

***Providing Information to Manage
Your Drilling and Blasting***



The DEI-X is the latest addition to Thunderbird's family of drill monitors for rotary blasthole drills that date back to the early 1980s. It is truly a revolutionary product with features and capability unmatched in the industry. These include Wi-Fi connections to the mine office, displaying drill pattern maps to the operator, strata-logging, cameras, and logging hole position with LPGPS. The DEI-X platform can also be readily upgraded to a Drill Guidance system for those mines that may require a navigation system at some point in the future.

Thunderbird has been supplying instrumentation to the surface mining industry for over 20 years. A full range of on-board monitors and software solutions are available from Thunderbird to insure that each customer is provided the right product to meet your needs.

The DEI-X will reduce your drilling and blasting costs

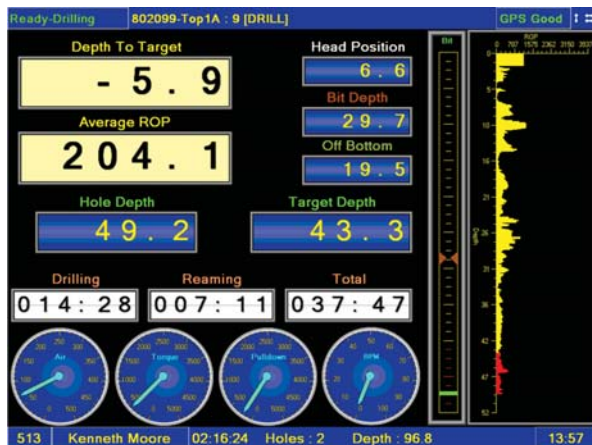
DEI-X

DRILL MONITORING SYSTEM

DEI Systems

Thunderbird's DEI family of products includes or will include:

- Basic drill monitoring
- Data logging using Wi-Fi or USB for uploading or offloading of data
- Strata recognition using Specific Energy of Drilling algorithm
- PDA for viewing drill fleet status or texting drills
- Health monitoring
- Interface to drill PLC systems
- Camera ready for added safety
- Rock Recognition
- DEI+Nav—HPGPS Drill Guidance
- Backbone for remote control and autonomous

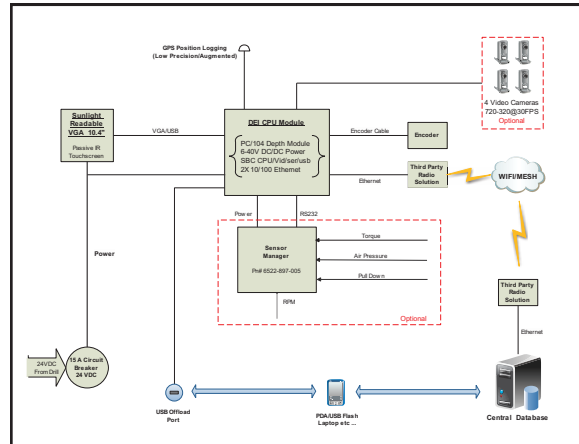


Drilling Screen with Overdrilling Warning

Operator Display

- Sunlight readable, VGA, touch display
- Enhanced graphical interface
- Drilling parameters and times
- Overdrilling and Pipe-in-the-Hole warnings
- 3D views of pattern and drilled holes
- View single or multiple drill patterns
- Show bench terrain and contours
- Surface features including operator warnings for 'no entry' or danger zones
- 2 Way text messaging

DEI-X On-Board System



- Intel Atom 1 GB Ram Processor & 16GB Compact Flash Memory
- Water & dust proof (IP65/NEMA 4)
- Upgradeable from older Thunderbird DEI Plus or Logger systems
- Built-in shutdown circuitry to insure no data is lost
- Outputs for audible or visual alarms
- Optional upgrades include: Sensor Manager, cameras, GPS receivers
- CAN bus available for health monitoring
- Integration with Fleet Management Systems
- Remote internet access for support and system upgrades
- Available for all makes and models of rotary blasthole drills

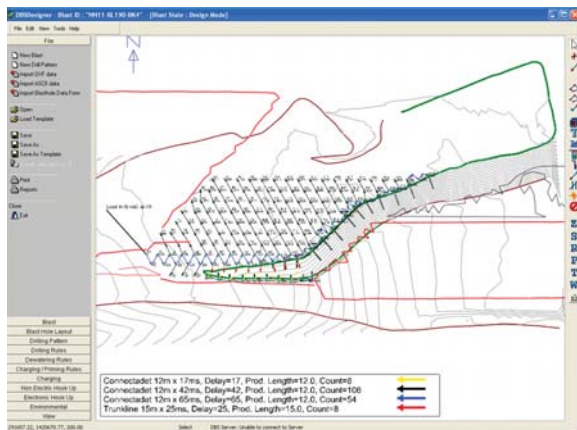
Data Logging

- Operator and Sampler ID numbers
- Pattern and hole numbers
- Tracks all time and drill status
- Pre-shift inspections
- Delay codes and downtime
- Drill bits, drill stem components
- Track over or under drilling
- Operator comments on the holes
- Optional sensors values and Drilling Index or Specific Energy of drilling
- Optional drill and hole locations

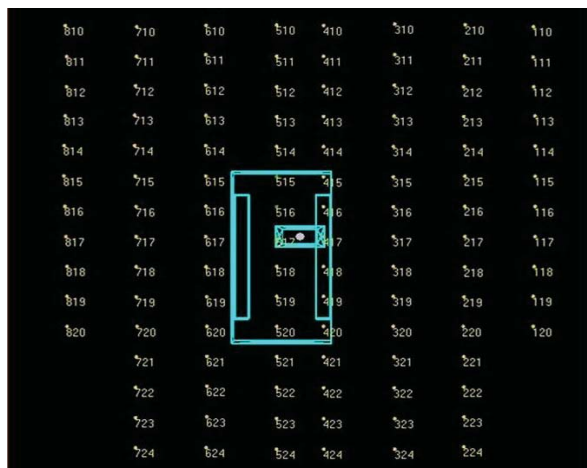
System Options:

Drill Pattern Maps

- Upload via Wi-Fi or USB drill pattern maps on to DEI-X operator display
- Operator trams to surveyed hole locations and touches hole number—system displays all hole parameters
- DEI-X logs hole number, actual vs. planned depth, & drilling conditions
- Status of all holes on the pattern are displayed to all drills: drilled, undrilled, or redrilled
- Add a HPGPS or LPGPS receiver to log approximate hole location and position of the drill on the pattern
- 3D views of pattern and drilled holes with strata information



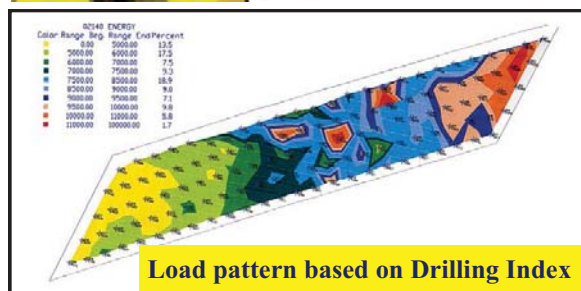
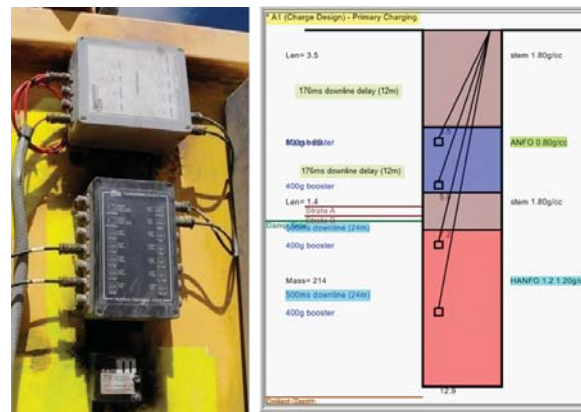
Designed Drill Pattern



DEI-X Screen with Pattern Displayed

Stratalogger

- Optional Sensor Manager & sensors
- Allows for monitoring of pull-down, torque, RPM & air pressure, and providing operator KPIs
- Real-time display of Drilling Index
- Recorded data can be used to more accurately load the pattern leading to improve blasting with better fragmentation and reduce costs



Load pattern based on Drilling Index

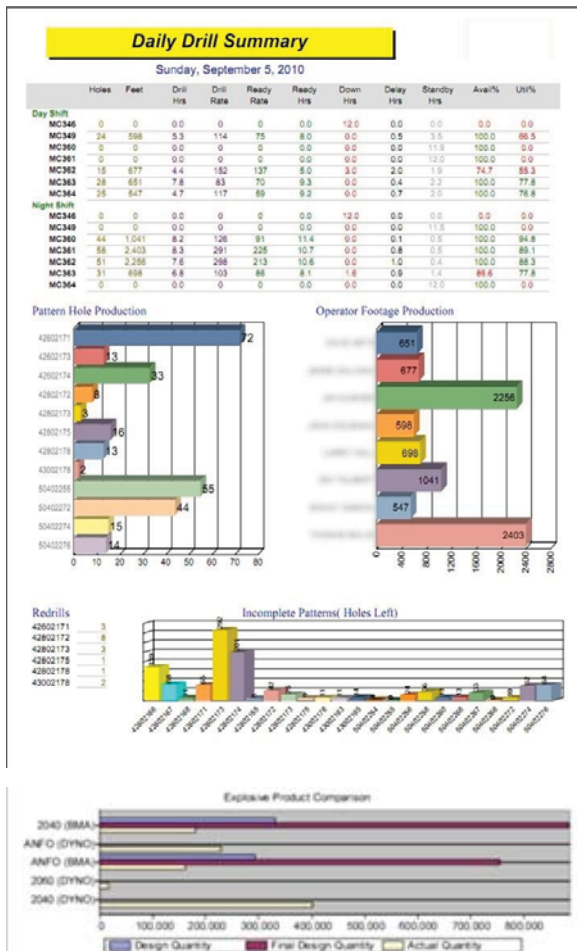
Cameras

- Multiple fixed and/or Pan/Zoom/Tilt cameras
- Integrated into DEI-X Operator Display
- Improve safety and productivity



Central Office System

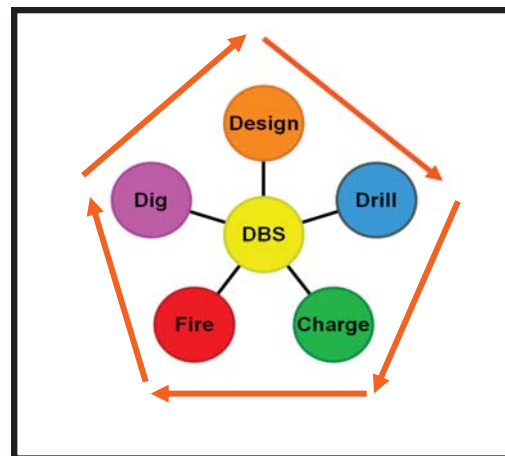
- Full suite of drill reports including operator KPIs
- Microsoft SQL database
- Microsoft SQL Reporting Services used for report generation
- SQL queries easily done
- Easy to export data to other databases
- Integration with DBS blasting software



Why Choose the DEI-X System?

- Meets the customer needs because it is being designed by the most knowledgeable team in the industry
- Operator interfaces and numerous other features unmatched by any other system
- Upload pattern maps to increase accuracy of drilling and data collection
- Enhanced add-ons: Sensor Manager, Strata Recognition, Cameras, & GPS
- Remote access via the internet
- Easily upgradeable to full navigation system when required
- Will provide the mine with a higher ROI because of the pricing and enhanced features

DBS Drill & Blast Software



- Manage Topography and Surfaces
- Layout Blastholes
- Charge Blastholes
- Collect Drill and Blasthole Data
- Manage Drill and Blast Consumables
- Report on Drill and Blast Performance

*Fully Integrated and Available
from Thunderbird*

Thunderbird Mining Systems
2609 – 151st Place N.E.
Redmond, WA 98052-5522 USA
Phone: (425) 869-2727
Fax: (425) 869-2735
Email: mining@tbirdpac.com
Visit our web site:
www.tbirdpac.com