

Polyurethane Concrete Slab-Jacking VS Conventional “Mud”-Jacking

After 30 years of field experience in pressure grouting/mud-jacking/slab-jacking, American Pressure Grouting and Mudjacking Association partnered with leading grout pump manufacturer Black-Jack Grout Pumps Inc. to analyze materials being used in the industry. An extensive 2 year comparison study of Polyurethane verses Classic mix design suggests a much more limited role for Polyurethane products than conventional wisdom would allow.

History:

There has always been a desperate search for a stable lubricant to be used for pressure grouting and slab jacking that is both affordable and available throughout the United States and the World.

As concrete lifting equipment developed, a very inexpensive un-stable lubricant was discovered. Subsequently Topsoil/Black dirt/Mud was recommended for use by early equipment manufacturers. The simple name was created “Mud-Jack”

Only after many years of close study, the end results were staggering. Topsoil/Black dirt/Mud being organic in nature began to breakdown over a short period of time. Confidence in the reliability of Slab-Jacking was diminishing. Research showed that the contractor was often at fault. In many cases the contractor cut corners by reducing or eliminating Portland cement or simply performed the procedure incorrectly.

Understanding and recognizing the benefits of Slab-Jacking, regulations were implemented at a State and Federal government level. American Pressure Grouting and Mud-Jacking Association at present is the only private self-governing body. Members recognize the importance of these simple standards in order to preserve the integrity of Slab-Jacking and bolster Industry confidence in the future. (See www.apgma.com)

Present:

Part of the 2 year study was determining the most stable, reliable, affordable, and available material for Slab-Jacking. The results of the study were collected by certified technicians, board directors, and Municipal /Field Engineers. Physical inspection of actual projects were done in Illinois, Wisconsin, and Missouri. Other state climatic or geometric conditions do vary however, but similar results can be expected.

Recommendations/Testing

- When Slab-Jacking or Pressure Grouting, perform a standard organic content test prior to use. Some materials which certainly require testing are Top Soil, Pond Sand, Limestone by-products, and most natural unconditioned/processed aggregates (Consult testing engineers in your area). The percentage of organic content in any mix should never exceed standards set forth by APGMA.
- Finished grouts/polyurethanes should be tested to ensure adequate compression strengths and non-shrink properties prior to use.
- Once a material has been determined as satisfactory, strict quality control should be maintained at all times.

Recommended Material:

The American Pressure Grouting & Mudjacking Association and Black-Jack Grout Pumps Inc. recommend the following material for use in any Slab-Jacking or Concrete Lifting application with consideration to:

- Cost (material & equipment)
- Compression Strengths
- Flow under pressure
- Availability
- State and Federally Accepted
- Recyclable

CEMENTITIOUS GROUT is by far the most user friendly and versatile grouting material.

(Portland Cement, Fly-Ash, Sand, water, Bentonite & admixtures as required)

- The cost of the polyurethane equipment and materials are approximately 4 to 5 time the cost of conventional grouting equipment and materials.
- Compression strengths are easily controlled by adding or subtracting Portland cement to grout. Average compression strengths of polyurethane are 80-100 psi, while average compression strengths of Portland cement, Fly-Ash, and Sand are 1,500-4,000 psi. Higher compression strengths are critical for heavy bearing loads. Slab deflection has been observed when using lower strength materials.
- Flow of material under pressure is close to equal; both polyurethane and the above grout mix have extremely high lubricity therefore penetrating the smallest area.
- Portland cement, Fly-Ash, Sand, and Grout can be purchased and delivered by most any ready-mix company in bulk/bagged or mixed. Distributor availability of polyurethane is limited when compared to ready-mix companies. Grout costs average between \$96.00-\$128.00 per cubic yard(prices are subject to change).
- Portland cement/fly-ash/sand grout has been accepted and used by State and Federal agencies. At present polyurethane has been used as well; however municipalities within the study area indicated polyurethane to be cost prohibitive. In the state of Missouri on highway 54 near Mexico, polyurethane was injected and resettling occurred after a short period of time.
- At present most State and Federal Department of Transportation recycle Portland cement pavement, polyurethane being a non-cementitious material, separation will increase cost of the re-cycling processing.
- End results of any material used for Slab-Jacking is completely dependent on the supporting materials of the Portland cement pavement, however both polyurethane and grout can be injected into soil, peat moss, aggregates (when applicable) for stabilization.

Conclusion:

- Basic approved mix designs are available upon request at no charge, please email project information and any other specifications required. (www.apgma.com)
- As a reporting institution American Pressure Grouting & Mudjacking Association encourages any information or comments in regards to this study. Our goal is to report any technical data which benefits Slab-Jacking. Please feel free to email your comments or questions to www.apgma.com

Disclaimer:

The information provided in this study which includes technical descriptions, details, and case study results presented herein is for informational purposes only. American Pressure Grouting & Mudjacking Association and Black-Jack Grout Pumps Inc. are not responsible or liable for any end results. There are no warranties either expressed or implied, regarding the accuracy or completeness of this information.

Work Cited / Bibliography:

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Portland cement Association: www.cement.org

Tool Base Services: www.toolbase.org/Technology-Inventory/Foundations/Fly-ash-concrete

Mother Earth News: www.motherearthnews.com/Ask-Our-Experts/Green-Homes/Fly-Ash-Concrete.aspx

Headwaters Resources: www.flyash.com/data/upimages/press/HWR_brochure_flyash.pdf

HMI: www.mudpumps.com/otherproducts/polyurethane-equipment