



# Engine Start Module

## **STOP DOWNTIME BEFORE IT STARTS**

*How ESM Eliminates Deep Discharge -  
Battery-Related Delays in Mining*

Mining equipment faces extreme conditions—long idle periods, multiple start attempts, and harsh environments. These factors lead to deep battery discharges, causing premature failures and costly downtime. PMP Group's Engine Start Module (ESM) solves this problem.

### **THE CHALLENGE: DEEP DISCHARGING IN MINING**

#### **HEAVY-DUTY EQUIPMENT OFTEN EXPERIENCES:**

- Multiple failed start attempts
- Long idle periods with parasitic loads
- Harsh conditions requiring extended cranking

**Deep discharge = battery drained below 50% repeatedly → accelerated damage.**

#### **TECHNICAL IMPACT ON BATTERIES**

- Sulfation: Hardened lead sulfate crystals reduce capacity.
- Plate Shedding: Weakens structural integrity.
- Electrolyte Stratification: Uneven acid concentration causes corrosion.
- Increased Internal Resistance: Reduces cranking power.
- Accelerated Aging: Battery life cut by 50% or more.

#### **OPERATIONAL CONSEQUENCES FOR MINING**

- Frequent start failures
- Increased maintenance interventions
- Early battery replacements
- Higher downtime and lost productivity
- Safety risks during critical operations



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## CONSEQUENTIAL MAINTENANCE ISSUES

### DEEP DISCHARGE DOESN'T JUST KILL BATTERIES—IT STRESSES OTHER COMPONENTS:

- **Starter Motors:** Overheat and wear out faster due to prolonged cranking.
- **Alternators:** Overloaded from frequent recharge cycles.
- **Cables & Terminals:** Heat and corrosion from high current draw.
- **Electronic Control Modules (ECMs):** Voltage drops cause resets and faults.
- **Glow Plugs & Pre-Heaters:** Fail prematurely under low-voltage conditions.

#### How ESM Solves It:

- Ultracapacitor technology delivers instant cranking power.
- Prevents deep cycling by keeping batteries at a higher state of charge.
- Batteries offload the heavy start loads to the ESM, reducing stress and preventing damage.
- Extends battery life by 2-3x.
- Improves reliability for mining fleets in remote, demanding conditions.

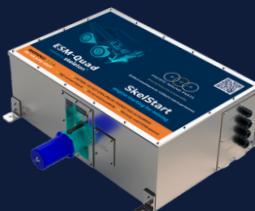
## APPLICATIONS IN MINING

- Haul trucks
- Dozers
- Graders
- Excavators
- Drill rigs
- Loaders

Deep discharge doesn't have to mean downtime. **PMP Group's ESM ensures reliable starts**, protects batteries, and keeps mining operations productive—**even in the harshest conditions**.

## BOOST PRODUCTIVITY & PROTECT YOUR PROFIT

- ✓ Maximum Efficiency & Reliability
- ✓ Lower Operating Costs
- ✓ Reliable +1 million cycle duty life
- ✓ Commitment to Sustainability



## Contact us today!

Learn how ESM delivers reliability that pays off your operations with PMP ESM and boost your fleet's efficiency

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