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Case Study – Ernest Henry Mine: Designing step out zones in an inclined sub-level cave

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ABSTRACT

Ernest Henry mine (EHM) is an underground inclined sub-level caving mine located in north-west Queensland, Australia. First production commenced in late 2011 and it has now ramped up to a rate of 6.8Mt/a. The mine has sublevels spaced with a 25m vertical interval and parallel cross-cut drives spaced at 15m. The orebody dips at 45 degrees to the south which requires a step out zone for each new level. The production process on each level starts with the firing of a blind uphole rise to start the slot extraction before starting each cross-cut by firing into the slot. As level production has progressed, the mine planning and design process has evolved as ore body definition has increased and mining method refined.

Initially the first full production level, below the transition firing from the open pit, was very linear with the main aim to ensure a successful start to the cave. The increased definition of the ore body has resulted in different step out zones on each level. This has included a separate lens in the south-east and a “pinching” of the ore body in the south-west. To maximise value for the business this has resulted in single, duel and angled slot drives used in different step out zones on a level.

The evolutionary process of mine design specific to EHM has resulted in key learnings throughout the process. Duel slots have been designed to decrease the time required to bring a level up to a full production rate from 7 months to 5 months. Initially the use of multiple, single cross-cut restarts was employed to reduce the amount of development and production conducted in waste material. Following this, the use of angled slot drives has been employed to reduce the amount of these single cross-cut restarts by 50%. These design changes have translated into both decreased costs and increased recovery for the operation.