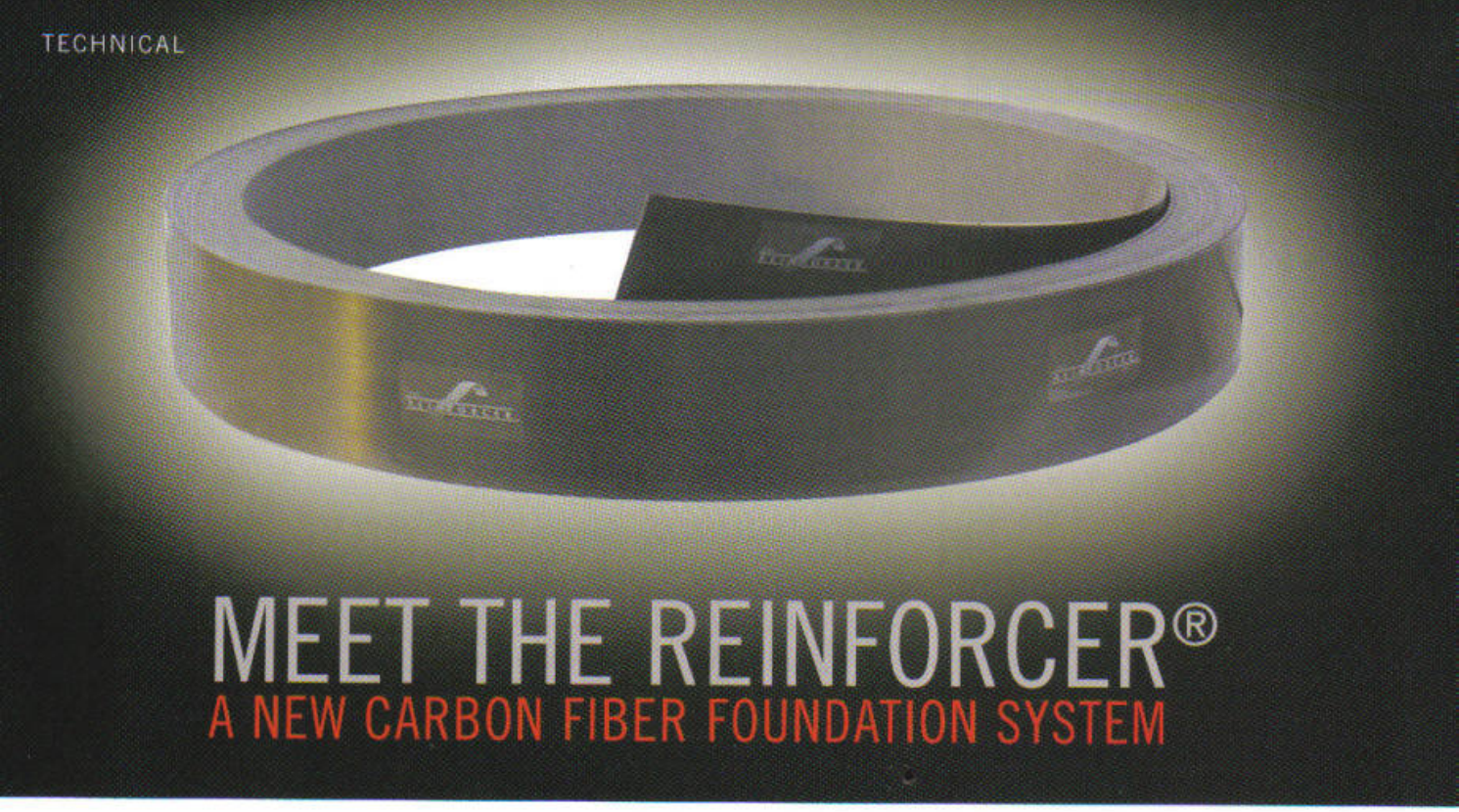


MEET THE REINFORCER®

A NEW CARBON FIBER FOUNDATION SYSTEM

Bob Thompson, PE, Nationwide Reinforcing, Ltd.

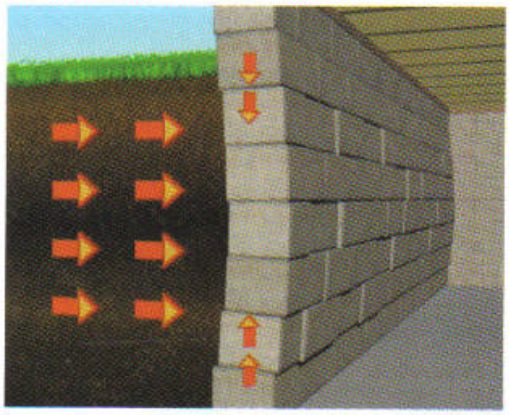
Whether in a residence or a commercial building, in most cases, the best defense for foundation failure is a good offense. The development of The Reinforcer®, a recently patented carbon fiber technology system, is providing an alternative for repairing and strengthening foundation walls. Developed by Nationwide Reinforcing, Ltd. (Columbus, Ohio), the externally bonded composite reinforcing system is a Carbon Fiber Reinforced Polymer (CFRP) that is lightweight, non-corrosive and virtually impossible to stretch. The carbon fibers form in an epoxy resin matrix that has a tensile strength of more than 350,000 pounds per square inch (psi), making it 10X stronger than steel, which has a tensile strength of 36,000 psi.

To date, the process of installing steel beams with heavy equipment (digging, jackhammering, moving utilities and duct work, etc.) has been the primary way to brace and shore up existing foundation walls. The Reinforcer® is essentially a carbon fiber "strip" or "strap" that is only 4" wide and .045" thick, making these old and intrusive methods appear antiquated.

Design/Engineering Philosophy

A foundations' structural integrity becomes jeopardized when hydrostatic and lateral earth pressures exceed the strength of the concrete or masonry wall. These lateral pressures barrage the foundation and cause the walls to bow inward. The philosophy behind The Reinforcer® is based on standard engineering principles following Hookes law and a linear stress strain relationship.

For every increase in pressure, The Reinforcer® provides an equal and opposite resistant force; making the wall stronger, which helps eliminate shifting, cracking and bowing. ▸▸▸



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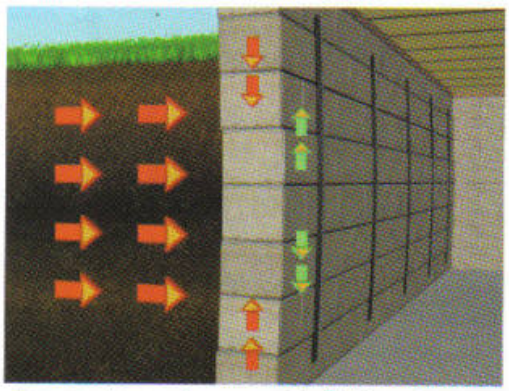

For every increase in pressure, The Reinforcer® provides an equal and opposite resistant force; making the wall stronger.

Being lightweight and thin-as-a-dime, it is easier and faster to install. We believe this is particularly beneficial around complex plumbing and electrical systems that otherwise might have to be removed and reinstalled. It's also an attractive solution. Once the block wall has been painted over, it is virtually concealed.

Streamlined Installation

The installation process is simple, and it takes approximately half the time other solutions take; therefore, it is cost-efficient. The high-strength carbon strips are supplied on 250 ft. continuous rolls, cut-to-length, and spaced based on the engineering design charts prepared by Nationwide Reinforcing's engineers.

The walls must be cleaned of all paint and debris prior to installation. The strips are then applied with a structural epoxy paste (ECS 104) along the interior surface of the bowed or cracked walls. Removing excess epoxy off the strips and filling remaining cracks with ECS 104 completes the installation.

Residential Advantage

Foundation failures represent a stigma (both real and perceived) for homeowners who fear the real estate value of their home and its structural integrity may be compromised. Certified installers have completed more than 20,000 residential Reinforcer® installations across the United States and Canada.

Commercial Advantage

As competition and technology continue to converge, engineers and contractors are seeking out material alternatives such as Fiber Reinforced Polymers (FRP), over conventional steel and wood for construction applications. This trend is based on a variety of design flexibility and material performance advantages; i.e.—lighter weight, easier installation, higher strength and the non-corrosive ability to withstand harsh environments.

Advancing this trend, The Reinforcer® carbon fiber strengthening system is being used for commercial construction applications from bridge decks to parking garages, from culverts to stadiums. The product's inherent material per-

formance benefits allow the construction industry to comply with increased design load specifications and keep ahead of ever-changing Code requirements.

Manufactured and distributed by Nationwide Reinforcing, Ltd. since 1998, the system comes with a lifetime manufacturer's warranty. The company also produces a unidirectional sheet/fabric made with high-strength carbon or glass fibers called The Reinforcer Shield™. This product can conform to irregular shapes such as circular or square columns. It's used for flexural and shear strengthening and can provide a waterproofing membrane for foundation walls. ■

Go to **www.ashireporter.org** to read about two projects that used the carbon fiber system to solve structural problems. Find the information at the end of the article.

Bob Thompson is the co-founder of Nationwide Reinforcing, Ltd. and is also a professional civil engineer. Nationwide Reinforcing, Ltd. is an ASHI affiliate member and belongs to The National Association of Waterproofing and Structural Repair Contractors (NAWSRC) and The American Society of Civil Engineers (ASCE).

HOME INSPECTORS QUESTION: MANUFACTURER ANSWERS

Q. Is The Reinforcer® only for concrete block foundations?

A. The system is also for poured, brick and other cement/masonry foundations; not just block: although that tends to be the primary application.

Q. Can it be installed on a significant wall deflection (buckled) to prevent further movement? All of the photos showed walls that appeared to be plumb. You know that residential sellers & buyers usually operate on minimal budgets and would like to keep what they've got structurally, even if it is cosmetically undesirable.

A. The Reinforcer® is used 99 percent of the time on walls or structures that have already bowed or cracked. Seldom do we do a true preventive maintenance installation.

Q. Can it be used where the concrete surface isn't sound; if the concrete sloughed?

A. The concrete and block need to be solid, not deteriorated or falling apart. We have performed nearly 20,000 projects and only turned away 5 to 10 jobs that had severe deterioration.

Q. Can it be used on surfaces that have been painted or coated with something like waterproofing paint or anything else that might interfere with the bond? Or do coatings have to be sandblasted off the surface before the system is applied?

A. We use a specialized surface grinder on nearly every job to remove paint or waterproofing materials. This is standard and easily performed at minimal cost. One person can usually prepare the area in approximately 5 minutes. We will sandblast on outside projects like bridge decks or parking garages where the mess doesn't matter.

Q. The literature states this approach is cheaper than conventional repairs. Most repairs of this type must be engineered; is there an engineering expense with The Reinforcer® system?

A. Nationwide Reinforcing provides free engineering consulting on all jobs, and works directly with our certified installers to train them and educate the local engineers on our system.

Q. Apparently the product has already been used in my state with architectural/engineering and code approval on public buildings, which take on the most liability. What, if anything, do you know about local codes and this product?

A. It has been used in most states and Canada with the approval of local engineers and building codes. For instance, Columbus and Cleveland, Ohio, have approved it. Most municipalities recognize us as a proven system as long as a structural engineer stamps the plan.