

# CASE STUDIES

# INTRODUCTION



The Enrich Bits and Tools process has been utilized in a number of case studies evolving various applications. These trails were performed by the clients.

- Civil Drilling and Blasting
- Concrete Block Manufacturing
- Underground Tunnel Ground Support

# DRILLING

## Application:

Civil construction drilling with 4 inch button bits on an air track drill.

## Location:

Osage Beach, Missouri in OG Gasconade Dolomite

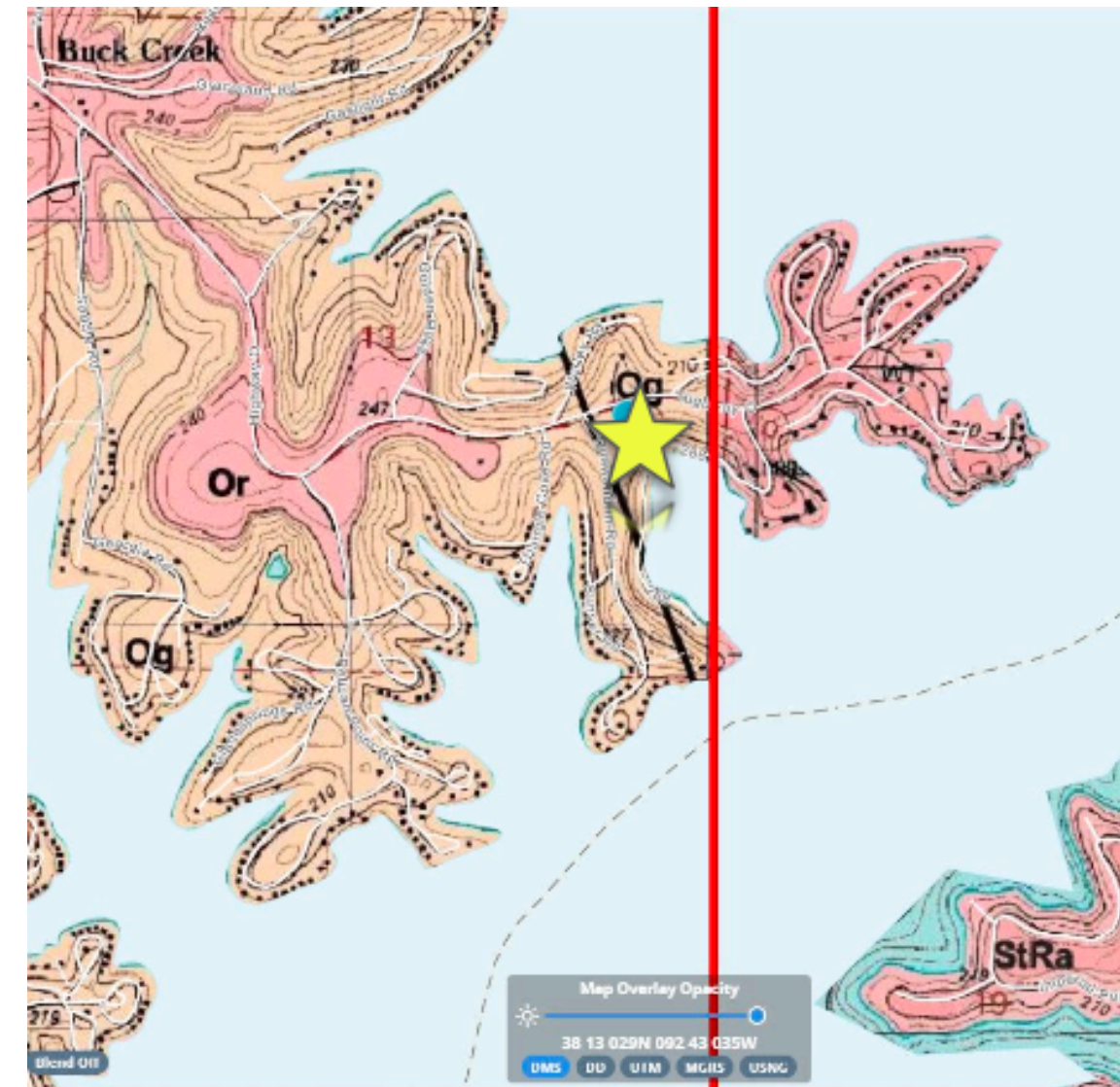
## Date:

Part 1: October 2022 to February 2023

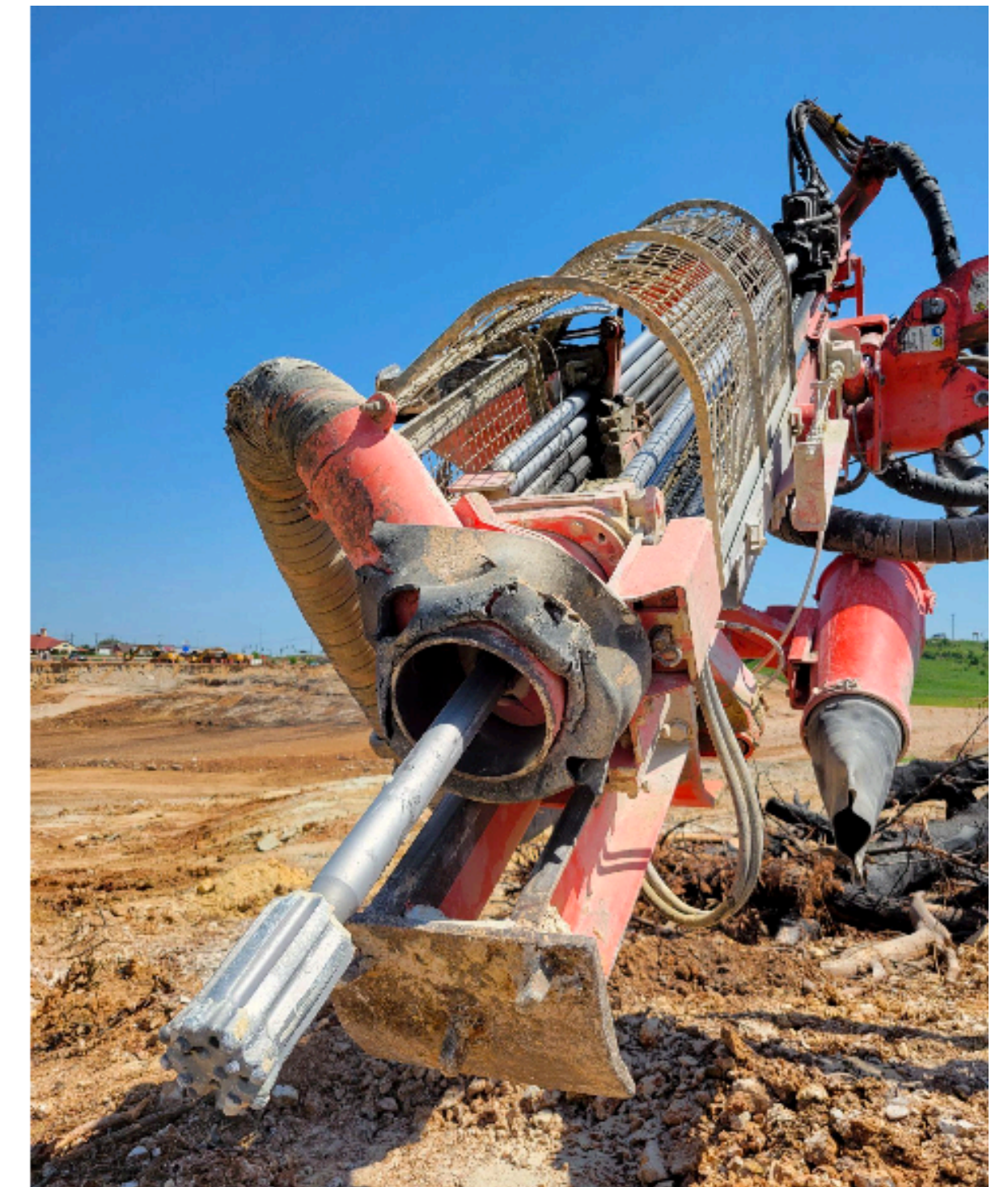
## Description:

Conducted under a driller with 25 years of experience, the project location was chosen as the worst case scenario for this client. Located in the most abrasive geology for any current operational site, OG Gasconade Dolomite formation, the study was conducted over a 7 month time frame.

When a carbide button breaks out, the bit is considered worn out. This mode determines a failure.



Middendorf, M.A., 2002, Bedrock Geologic Map of the Sunrise Beach 7.5' Quadrangle, Camden and Morgan Counties, Missouri: Missouri Department of Natural Resources, Geological Survey and Resource Assessment Division Open-file Map OFM-02-421-GS, 1 sheet.



# DRILLING

## Part 1 Results :

A **165% increase in bit life was measured**. The final footage drilled was 12,999 borehole feet before a button was rolled. The bit life of the same manufacturer was tested without treatment and the final borehole footage was recorded at 4,907 borehole feet.

The percentage increase accurately reflects the increase in performance in comparison to the same geologic conditions of infield results. Notice the amount of wear around the body of the bit after lasting over 2X longer.



4,907 ft Untreated bit



12,999 ft Treated bit

# DRILLING

## Part 2:

A treated retract bit was trialed in the same geology. On August 25th, 2023, a photograph of the treated retract bit after drilling ~3000 borehole feet was taken to observe the wear in comparison to a brand-new bit. The bit treated with the Enrich Bits and Tools process shows minimal wear to the body of the bit even after operating for 3/5th of a typical bit's operating life. The carbide button wear is normal while the body appears unphased for the distance drilled.

## Part 2 Results:

On September 15th, 2023, the final footage of the treated retract bit was measured at 16,802 borehole feet. Operating at 3.4X the reliability from the baseline test.



Photo compares wear on the face of the bits.



Unused bit



Treated bit

Photo compares wear on the body of the bits.



Unused bit



Treated bit

# MANUFACTURING

**Application:** Concrete block molds

**Location:**

Rockmart, Georgia & Chattanooga, Tennessee, USA

**Date:**

Fall 2020 to September 20th, 2023

In a 3 year long study completed in September 2023, a series of trials were conducted utilizing the Enrich Bits & Tools process on 8 inch block molds.

**Phase 1:** In Rockmart, Georgia, USA manufacturing concrete blocks using #8 sand.

**Test 1:** Treated block molds were installed. Test concluded ~90,000 cycles prior to replacement. This is approximately 270,000 blocks.

**Test 2:** To confirm baseline measurement the untreated molds were installed. The untreated replacement molds lasted ~40,000 cycles prior to replacement.

**Results: 125% increase**



8" SBBB



8" FHA



8" SPLIT  
FACE CORNER



8" HALF HIGH

# MANUFACTURING

Phase 2: In Chattanooga, Tennessee USA

In order to repeat the results found in phase 1, a second test was performed by the client with 46 years of experience, at a different facility utilising #10 limestone as the block composition.

Lead times for replacement block molds are 20 weeks. However, from July 2022 to September 2023, an 8 inch block old from the same manufacture was put into production.



## Results:

**387,783 blocks were produced.** The plant manager reported more than double the typical number produced by their historic counts at the location.



# TUNNELING

## Application:

Underground Tunneling Roof Support

## Location:

Viburnum, Missouri, USA

**Date:** 5/14/22-5/25/22,

An Enrich Bits and Tools treated split-set bolt driver was put into service on a Cannon Roof Bolter.

## Results:

The machine installed 286 units of 39MM x 6' Galvanized Roc-Set split-set roof bolts. The seasoned operator reported the life of a typical split-set driver has been ~100 bolts per driver prior to treatment.

**A 186% Increase**



Split-set  
roof bolt



Treated  
Bolt Driver



# SUMMARY



We thank the entire team of operators and managers for the opportunity to present the value added technology for in field studies. The real life results took months or years of tracking and follow up that could not have been completed without their help and patience. We are looking forward to providing Enrich Bits and Tools technology far into the future in these applications and many more.

Do not hesitate to contact us if you have any questions.

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