

**CHEMFORCE**

# Case Study: Enhanced Drilling Performance with Complex42™



Project	91 x 7-8 m deep 600mm Cores
Substrate	Up to 300MPa Basalt
Location	6 Cross St Footscray Melbourne
Date	July 9th, 2023, to August 15th, 2023
Company	Access Excavation
Engineers	Joel & Kyle Dazenko
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Drill Rigs	HPM 100J, IMT A140
Drill Bits	600mm Core Drill, Betek TCT Teeth

Summary of results IMT A140 drill rig using 0.8% Complex42™

**79.6%**

Less Teeth consumed per hole

**43.7%**

Less fuel consumed per hole

**27.4%**

Faster drilling time

Summary of results HPM 100J drill rig using 0.8% Complex42™

**69.8%**

Less Teeth consumed per hole

**39.6%**

Less fuel consumed per hole

**26.5%**

Faster drilling time

Parameter	IMT 140 (Water Only)	IMT 140 (Complex42™)	HPM 100J (Water Only)	HPM 100J (Complex42™)
Avg. Duration/Hole	256 minutes	188 minutes	277 minutes	201 minutes
Avg. Fuel Consumed/Hole	114.47 Litres	69.11 Litres	121.13 Litres	68.09 Litres
Avg. Drill Teeth/Hole	8.83	2.66	9	1.83

## Project Details:

- A construction site for mixed-use development by Valeo saw 91 600mm piles drilled.
- Ground composition: Predominantly basalt with strengths up to -300 MPa.
- The site was located on Quaternary aged basaltic deposits.

## Methodology:

- Equipment: IMT 140, HPM 100J
- Measurements: Duration of drilling, fuel consumed, and number of drill teeth used per hole.

## Key Findings:

1. *Fuel and Operational Efficiency:* Based on a diesel price of \$2.09/Litre Savings of approx. \$95.05 and \$110.07 per hole for IMT 140 and HPM 100J respectively when using Complex42™. Distributed across 91 holes, potential fuel cost savings amount to approx. **\$9,332.96**.

2. *Labour Saving:* Based on a wage of \$50 / hour Saving of approx. 69minutes and 76minutes per hole for IMT 140 and HPM 100J respectively when using Complex42™. Distributed across 91 holes, potential labour cost savings amount to approx. of 6,597.5 minutes or 109.9 hours x \$50 for a total saving of **\$5,497.90**

3. *Teeth savings:* Based on \$18.40/tooth Saving 6.17 and 7.17 per hole for IMT 140 and HPM 100J respectively when using Complex42™. Distributed across 91 holes, potential tooling cost savings amount to approx. 607 teeth x \$18.40 = **\$11,168.25**

4. Tool Wear Reduction:

Significant reduction in wear on drill barrels' hard facing with Complex42™.

Using traditional methods, hard facing would typically last 2-3 days in hard basalt. With Complex42™, the HPM 100J drilled up to 252.6 meters and the IMT 140 achieved a depth of 355.7 meters with only one changeover. The total cost for traditional methods would be: (8 + 11) barrels x \$250 = \$4,750

Hard facing savings amounted to **\$4,500**.

**Total Savings: \$30,499.11**





Complex42™ Consumption and Cost:

- Consumption: About 2.40 liters of Complex42™ per hole.
- Cost per hole: \$26.52.
- Total cost for 91 holes: Approximately \$2,413.32.
- Total Savings: \$30,499.11
- Total savings from using Complex42™ across 91 holes: Approximately **\$28,085.79**

### **Environmental Impact:**

As evidenced by our empirical data, there was a marked reduction in fuel consumption per hole when using Complex42™. Specifically:

IMT 140: An average reduction of 45.36 litres per hole

HPM 100J: A average reduction of 53.04 litres per hole

Considering the combined average fuel consumption reduction per hole is approximately 49.2 litres, and given the number of holes drilled, this translates to a whopping 4,477.2 litres of diesel saved across 91 holes.

*Environmental Implication:* Diesel combustion is a significant source of CO2 emissions. On average, burning one litre of diesel emits 2.68 kg of CO2. Thus, the fuel savings translate to a reduction of approximately 12,000.93 kg of CO2 emissions over the course of the project.

### **Discussion:**

Complex42™ enhanced the drilling efficiency, particularly in hard materials, reducing the friction and allowing for smoother operations. The addition of Complex42™ significantly reduced the wear on drill barrels' hard facing, leading to cost savings, and amplified operational efficiency.

### **Conclusion:**

Complex42™ offers numerous benefits in piling and rock drilling, including reduced costs, increased equipment lifespan, and fuel efficiency. Its use emphasizes a commitment to sustainability, marrying industrial efficacy with eco-friendliness.

