The Pros & Cons Of Contract Drilling & Blasting
Purpose of Drilling & Blasting

Get From This…
To This…

To, Ultimately, This
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Contract Driller’s View

Matt Boatman
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Fishers, IN
Background of General Drilling

- Indiana, Kentucky, Illinois, Ohio & Tennessee
- Limestone Quarries
- Equipment
- Operations
- Hole Diameter
- Started in 1967
  - Costs in 1967
  - Costs in 2015
- Utilization
Who Should **Not** Use A Contract Driller?

- Union Contract
- No Satisfactory Drillers
- Owners of New Drills
- Daily Small Shots

What are the advantages to owning a drill?

- **Operational**
  - Control of Training
  - Schedule as needed
  - Day to Day communications with Driller
- **Economic**
  - Volume
  - Specialized Drilling
  - No Viable Contractors
What are the costs of owning a drill?

- Personnel
- Capital
- Maintenance
- Administrative
- Internal Rate Of Return
- ‘Apples to Apples’

Making the Right Drill Decision …
Cost Example of Owning a New Drill

New Drill Cost $800,000

- 7-year Annual Depreciation $114,285
- Annual Labor Cost $47,400
- Benefits and Taxes $31,848
- Equipment Insurance $7,500
- Wear Items (Limestone) $29,500
- Maintenance and Upkeep $54,000

Total Annual Cost $284,533

Breakdown Of Cost: Drill Labor

- Wage Rate: $20.00/hour
  - Regular Hours: 1,920 hours
  - Overtime Hours: 300 hours
  - BASE GROSS WAGES: $47,400

- Other Related Costs
  - Unemployment Insurance: $560
  - Social Security/Medicare: $3,621
  - Work Comp Kentucky (18.56%): $8,797
  - OTHER RELATED COSTS: $12,978

- Benefits
  - Health & Welfare: $9,990
  - Pension: $8,880
  - TOTAL BENEFITS COSTS: $18,870

- Working 48 weeks
  - Average of 6.25 hours of OT per week

TOTAL LABOR COSTS: $79,248
TOTAL LABOR COSTS/HOUR: $41.28
Wear Items Cost Breakdown

- Drill Steel = $6,000
  - 6 Drill Steels x $1000 / Steel
- Hammers = $10,000
  - 2 5” Hammer x $5000 / Hammer
- Bits = $5,500
  - 10 5.5” Bits x $550 / Bit
- Accessories = $8,000
  - Wear Sleeves, Back Heads, Chucks, Foot Valves, Rebuild Cost etc.

- Total Wear Item Cost = $29,500 / year

Breakdown Of Costs: Maintenance and Upkeep

- Average cost for the life of the machine, per major Drill Manufacturers, is approximately $30 / hour for a rotary blast hole drill
- Includes Lubrication, Filters and All Parts
- Does not include Quarry Mechanic Labor
Cost Example of Owning a Drill Summary

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Pit Production</td>
<td>1,500,000 tons</td>
</tr>
<tr>
<td>5.5 “ Hole, 15 x 17 Pattern</td>
<td>21 tons per drill foot</td>
</tr>
<tr>
<td>Annual Production Footage</td>
<td>71,429 feet</td>
</tr>
<tr>
<td>Annual Overburden Footage</td>
<td>20,000 feet</td>
</tr>
<tr>
<td>Annual Total Footage</td>
<td>91,429 feet</td>
</tr>
<tr>
<td>Annual Drill Cost</td>
<td>$284,533</td>
</tr>
<tr>
<td>Total Annual Drill Cost Per Foot</td>
<td>$3.11</td>
</tr>
<tr>
<td>Total Annual Drill Cost Per Ton</td>
<td>$0.19</td>
</tr>
</tbody>
</table>

*Does Not Include Diesel to run Drill*

Internal Rate of Return Example

- **Internal Cost of Drilling**
  - $3.11 / ft
  - $0.19 / ton
- **Contract Cost of Drilling**
  - $3.25 / ft
  - $0.198 / Ton
- **Total Annual Footage**
  - 91,429 Feet
- **Annual Internal Cost of Drilling**
  - $284,533 / year
- **Annual Contract Cost of Drilling**
  - $297,144 / year
- **Annual Savings**
  - $12,611 / year
- **$.008 / Ton**
Return Against Capital Expenditure

$12,611 / $800,000
1.6% Return

7 year Jumbo CD Rate = 2.20%

Actual Rate = 0.6%

Volume Economics

• Fixed and variable costs
• Volume required
## Cost of Operations

<table>
<thead>
<tr>
<th>Description</th>
<th>Types of Costs</th>
<th>Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fixed</td>
<td>Variable</td>
</tr>
<tr>
<td>Drill Labor</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Drill Bits and Tooling</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Rig Oil and Fuel</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rig Repairs</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Training</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rig Depreciation</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pickup Maintenance</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Mobile Phones</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Licenses, Permits, &amp; Fees</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

## Selling and Administrative Costs

<table>
<thead>
<tr>
<th>Description</th>
<th>Types of Costs</th>
<th>Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fixed</td>
<td>Variable</td>
</tr>
<tr>
<td>Salaries</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Advertising</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Auto Expense</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Auto Depreciation</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Office Rent</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Interest Expense</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Insurance on Equipment</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Office Supplies</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Office Maintenance</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Property Taxes</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Costs *NOT* Associated with Quarry Ownership of Rigs

- Driller’s Pickup
- Mobile Phone For Driller
- Office Salaries
- Advertising
- Auto Expense and Depreciation
- Office Supplies
- Utilities
- Profit

Footage Required to Pay for Costs Not Associated with Quarry Ownership of Rigs

- Driller’s Pickup
- Mobile Phone For Driller
- Office Salaries
- Advertising
- Auto Expense and Depreciation
- Office Supplies
- Utilities
- Profit

The above divided by the Average price per foot equals:

**Footage required to pay for costs NOT associated with quarry ownership of rigs**
Footage Required to Pay for Costs Not Associated with Quarry Ownership of Rigs

The Number of Rigs

Equals:

Footage per drill needed to cover costs not incurred by quarry

\[ \approx 125,000 \text{ feet in Limestone to breakeven} \]

Why Use A Contract Driller?

- Back-up
- Mechanical
- Capacity
- Personnel
- Liability
- Budget Forecasts
What To Look For In A Contract Driller

- MSHA/Safety Concerns
  - Part 46 / 48 Training
- Back-up
  - Multiple Rigs readily available
- Insurance
- Equipment
  - Rigs to cover all your needs
- Personnel
  - Trained and experienced
  - Mechanics
- DOT Concerns

What Does A Driller Expect From The Quarry?

- **Safe Work Areas**
  - Accessible
  - Cleaned as much as possible
  - Removed as much as possible from dangers both above and below

- **Operational Needs**
  - Shot Laid Out in Timely Manner
  - Open Communication with Quarry Personnel and Blasters
  - Clear Instruction and Expectations
STUFF HAPPENS!!!
Burning Questions?

PROS AND CONS OF CONTRACT DRILLING AND BLASTING

Explosives suppliers viewpoint on the use of outside vs. in-house personnel and views on the benefits of outside assistance.
Definition of Services

Services for Blasting:
• DELIVERY
• DOWN HOLE
• SHOT SERVICE
• D&B PACKAGE

Definition of Services in Blasting

• DELIVERY
  – Quarry does it all – Operation owns and operates its own drill.
  – Explosives are delivered and stored on site.
  – Operation provides all services, blaster, equipment for hole charging, and handles all design and layout.
Definition of Services in Blasting

- **DOWN HOLE**
  - Quarry does almost all.
  - Same as delivery except product to the borehole is contracted through an outside explosive company (may have some storage).

Definition of Services in Blasting

- **SHOT SERVICE**
  - Quarry does some.
  - Operation owns and operates the drill or “contracts” drill but has management responsibilities for drilling.
  - Blasting Services company is hired to provide products and services to provide shot rock
  - Time and materials or cost per ton
Definition of Services in Blasting

• **DRILL AND BLAST PACKAGE**
  – Mining Operation Contracts All From One Source

THE BIG QUESTION ???

How to decide which is the right choice?
Key Issues to Consider

- Communication
- Blasting Process Specifications
- Determination of Risk Balance
- Decision Process
- Implementation
Communication

• Structured and open exchange of process relevant information and expectations.
• Parameters, measurements and objectives of the blasting plan

Communication

• Complete initial communication increases probability of success.
• Incomplete communication can lead to frustration and failure for all parties.
• Operational issues require continuing discussion and compromise.
• Review mechanisms should exist on all operation levels.
Blasting Process Specifications

Safety
• Regulations, Rules and Ordinances
• Safety Policies of all Parties
• Emergency Procedures
• Site Specific Requirements

HAZARDS OF EXPLOSIVES

Health
• Weather: Heat, Cold, etc.
  • Medical
  • Exposure to:
    • Dust
    • Noise
    • Chemicals
    • Fumes

Safety
• Handling Materials
  • Working with Tools
  • Equipment
  • Tripping and Falling

HazMat
• Shock
  • Impact
  • Fire
  • Exposure
  • Spills

Blast Site Safety
• Moving Equipment
  • Terrain
  • Falling off Highwall
  • Rockfalls
  • Driving over Explosives

Blasting Procedures
• Flyrock
  • Misfires
  • Premature Detonation
  • Blast Area Security
  • Blast Signals
HAZARDS OF EXPLOSIVES

Health

Safety

HazMat

Blast Site Safety

Blasting Procedures

Health and Safety Initiatives

Blasting Process Specifications

Production

• Tonnage (Volume) Requirements
  – Tons per Day
  – Quality (Size and Mineral Content)

• Mine Plan and Extraction Schedule

• Blast Design
  – Drill Pattern
    • Products
    • Loading Requirements
AN-Based Bulk Products

Ammonium Nitrate (AN) and Diesel Fuel (FO)
Blended when loading

AN/FO added to Un-sensitized Emulsion:

AN/FO
100%

Heavy AN/FO
70/30 %

Heavy AN/FO
50/50 %

Pumpable Blend
30/70 %

Pumpable Blend
20/80 %

Emulsion
100%

Blends

AN/FO
100%

Heavy AN/FO
70/30 %

Heavy AN/FO
50/50 %

Pumpable Blend
30/70 %

Pumpable Blend
20/80 %

Emulsion
100%

Augered

Pumped

Chemical Sensitization or Sensitized Emulsion

Un-sensitized Emulsion:

+ Gassing Chemicals

A + B

Equipment Reference: Blasters’ Handbook, International Society of Explosives Engineers (ISEE) 2011
Blasting Process Specifications

Cost

- Production Cost
- Product Prices
- Cost Evaluation Process
Blasting Process Specifications

Measurement

- Blast Assessment
  - Blast Geometry
  - Fragmentation Requirements
  - Displacement
  - Blast Evaluation

- Seismic Monitoring
  - Compliance
  - Advanced Signal Analysis

- Reporting

Blast Reporting – ‘Source Documents’
From the Blaster’s Perspective

Selection of Documents:
May also include ATF, DOT, or other required forms.
Blasting Process Specifications

Environmental Program
- Regulations
- Compliance Monitoring
- Operation Limits
- Community Relations
- Complaint Response Procedure
Decision

- Team Approach with Knowledge, Understanding, and Responsibility
- Defined Objectives
- Type and Duration of Contract
- Expectations and Conflict Resolution
Considerations

• Compare Cost-Benefits:
  - Include All Aspects of Production Costs
• Determine “Real” Value - Assess Cost versus Price Issues
• Develop Procedures for Operator & Contractor Conflict Resolution

Implementation

• Verification of Costs and Reporting of Actual Costs
• Regular Review of Goals and Methods
• Continued Operations and Management Commitment
• Adherence to Agreed Plan
Blasting Planning

The Circle of Continuing Improvements

Blast Monitoring

Product Quality and Innovation

Blast Design Tools

Quality Control

Technical Services

Electronic Blast Report

PARTNERS

Communication

Expectations

Action

Planning

Feedback

Performance Evaluation

Communication

Producers

Team Work

Contractors
Summary Remarks

• Manage the contractors as you would manage your own people.
• Consider agreements that are for multiple years.
• Do not make the decision to contract based on lack of understanding of blasting.
• Make the decision after a complete review of “ALL” issues, both internal & external.

Summary Remarks (cont’d)

• Key participants must be Leaders; if not the partnership is weakened.
• Price is important, quality & performance should have equal weight.
• Demanding Quality is not the answer, the Team must agree on performance criteria.
• Teamwork will improve combined performance.
Thank You!

PROS AND CONS OF CONTRACT DRILLING AND BLASTING

Producers viewpoint on the use of outside vs. in-house personnel and views on the benefits of outside assistance.
Outsource Versus In House

- What Is The Best Alternative for Your Operation?
- Factors - Cost, Safety, Performance, Flexibility Liability, Capital Cost, Capital Requirements, Preference
Four Primary Alternatives

- Totally Outsource the Process
- Outsource Blasting, In House Drilling
- In House Blasting, Outsource Drilling
- Totally In House - Do It Yourself!

Note: There are Subsets or Hybrids of Each

Total Outsource

- Situation- Management Wants to be Super Lean
- Manage the Least Amount of People and Machines
- Lack of Expertise in Blasting
- Wants to Focus on Crushing and Selling Rock!
Total Outsource

- Many May Contract a D&B/Ton- Lowers Risk
- Will Likely Pay a 30- 50 % Premium
- If D&B is 10% of Total Costs of Sales- the 5 % Increase in Total Cost is WORTH IT!

Outsource Blasting
In House Drilling

- Lacks Blasting Expertise and Wants to Limit Liability?
- Has Good Contract Blasting Relationship
- Has Drilling Expertise and Likes Flexibility
- Eliminating Drill Contractor Profit Margin Allows a Decrease in D&B Costs- 17%
Outsource Blasting  
In House Drilling

- Company has Lower Cost of Capital than Contractor
- NEED about 125,000 Ft/yr to Cost Justify Drill Purchase
- Contract Driller is Not an Option

In House Blasting  
Outsource Drilling

- Has Blasting Expertise- People on the Payroll who Know What they are Doing!
- Operator Does not Have the Proper Drills or Does not want to Buy a New Fleet
- Operator has Limited Knowledge of Drilling Process
In House Blasting
Outsource Drilling

• Change in Mine Plan- Must Move very close to Structures
• Cost Increase- Driller Must Make Money- 17%
• Need to Blast About 3 Days per Week To Break Even, Can Save Money if enough Volume is Required at The Operation

In House Blasting
Outsource Drilling

• Blaster Knows the Rules and Conditions, Company D&B STANDARDS
• Storage Issues? Bulk Trucks
• Is Tailgate Service an Option?
Totally In House

- Must Have Expertise in Both Functions
- Requires Specialized Management
- Blasters and Drillers Know the Operation

Totally In House

- Suited Best for Large Volume Operations
- Lowest Cost Option in Many Cases
- Highest Exposure?
CONCLUSION

• There are many Variables to Consider
• Operations Can Mix the Alternatives
• The Volume of the Operation or Operations Often Drive the Decision

QUESTIONS
Different Applications

Different Applications