

The GICHD Tool for Management of Mechanical Demining Operations

In response to a need for an operational management tool for the mechanical demining community, the Geneva International Centre for Humanitarian Demining developed a system called the Management Tool for Mechanical Demining Operations. This system increases the efficiency of mine-clearance operations by using a database that organizes and creates data reports. GICHD is working to improve the system including the addition of a GPS tool in 2012.

by Pehr Lodhammar [Geneva International Centre for Humanitarian Demining] and Erik de Brun [Ripple Design]

Mechanical demining systems can greatly increase the effectiveness and efficiency of mine-clearance operations. In the past, only some commercial companies and very few noncommercial organizations used machines regularly, but today most make use of them in at least some capacity. Also, in recent years, the number of machine manufacturers has steadily grown, and many different types of machines and systems exist.

The Geneva International Center for Humanitarian Demining has researched and studied machine-deployment practices and the cost-effectiveness of various mechanical demining systems. GICHD found that the success of operational mechanical demining programs depends on several key elements:

- Appropriate machine-type selection
- Effective operational management
- Administration of mechanical demining operations
- Planning of mechanical demining operations
- Proper understanding of how various machines are best utilized (i.e., as stand-alone systems or jointly with other assets)

The research also revealed some unmet needs in mechanical demining:

- Operators require increased flexibility and versatility during field operations. As a result, machines are increasingly developed to support multiple working tools, such as tillers and flails. Despite the improved design of machines and their increased use, much room for improvement remains regarding how machines are deployed and how performance data is captured and processed.

- In general, mechanical demining systems in the field often are underused, which is also known as downtime. If the role of the machines in technical survey (when used alone or when combined with other methods) was more appropriately defined, overall operational efficiency would increase. Far too often, machines are not used effectively, suggesting untapped potential. This can be due to poor management and planning, a lack of logistics, or external factors such as the weather or poor security. Given the increase in mechanical demining among operators and national mine-action programs, the demand/need for assistance is likely to remain high and may increase in the coming years.
- The increased use of machines requires central coordination and support to ensure that information or experience with promising conceptual/technical innovations, as well as general global empirical experience, are shared with the community at large.

Using funds provided by the Governments of Switzerland and Sweden, GICHD worked to address these needs by developing a software tool designed to aid in the operational management of mechanical demining in 2011. The Management Tool for Mechanical Demining Operations helps minimize vehicle downtime and maximize output during mechanical demining operations. This process is done by enabling the collection and review of machine-specific operational and nonoperational data.

The GICHD Web page and GICHD training interventions made the tool accessible to the mine-action community. Based on positive operator feedback and requests from the users of the mechanical demining systems, the initial,



Figure 1. Demining Management Tool: Main Menu.



Figure 2. Demining Management Tool: Admin Data Entry.

mechanical, demining-centric tool was expanded to support the management of animal detection and manual-demining operations and is known as the Management Tool for Demining Operations.

Description

The Management Tool for Demining Operations is a simple, macro-enabled, Microsoft Excel® database. This tool tracks the performance and downtime of mechanical, manual and animal detection demining assets. It was developed primarily for field/site management and is intended to:

- Be user-friendly
- Require only a short daily or weekly time commitment
- Augment, rather than replace, existing reporting/tracking processes

The database collects operational data (i.e., performance) and nonoperational data (i.e., downtime) for each working asset every work day. The data is then compiled into a series of summary reports, which can be viewed, printed or saved as PDF documents.

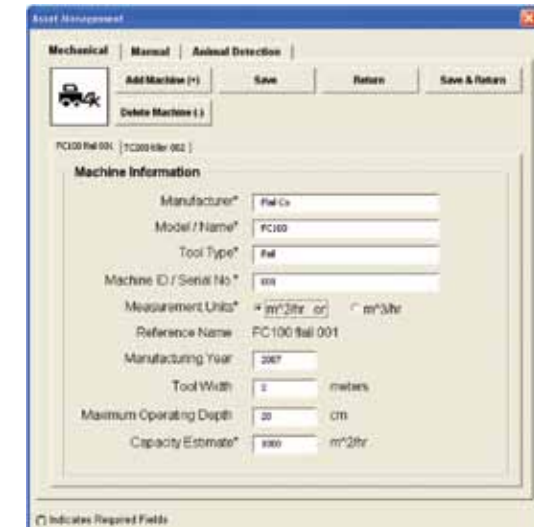


Figure 3. Demining Management Tool: Mechanical Asset Entry.

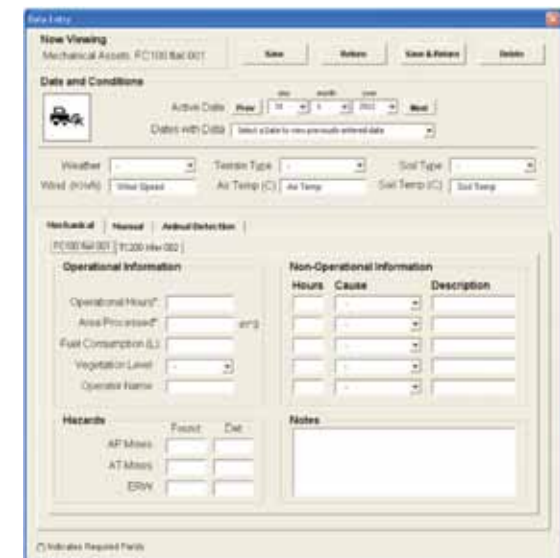


Figure 4. Demining Management Tool: Mechanical Daily Data Entry.

The user interface is designed to be intuitive for operators; it has a simple format that contains clearly-labeled data-entry fields. The main menu provides a starting point, and the tool is divided into three main sections:

- Setup
- Daily data entry
- Reporting

Using the Tool

When the tool is first used as part of a new task, the user must enter organizational and asset-specific information in the setup areas. The user only needs to enter the information once, and it can be saved and used as a baseline for

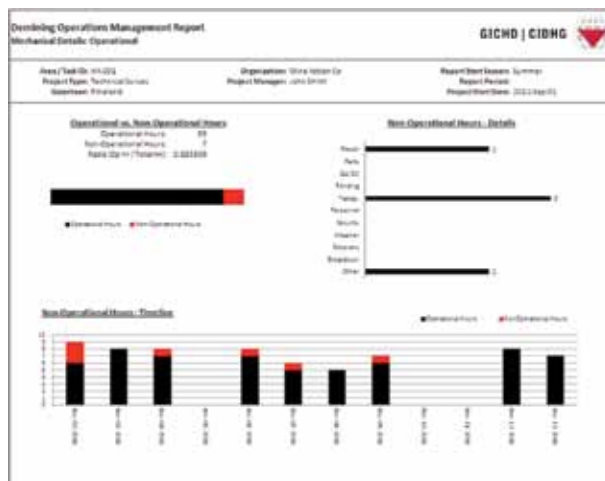


Figure 5. Demining Management Tool: Example Report, Mechanical Page 1.



Figure 6. Demining Management Tool: Example Report, Mechanical Page 2.



Figure 7. Demining Management Tool: Example Report, Page 3.

subsequent tasks. Task and organizational information is entered first, followed by asset information. For machines, users need to input:

- Machine-identifying information
- Tool specifications
- A capacity estimate (area processed per unit of time)

For manual-demining teams, users enter the team name, supervisor and a team-capacity estimate. For each animal asset, the animal name, handler ID and a capacity estimate are required. Assets can be added, modified or deleted at any time.

Once assets are entered into the database, the daily data entry form (Figure 4, previous page) can be used to record operational and nonoperational information for each asset every working day. To begin, data about the site's environmental conditions, e.g., weather, terrain, soil information, is recorded. Under each asset type, individual assets can be selected and specific related information for that working day entered. The following information for each asset is also recorded:

- Operational data, such as hours worked, area processed or asset-specific environmental data
- Nonoperational data, such as downtime and causes
- Hazard-specific data

Once data entry is complete, operators can access the reporting forms. The demining management tool processes all recorded data and produces a set of reports for each asset group and individual reports for each specific asset. For each asset group, a two-page summary report is generated, which shows tabular and graphical data for all the active individual assets. For any specific asset, a two- to three-page report is prepared, which shows nonoperational details and operational/performance details, alongside environmental conditions (see Figures 5, 6 and 7 for an example of a mechanical asset report). Reports can be viewed within the tool, printed or exported as PDF documents.

In 2012, the tool will be improved to include a GPS tracking and visualization function, as well as other features to allow operators to view the mechanical demining unit production graphically. A small GPS tracking device will be fitted to the demining machine, and after each working session, the data collected during clearance will transfer to the management tool. To review the GPS data, the operator needs only to select appropriate dates, and the software will display a map of the area with all path data displayed as an overlay. The GPS tracking report will be viewable and printable.

Conclusion

Based on needs identified during studies of mechanical demining operations in the field, GICHD developed the Management Tool for Mechanical Demining Operations, software enabling mechanical demining operators to collect performance and downtime data and generate useful reports. The initial tool, released in mid-2011, is already used in more than 40 field projects. Based on feedback from operators, the tool was expanded to include manual demining and animal detection, and will continue to help enhance the productivity and cost-effectiveness of demining operations.

The tools and companion user manuals can be downloaded from the GICHD Web page and are regularly distributed to operators during GICHD training outreach activities.¹ GICHD welcomes feedback from users, which should be sent to Pehr.Lodhammar@gichd.org.

See endnotes page 82



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