THE UNIVERSITY OF ARIZONA
COLLEGE OF ENGINEERING
Department of Mining and Geological Engineering

MST

University of Arizona

Project / Site Name: AXON Network Infrastructure San Xavier Mine

Project / Site Location: **San Xavier Underground Laboratory**

Project Timeline: 1Q2023

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The University of Arizona San Xavier Underground Laboratory is an underground copper, silver, lead and zinc mine with a Vertical Shaft (No. 6) and four levels (250 feet deep). The mine currently utilizes three underground levels (surface level, 100-feet deep level and 150-feet deep level), two of which are serviced by the primary shaft. Located 23 miles south of Tucson, the Henry G. “Hank” Grundstedt San Xavier Mining Laboratory has one of the nation’s most sophisticated research hoisting systems, two declines for access of rubber-tired vehicles and legacy rail haulage access.

The San Xavier mine operated from 1880 until 1952, producing silver, lead, zinc, and copper. University of Arizona's then College of Mines began operating the No. 6 Shaft in 1958 and has owned it since 1975.

No.6 Shaft and Hoist headframe views

A newly developed 15 x 15 feet decline will eventually run over 1,500 feet long.

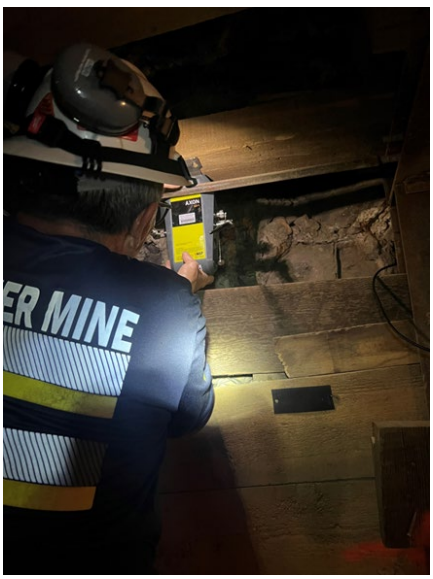
Decline portal 15'x15'

Drill on working face

MST's AXON digital platform will provide an underground fiber network infrastructure for Wi-Fi communications and personnel tracking to the mine. It will play a critical part in the safety and productivity program for research, teaching and training opportunities for students and faculty. Good connectivity ensures reliable communications and knowledge of the location of all personnel, which is important in the day-to-day operation of a mine but becomes vitally important in an emergency.

AXON Core, Composite Fiber Cable,

and UPS AXON Mini installation



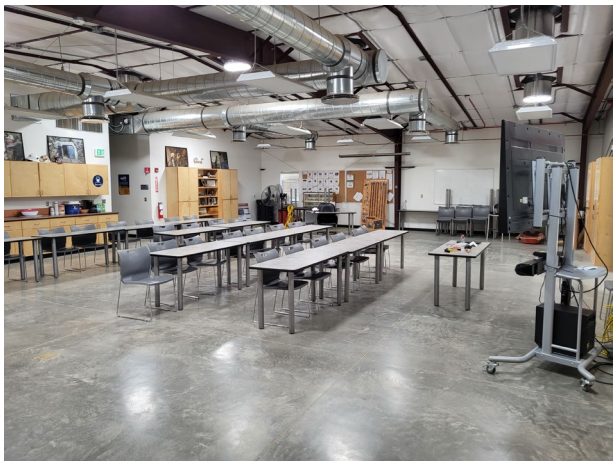
AXON Air+ installation

The state-of-the-art fiber infrastructure network will modernize the mine, facilitating future growth and expansion while supporting the latest mining technologies.

MST's HELIX enterprise software platform will provide all the luxuries of a modern interface and platform while building a digital ecosystem in San Xavier mine. HELIX 3DConnect is the eyes and ears underground, providing location of personnel, fixed and mobile assets, and technology devices underground, giving a total overview of the operations in real time, including the integration of surface map.

These improvements should move University of Arizona to the top of the list of underground mining laboratories for research and education, exceeding similar facilities found at the Colorado School of Mines, Montana Tech, and Missouri University of Science and Technology.

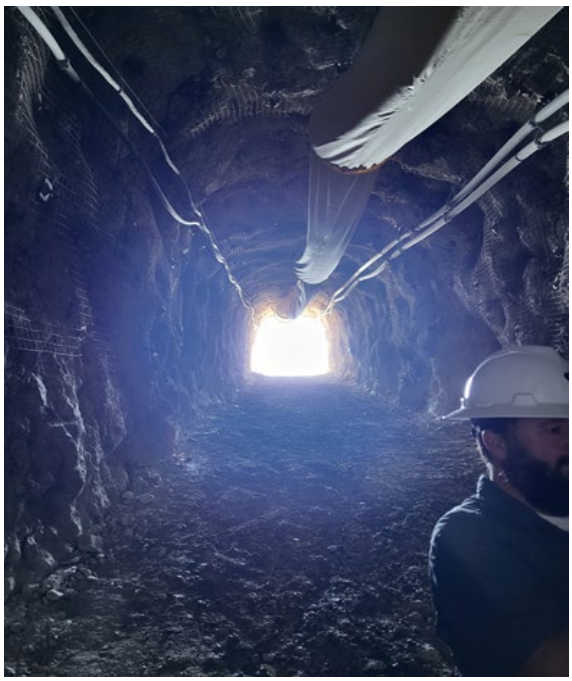
San Xavier Mine view from the South



Student classroom at San Xavier Mine

Deployed infrastructure consists of MST's hardware deployment consists of AXON Core digital network switch platform, AXON Air+ Wi-Fi and Bluetooth access points, AXON Mini UPS with remote monitoring and MST's personnel tracking tags.The HELIX software suite will be installed on local virtual machines.

Underground workings



Decline and ventilation.

About The University of Arizona College of Engineering

The College of Engineering was founded when the University of Arizona was established in 1885. For more than 135 years, our students, faculty and alumni have explored, shaped, and made habitable the world – indeed the universe – in which we live. Today, graduates of the college, which offers 16 undergraduate degrees, are entrepreneurs who develop high-tech companies, create jobs, and improve our quality of life. The college has $59 million in annual research expenditures, and U.S. News and World Report ranks the University of Arizona as a Top 50 Public University. For more information, visit www.engineering.arizona.edu