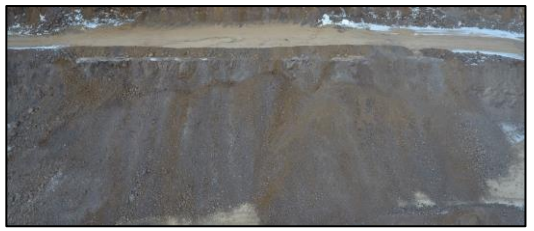
Digital Blasting – Creating the Platform to Achieve Net Zero

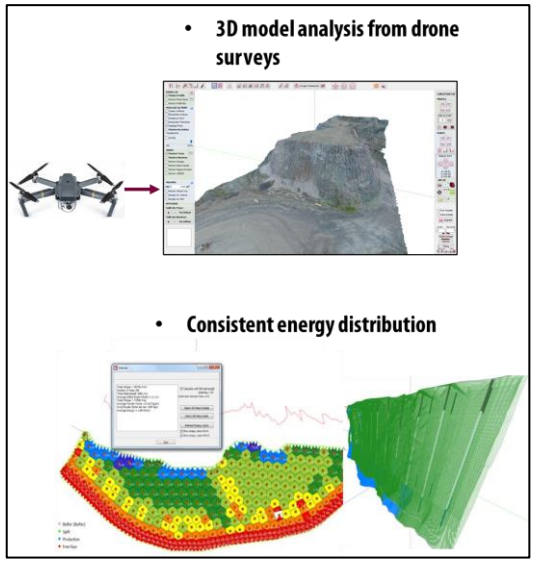
EPC-UK

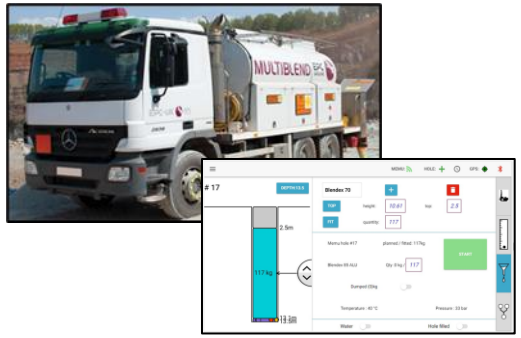
Introduction

- New digital technologies enable us to record and analyse performance in all sectors of a quarrying operation.
- Make use of recorded KPIs on site to monitor and review blast performance.
- By collecting the correct data accurately, it is possible to drive a process of continuous improvement to optimise entire rock breaking process
- Help deliver a net zero carbon footprint through incremental blast refinements and optimisation

Digitalization of the Blasting Process







Drone Technology

➔Implementation of photogrammetry techniques using drones to perform face profiling surveys.

- Models are geo-referenced through RTK surveys

➔Benefits

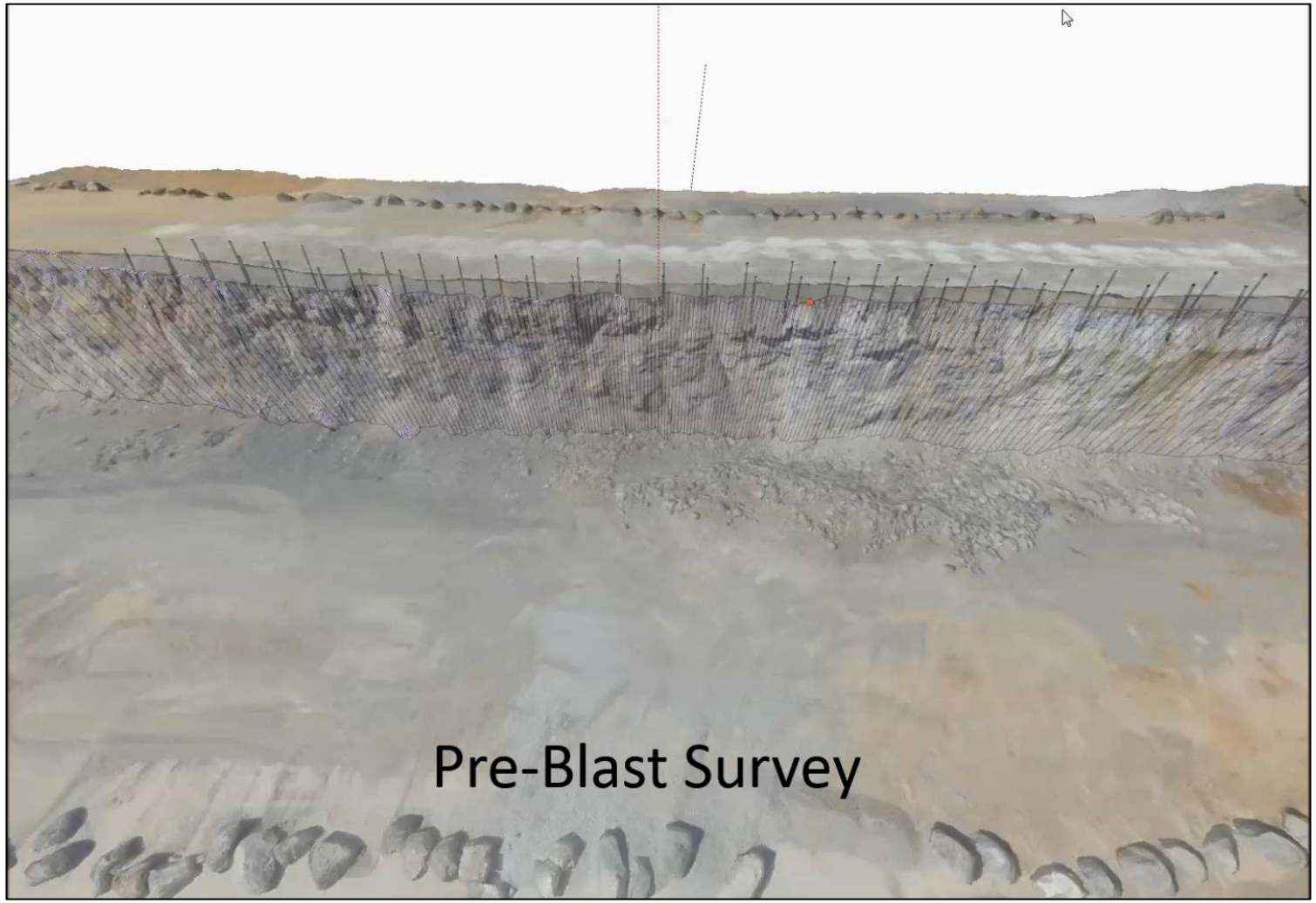
- Safer
- Improved accuracy
- Geological conditions recorded
- Capable of obtaining measurements behind toe bunds
- Faster than surveying where multiple setups would be required

➔Limitations

- Weather

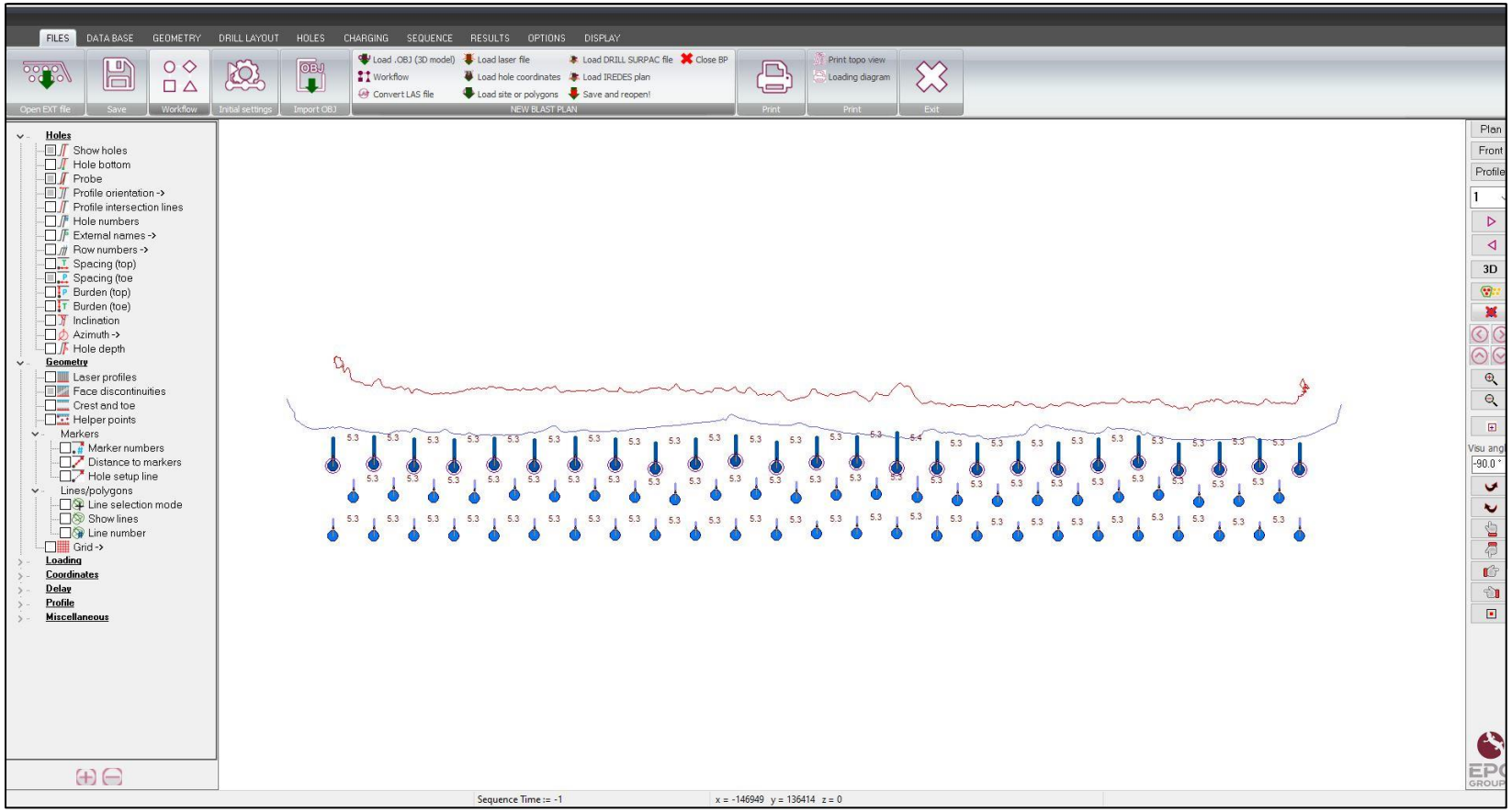
Drone Technology

➔Pre & post blast surveys



Auto drill layout Example

- Blast design in Expertir.
- Blast design algorithms enable automatic generation of blast hole locations.
- Optimised energy distribution.

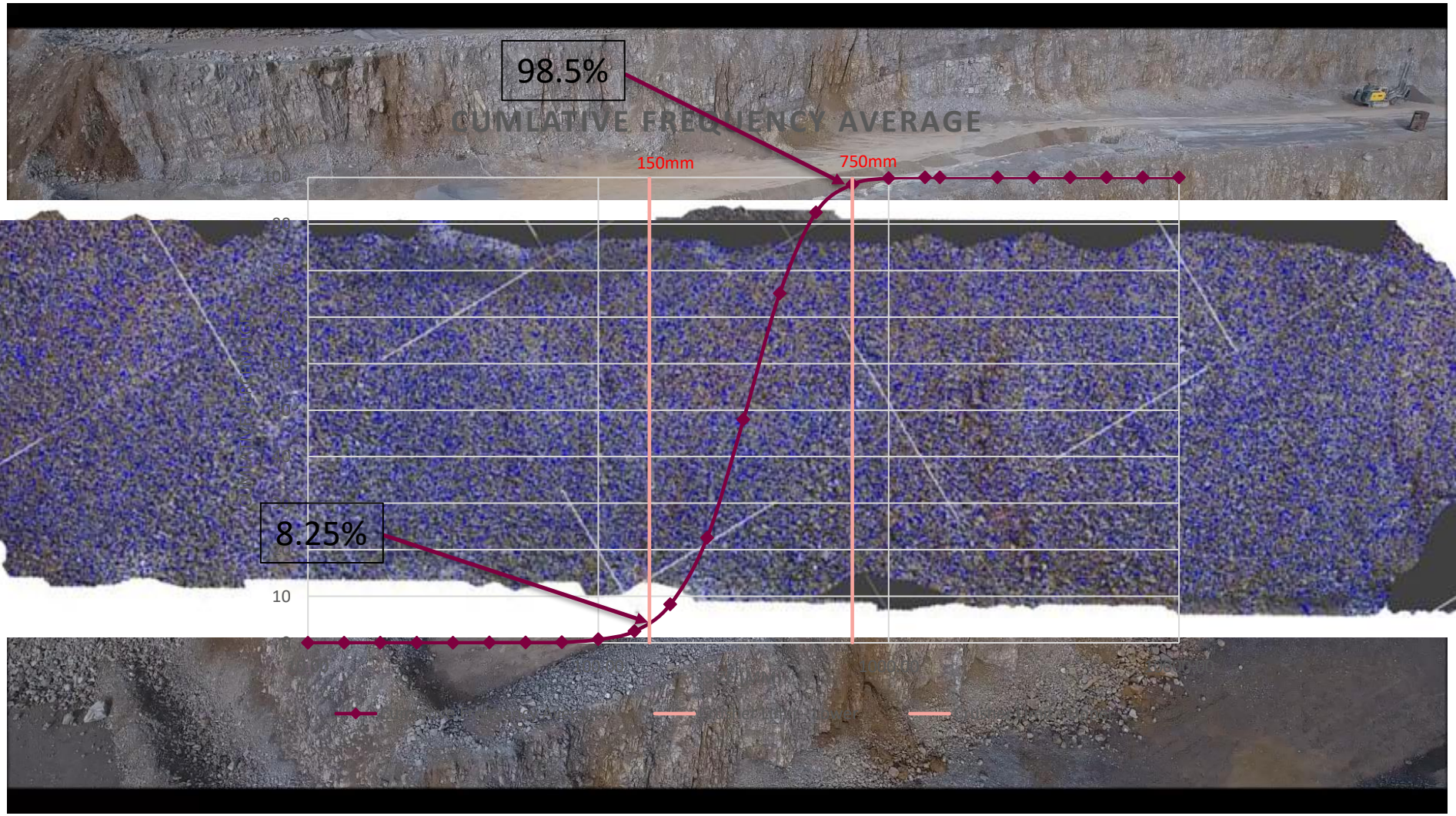


Expertab

- Digital drill logs generated and store on Explore cloud-based storage system.
- Digitally recording drill logs and uploading into Expertir for final design stage.
- Digitally recording hole loading.

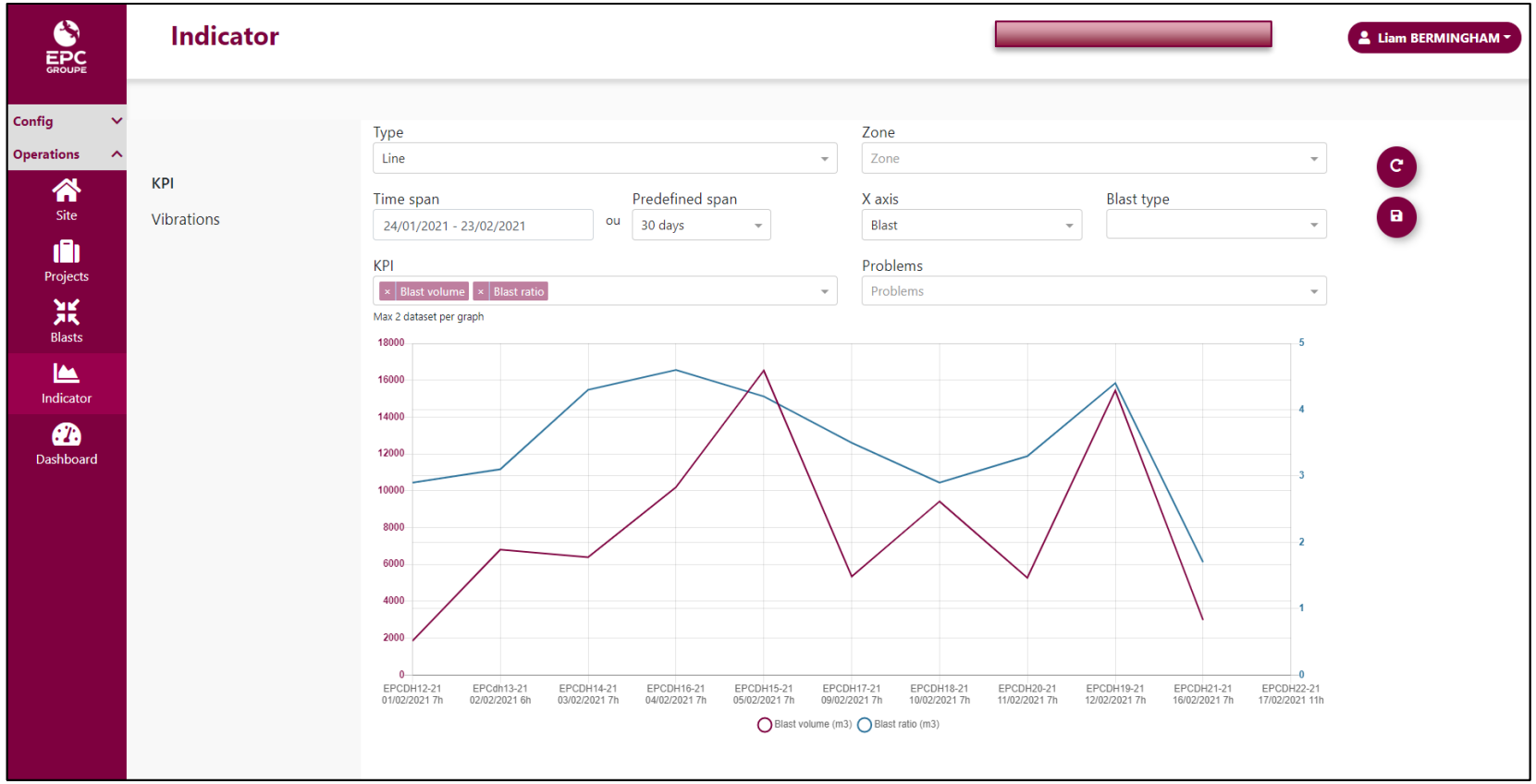
Performance Monitoring

➔Frag Analysis.



Explore Platform

- Storage of data in a centralised location.
- Provides ability to analyse & interpret blast statistics.
- Existing data will allow for efficient decision making in the future.



Performance Review

➔ **In the past, it has been common to carry out qualitative assessments of blast performance**

➔ **Measure, record and analyse data downstream of the drill and blast process**

- Load & haul fleet performance
- Processing plant performance

➔ **KPIs bespoke for the customer**

➔ **Quantify the impact of blasting**

➔ **Drive continuous improvement**

Case Study

➔ **In 2018, the Digital Quarry Project began**

➔ **Objective:**

- To implement the latest digital technologies to the drill and blast process
- To monitor the downstream benefits
- Demonstrate potential cost savings
- Demonstrate reduction in overall carbon footprint

➔ **Location:**

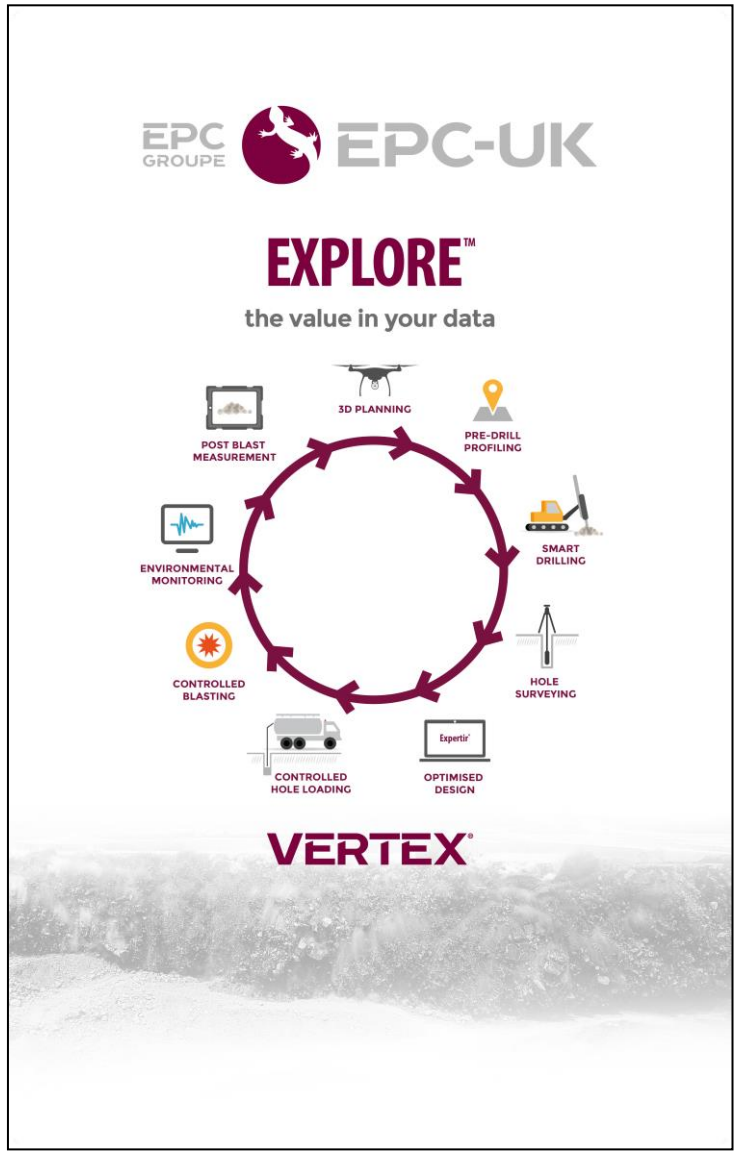
- Large scale limestone quarry

➔ **Technologies implemented:**

- Electronic detonator systems
- Drone surveying
- Expertir software – Digital blast design
- HNS drill rig
- Adaptive hole layout

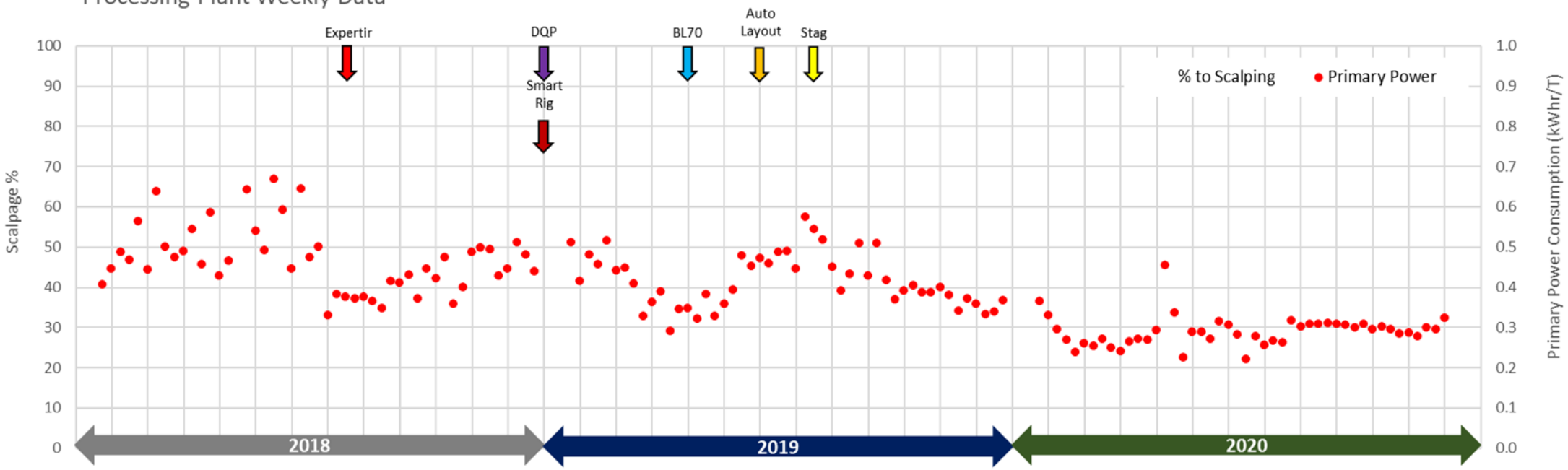
Case Study – Phase 1

- ➔2018 Phase 1 commenced
- ➔Monitor the existing site KPIs
- ➔To provide a baseline for future review
- ➔KPIs chosen
  - Primary crusher's energy consumption (kWhr/T)
  - Percentage blasted material scalped off as waste product
  - Primary crusher throughput
  - Product split



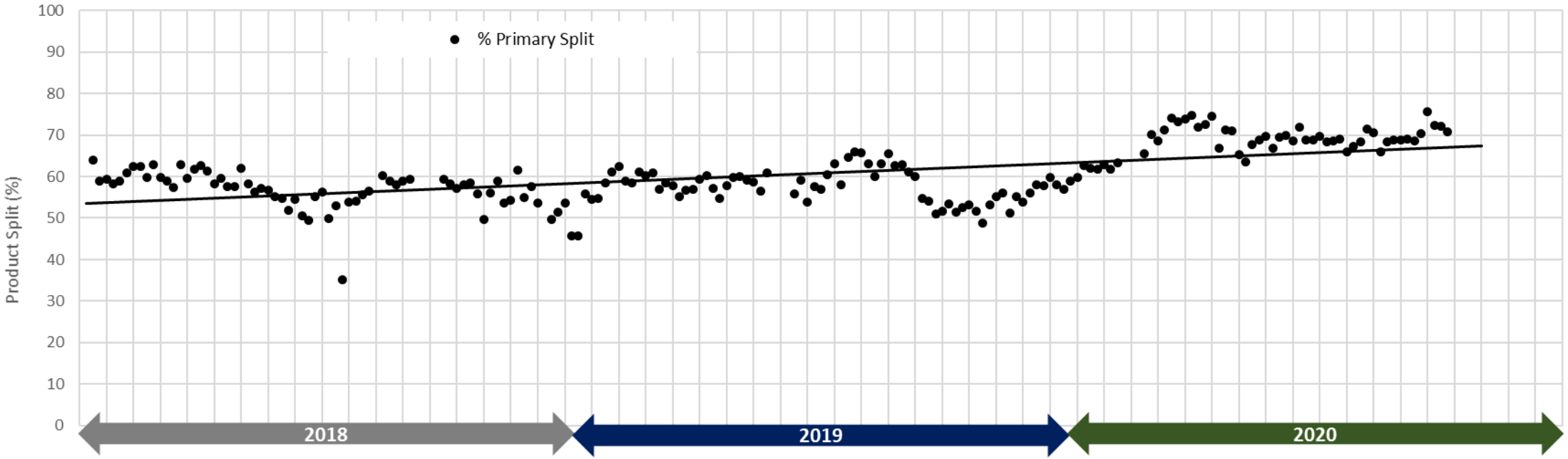
Case Study – Phase 2

- 2016 – Phase 2 average power consumption reduced from 0.42 kWhr/T
- Gradual introduction of new technologies and techniques
- Significant impact downstream of the d&b process
- Total reduction of 38%



Case Study – Phase 2

- During phase 2 the average product split increased by 11% of material fed through the crusher
- Since phase 1, the average product split increased by 13%
- Resulting in less waste and more value retained



Overall Results

- A significant decrease in energy demand of the primary crusher
- An increase in the percentage of blasted material feeding the crusher
- Allowing for increased crusher throughput
- Producing a lower volume of waste material
- Overall, the result has been in improved blast fragmentation which has led to a ‘tightening’ of the particle distribution curve.
- Ultimately resulting in significant cost savings for the customer
- Significant reduction in the carbon footprint

Conclusion

➔**Current technology now enables the drill and blast process to become fully digitalized.**

➔**The Digital Quarry demonstrates the improvements which can be made using the latest technology.**

➔**It is vitally important to measure and record accurate data on site.**

- Provides ability to optimise the drill and blast process for the customers needs
- Frequent review of data allows for fine tuning and drives continuous improvement

➔**Thereby optimizing the entire rock breaking process.**

➔**Helping to deliver net zero carbon footprint.**

Thank you for listening