

75: Helix belt – 2000s research in Canada and USA



Figure 153. HPC HELIX BELT
Material ascending the helix belt of the HPC-10 wash-plant. (photo: courtesy of Extrac-TEC www.extrac-tec.com)

The Extrac-TEC HPC helix belt is called by the makers a "transverse spiral concentration belt". The device is a highly innovative form of Archimedes screw, unique to the Extrac-TEC HPC systems. The helix belt, helix cylinder and helix wheel (gold wheel) are three different classes of Archimedes screw used for heavy mineral separation.

The helix belt has ribs that serve as riffles arranged in a helix. The profile of the helix belt is sagged into a bow-shaped gutter-like trough that is gently tilting to drain the tailings down the trough, whereas the settled heavies are hauled up the trough by the moving riffles.

Development began in 1986, the first prototype was completed in 1988, and the first patent was granted in 1993 according to the company website. "...independent analyses showed recovery efficiency close to 95%".

From 1999-2002 the company focused on using the HPC technology for its own placer operations in Canada such as in Anderson Creek in the Yukon.

According to the company (www.extrac-tec.com) fresh patents were filed in 2003 for the more advanced 'Generation-2' version using the helix belt.

Operation

Pay gravel is dumped in a hopper that feeds a scrubbing/screening trommel that is an integral part of the Extrac-TEC HPC wash-plant. Screening is at 6mm, 13mm or 25mm. The washed undersize is fed as slurry to the helix belt. The helix belt rotates as a reverse helix that functions as an Archimedes screw. The helix belt is tilted at a gentle angle sufficient to ensure water and lights fed onto it are washed down-slope. Water and lights travel down the central valley of the helix belt by spilling over each rib (riffle) sequentially. Arriving at the bottom end of the helix belt, the lights discharge as tailings.

The belt's motion and water flow cause heavies to settle on the helix belt. Any heavies escaping over a rib are trapped and re-processed by the next rib. Once settled on the helix belt, heavies are inexorably hauled up the slope by tangential motion of the ribs (riffles).

Arriving at the top end of the helix belt, the heavies continuously discharge into the concentrate sluice.

The bed-profile, inclination, characteristics of the reverse helix, water flow and belt speed are configured to produce the solids density desired (0.1 to 40% by weight).

The helix belt ensures concentrate fed to the sluice is properly pre-concentrated, and prevents surging and so flow is steady down the sluice and optimized for gold recovery. This reduces water consumption, and the manufacturer claims that gold recovery is increased "down to 40 microns". A high concentration ratio is achieved and so the final concentrate is reasonably clean.

Adoption by placer gold miners

The Extrac-TEC HPC wash-plant with its helix belt has become widely available over the last few years, and some are operational in most continents, and early versions were sold in Canada, China, Mexico and USA.

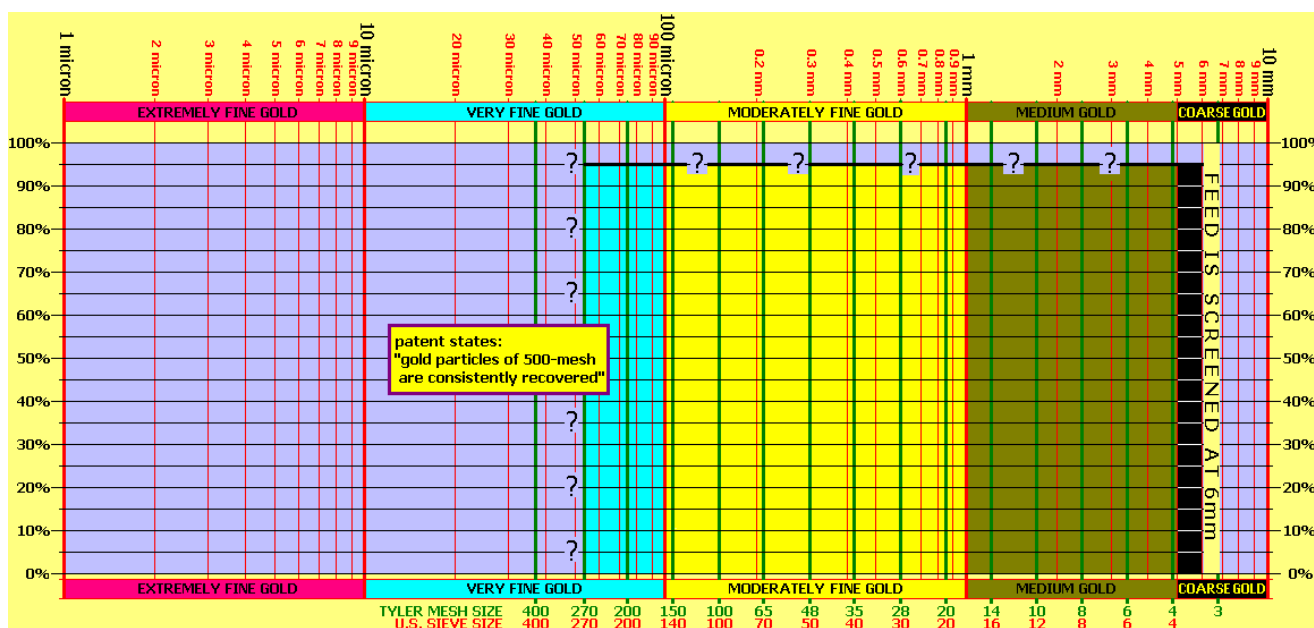


Figure 154. GOLD RECOVERY BY THE EXTRAC-TEC HPC HELIX BELT – generalised
Recovery of placer gold by the Extrac-TEC HPC helix belt, according to information from the manufacturer. (compiler: Robin Grayson)