



Home of the
MERGER MINER
 Using Lasers for
The Future of Mining
208-664-8801

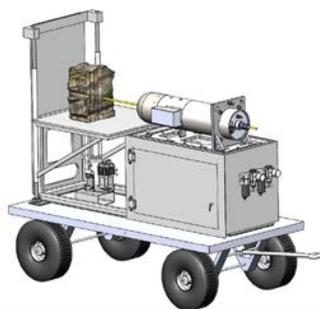
The Merger Miner Designed specifically for narrow vein mining.

U.S. and International
 Patents Pending
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The Merger Mines corporate engineering staff has nearly completed CAE Modeling of the Scan Head, Test Unit, Characterization Unit and the Merger Miner Unit itself, with engineering documentation well underway. Component suppliers and our manufacturing base are eagerly awaiting release of documentation to move ahead.

Modern technology, creative thinking and long-time experience have been combined to harness the power of the fiber laser to augment and make profitable the mining of narrow veins of precious metals as well as gem stones in remote areas of the planet and possibly elsewhere as well. Merger engineers, based on studies conducted at Argonne National Laboratory in their Laser Application Laboratory in the early 2000's, and on later presentations by various organizations have expanded and extrapolated additional data that given the "right parameter" a laser beam could be configured to work within that narrow regime between just heating a rock and melting or vaporizing the rock. That regime is "thermal fracturing" or "spallation".

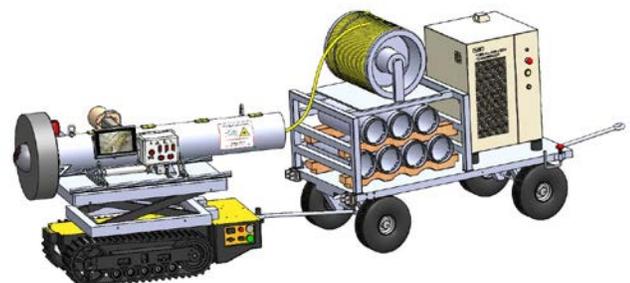
Merger believes that it has determined the ideal irradiation zone size and is near to determining the irradiation duration and laser power to fracture the chemical bonds between molecules found typically in the quartz and granite geologic structures where the sought after materials have been formed over the millennium. Our definition of an ideal spall is about half a cubic centimeter or about the size of a "pea". (the diameter of the "spot" size and about half the diameter in depth.)



Lab Test Unit

To make that determination, Merger engineers, along with mechatronics partner, Frencken-America, have designed a universal Test Unit which will be initially used in the IPG Photonics laser test laboratory. In the lab, IPG will be able to empirically thermally fracture or spall a number of geologic samples furnished by Merger and our underground mining and system training partner, Groundhog Mining and Milling, LLC. This series of tests will define the range of laser power needed and will allow tuning of the software for both the laser and the scan head. The Test Unit will be subsequently used, with a much lower power Helium Neon (HeNe) laser to verify scan patterns in production Scan Heads.

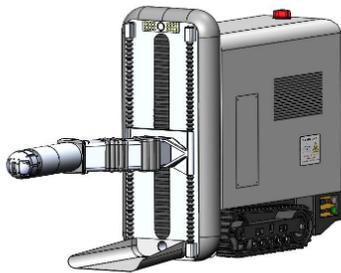
Recognizing that the geologic structure varies from mine site to mine site, Merger has developed a Characterization Unit. This unit, mounted on Movex Innovation's heavy duty "Track-O" electrically driven, low profile vehicle will be transported to a customer's site and be used to determine the exact power density and scan dwell time necessary for optimum spallation at the site. That data will then be pre-programmed into the Merger Miner or any derivative thereof. The Characterization Unit, with its companion



Characterization Unit

laser and material collection system can be augmented with an appropriate power generation system as well as an air compressor should these items not be available on site.

The Merger Miner is also built on the Track-O vehicle with the Scan Head carried on a Robotic Arm. The Robotic Arm's movement is software controlled allowing the arm to move the Scan Head to carve



The Merger Miner

out any pattern selected. (see the Pattern Selection Sequence illustration below) Since most narrow veins are anywhere between 3" and 18" wide and varying and generally on a decline, the movement of the Scan Head may be easily programmed to remove waste rock from below the vein material, then the vein material itself and finally the remainder of the waste. This over a surface area of some 16 square feet (32" wide X 72" height) and extending about 12" inches deep. A single Scan Head is predicted to spall a minimum of 2.7 tons of material per hour. To guide the Miner along a drift, it is equipped with a video camera and illumination system allowing an operator to maneuver the Miner remotely. With inclusion of some additional monitoring equipment, it is not difficult to imagine a completely autonomous mining system.

Pattern Selection Sequence



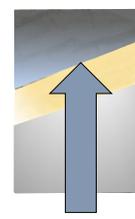
TYPICAL
FACE



SELECTED
PATTERN 1
(WASTE)



SELECTED
PATTERN 2
(ORE)



SELECTED
PATTERN 3
(WASTE)

The Arm allows to Scan Head to present the smallest aperture necessary for performing the thermal fracturing or spallation task. The aperture window must be protected from flying debris as well as any accumulation of dust to preclude damage from the laser beam itself. The waste may be directed in one direction for use as backfill and the vein material another for further processing. Merger believes that the vein material could go directly to a ball mill and then to a flotation pond or to a leach pad.

While a single Scan Head unit is built for the smallest aperture allowing a man passage, 32" x 72", larger openings may be produced by adding additional Scan Heads on the Track-O vehicle. Merger believes that a single laser may serve two Scan Heads.

Because of the degree of automation, multiple faces, with additional Merger Miners, may be worked simultaneously. An operator who wishes to operate in a raise between two known drifts any consider a fully self-contained unit that mines from the lower drift upward, following a vein, using gravity for material collection and possibly using forms attached to the mining unit for placement of waste as backfill as the unit moves ever upward.

Keeping in mind that the Merger Miner is an augmentation to today's mining practices but has the potential to be used for driving drift or even for mine development uses.

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