

# Horizon Sensing (Proposal #51) Quarterly Report (11<sup>th</sup>) 41050R11

Report Period Start Date:	<b>July 2003</b>
Report Period End Date:	<b>September 2003</b>
Principal Investigator/Author:	<b>Larry G. Stolarczyk, Sc.D.</b>
Project Period:	<b>36 months</b>
Project Start Date:	<b>20 December 2000</b>
Report Issue Date:	<b>31 October 2003</b>
DOE Award No.:	<b>DE-FC26-01NT41050</b>
Name of Submitting Organization:	<b>Stolar Research Corporation</b>
Address:	<b>848 Clayton Highway Raton, NM 87740</b>
NETL Project Manager:	<b>David M. Hyman</b>
Total Project Cost:	<b>\$1,817,506.00</b>
DOE Share:	<b>\$ 857,217.00</b>
Participant Share:	<b>\$ 960,289.00</b>



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## **Abstract**

Real-time horizon sensing on continuous mining machines is becoming an industry tool. Installation and testing of production-grade Horizon Sensor (HS) systems continued this quarter at Monterey Coal Company (ExxonMobil), Mountain Coal Company West Elk Mine (Arch), and Ohio Valley Coal Company (OVC). Monitoring of system function, user experience, and mining benefits is ongoing. All horizon sensor components have finished MSHA (U.S.) and IEC (International) certification.

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## Project Objectives

To demonstrate the feasibility of real-time stress measurement, bit loading, and horizon sensing on a longwall shearer, boring machine, continuous miner, and loading bucket.

## Project Cost Summary

	First Year		Second Year		Third Year		Total	
	Plan+	Actual*	Plan+	Actual*	Plan+	Actual*	Plan	Actual
<b>Participant</b>	<b>320</b>	<b>1,960</b>	<b>320</b>	<b>3,360</b>	<b>320</b>	<b>3,360</b>	<b>960</b>	
<b>DOE</b>	<b>303</b>		<b>298</b>		<b>298</b>		<b>900</b>	
<b>Total</b>	<b>623</b>		<b>618</b>		<b>618</b>		<b>1,860</b>	

Amount in thousands of dollars

Key:

+ Planned costs for the full year

\* Actual costs through the reporting period. Based on full Stolar Research Corporation staff deployment on the Horizon Sensor Project at \$280K/month

## Experimental Timeline

The major program milestones to date are on schedule and include:

<i>Complete</i>	<i>Date</i>	<i>Percent Completed</i>
Completed Certification (U.S. and Australia)	September 02	100
Dual-Frequency Capability HS Accelerometer Triggering	November 02	100
Clean Coal Technology Program (Illinois)	February 03	100
U.S. Production Miners (4 total)	February 03	100
U.S. Longwall Shearers (3 total)	March 03	100
Clean Coal Technology Program (Ohio)	March 03	100
HS-HW (Highwall HS system) being developed	March 03	100
HS-HP (Head Positioning) product launched	June 03	100
Forward-Looking Radar Development begun	June 03	60

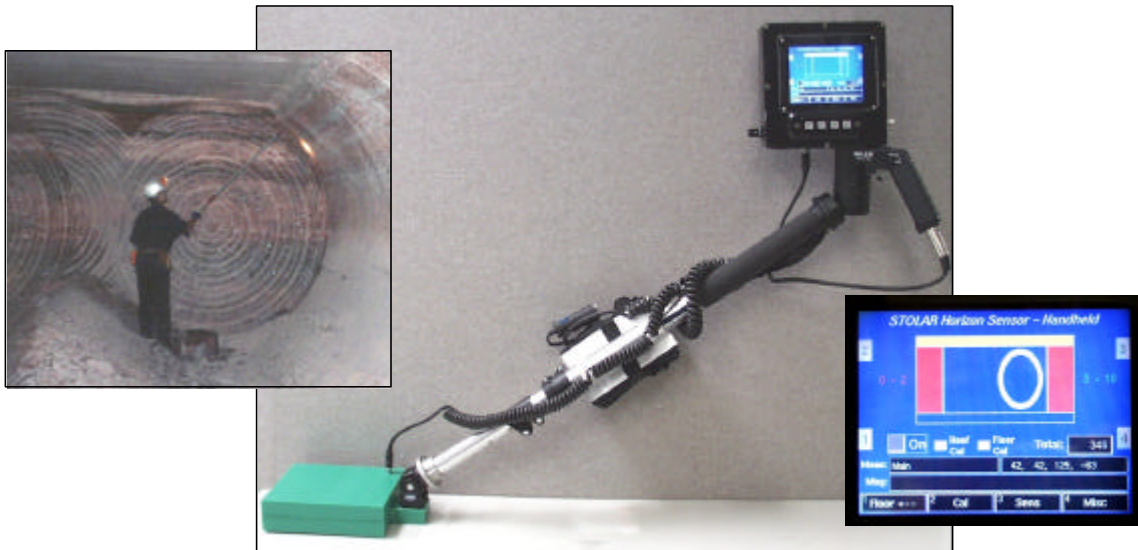
## Results and Discussion

### Project Progress-to-Date Highlights

- Field Installation Approvals (RAMP) are pending for Joy 7LS shearers and Voest-Alpine AMB-14 continuous miners. These approvals already exist for Joy 12CM-12 continuous miners, Joy 4LS longwall shearers, and Marietta Bore Miners.
- An additional HS-CM unit was recently installed at Monterey (EXXON). This brings their total systems in the last 20 months to four (two HS-CM and two HS-LW).
- HS-LW evaluation at the Deserado Mine has been delayed until new shearer delivery. Evaluation continues at Ohio Valley Coal (Mine No. 6) through September 2003.
- A highwall mining system has been developed and will soon be implemented at Massey Energy and Lee Ranch Coal Company (Peabody owned).
- Two major technical improvements have recently been made: control of the master graphical user interface via hard-wired remote display, and multiple calibration windows within a single system for geologic variety.
- HS-Radar continues to be developed for forward-looking void detection.

### Additional Highlights

- A man-portable, hand-held HS unit has been developed for uncut coal thickness verification (as well as trona, potash, etc.). This new unit, termed HS-P, has been used for in-mine geologic testing of HS technology and is proving to be interesting to mining companies as its own product line.



*Man-portable, hand-held HS unit*

One new field installation:

- HS-Continuous Miner: Monterey Coal Company, Joy 12CM-12 Continuous Miner

Five pending field installations:

- HS-Continuous Miner: Consol Mine (TBD), Pennsylvania, Voest-Alpine ABM-14 Continuous Miner
- HS-Longwall Shearer: Robinson Run Mine, Pennsylvania, Joy 7LS Shearer
- HS-Continuous Miner: Massey Mine (TBD), Kentucky, Superior Highwall Miner
- HS-Continuous Miner: Lee Ranch Coal, New Mexico, Superior Highwall Miner
- HS-Continuous Miner: West Elk Mine, Colorado, Voest-Alpine ABM-25 Continuous Miner

Additional highlights:

- A monitoring program is under way at Ohio Valley Coal to assess the impact that HS usage is having on run-of-mine (ROM) coal quality and production improvements.
- In particular, it has been found that the Ohio sections of the Pittsburgh seam are high in sulfur and mercury within the top 6 inches of the seam.
- The HS system is currently being used to selectively cut below this level, and coal samples are being analyzed to verify improvements in mined coal quality.

## **Conclusions**

### **Productivity Improvements**

- The total tonnage, shifts, and operational hours are being documented at Monterey, Twentymile, FMC, Oxbow, Deserado, West Elk, and Ohio Valley Coal.
- There are no outstanding engineering tasks left to “optimize” the performance of the system. Some improvements are being made for user concerns and ease of maintenance.

### **Safety Improvements**

- “Forward-looking” capabilities are being developed that will allow the HS (HS-Radar) to detect anomalies in the coal seam ahead of mining, such as dikes, faults, and abandoned mine workings. The HS-Radar prototype is being tested using a salt wall to simulate 25 feet of unmined coal seam.

## **Good News!**

TBD

## **Project Recognition**

- “The World of Smart Mining,” *World Coal* magazine, May 2001
- “Breakthrough Technology,” *World Coal* magazine, May 2002
- “A Clearer Image,” *World Coal* magazine, December 2002
- “Sensing the Future,” *World Coal* magazine, May 2003
- Numerous trade show and exhibition demonstrations of HS products and simulations
- Recipient of the R&D 100 Award for breakthrough technologies from *R&D* magazine

## **Project Assessment**

(internal DOE use only)

- Open issues and/or problems

None noted

- Overall assessment

Off to a good start

## **References**

None