

MSSP: New Additions in Version 3.00

MineSight Strategic Planner (MSSP) is a comprehensive long range mine planning and scheduling tool for open pit mines. It can be used for developing life-of-mine schedules that will maximize or minimize an objective function, typically maximize Net Present Value, subject to user-defined conditions and constraints. The conditions and constraints include capital and operating costs, phase and destination precedence, major mining equipment and destination capacities, targets, commodity prices, and recoveries.

MSSP has been used as the principal product for long range scheduling at various open pit mines around the world. This newsletter documents the improvements and additional features in MSSP version 3.00. These improvements can be categorized into four groups:

- Navigation and data entry options.
- Automatic material routing - Automapping
- Ore classes for true blending
- Enhanced stockpile handling

NAVIGATION AND DATA ENTRY OPTIONS

The navigation tree has been reorganized to group panels into logical categories (Figure 1). MSSP scheduling is very analogous to incremental scheduling, where conditions are tightened one at a time resulting in a better schedule for each pass. Thus this reorganization provides easier access to required panels. For example, **Haulage** includes all the panels applicable to haulage options.

Figure 1 Improved navigation pane

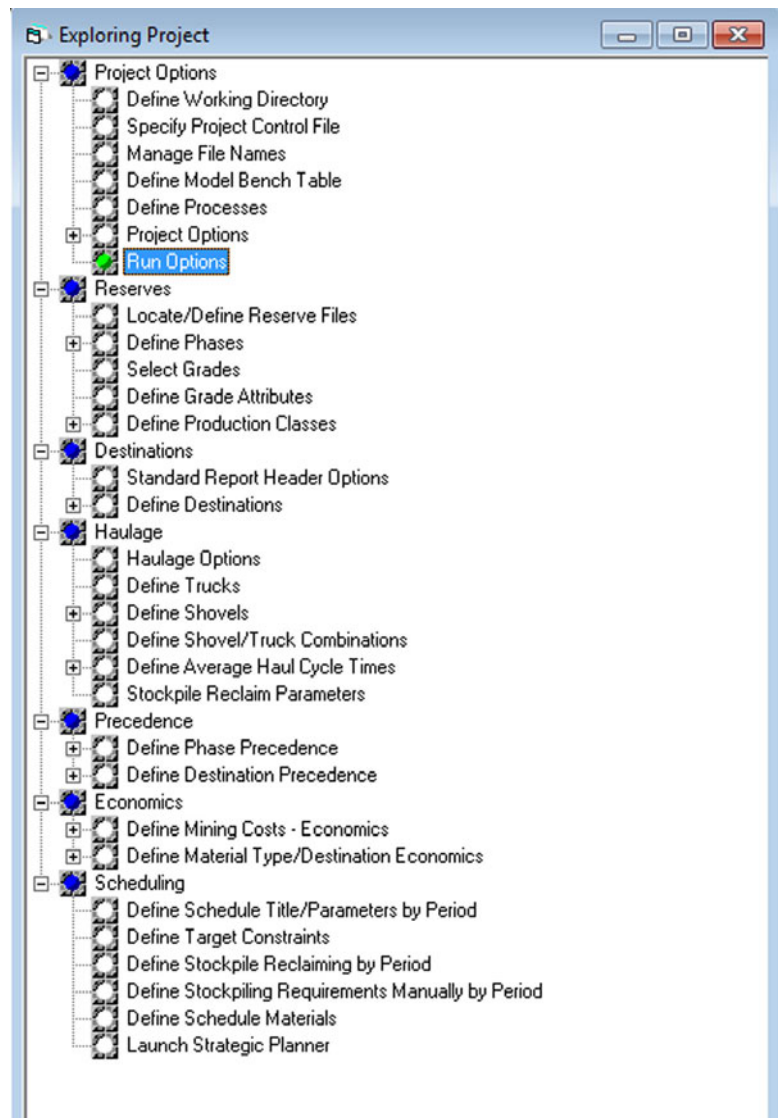


Figure 1

Another time saving feature is the introduction of an Excel Grid Panel for data entry. Most panels have an **Excel** button which opens a data entry screen (Figure 2). This grid is based on Microsoft Excel and has many of the same functions. When the Excel Grid Panel dialog is closed, MSSP validates the data and issues warnings if appropriate.

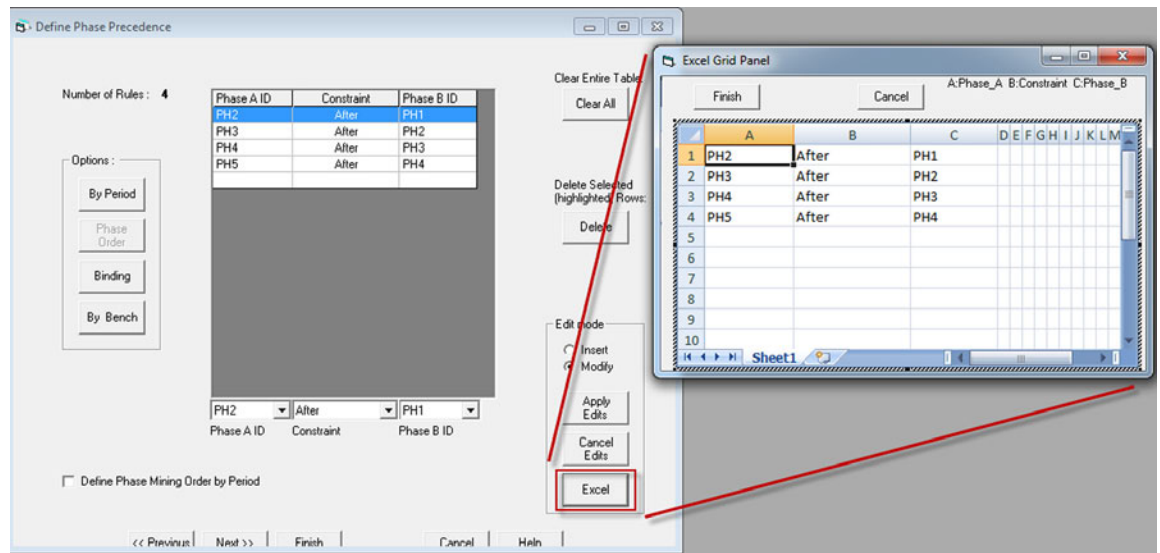


Figure 2 Activating the Excel Grid Panel

Figure 2

AUTOMAPPING

Automapping is a system of automatically determining the routing of each production class (material type or reserve bin) to various schedule material types, maximizing the NPV while satisfying the target constraints. Automapping can be used in conjunction with manual mapping where some production classes are predefined to be routed to particular schedule material types. MSSP computes the schedule material type for the rest of the production classes.

Manual mapping can predefine either all or a fraction of the production class to a particular schedule material type.

To illustrate, say we have three production classes PC1, PC2, and PC3. They can be routed to either Type1 Mill or Type2 Mill. If no options are chosen on the **Define Schedule Materials** panel (Figure 3), MSSP will decide the best destination for all the materials based on economics. Thus, 100% of PC1 and PC2 may be routed to Type1 Mill while 60% of PC3 may be routed to Type1 Mill and 40% to Type2 Mill.

However, PC3 can be routed completely to Type2 Mill by setting a **Pre-defined** flag and using **Fraction** equal to 1. This forces 100% of the PC3 material to Type2 Mill while Automapping determines the best destinations for PC1 and PC2. The example shows that the production classes can also be split and distributed to various schedule material types.

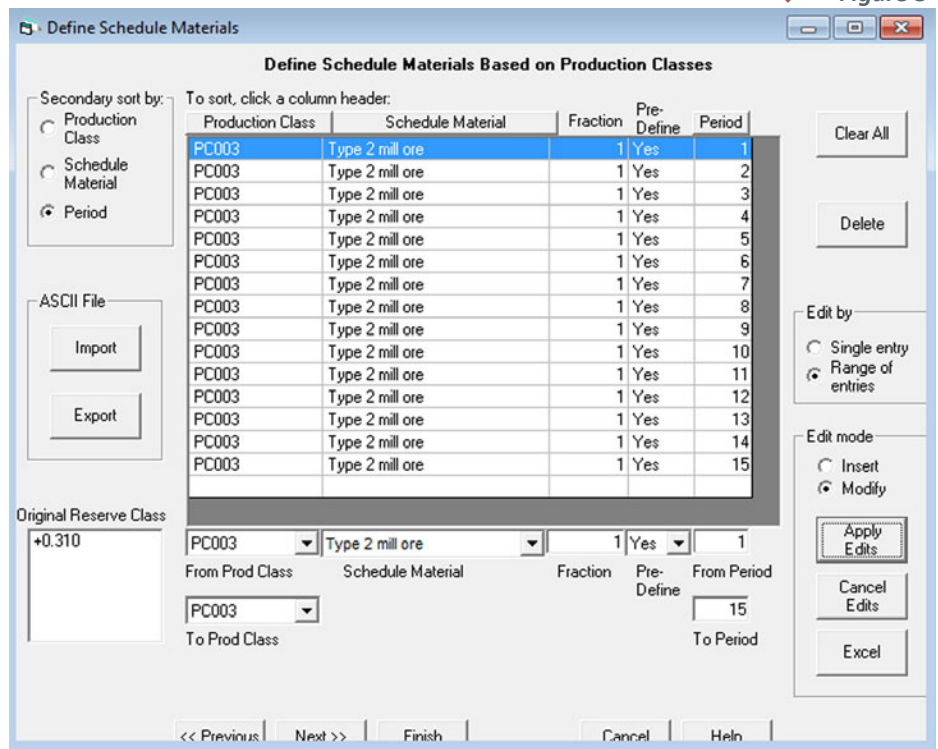


Figure 3 Forcing 100% (Fraction equals 1) of PC3 to be routed as Type2 mill ore using the Pre-define flag

ORE CLASSES FOR TRUE BLENDING

Ore class is conceptually similar to cost classes (collections of production classes) with two exceptions:

1. Ore classes allow the one-to-many mappings of production classes to ore classes while cost classes only allow one-to-one and many-to-one. For example, PC1 can be mapped to both Ore Class 1 and Ore Class 2 while PC1 can only be mapped to either Cost Class1 or Cost Class2.
2. No targets can be assigned on cost classes while targets can be assigned for ore classes. The targets are assigned as a lower and upper percent limit to constrain the ore class.

Ore classes can be used in scenarios which include blending and alternate reporting. To illustrate a blending scenario, assume we have 10 production classes (PC1-PC10) that need to be routed to three mill ore types (Mill1-Mill3). The mills can take material as shown in Table 1. In addition, at least 50% of PC4 should be sent to Mill2.

Mill	Production Classes
Mill1	PC1 - PC4
Mill2	PC4 – PC9
Mill3	PC4,PC10

Table 1 Possible routing of production classes to various mills.

This scenario can be scheduled using a combination of ore classes and Automapping. We define four ore classes as shown in Table 2 and Figure 4.

Ore Class	Production Classes
OC1	PC1-PC3
OC2	PC4
OC3	PC5-PC9
OC4	PC10

Table 2 Classifying the production classes as ore classes.

Figure 4 Mapping production classes to the ore classes in Table 2.

Then the targets for the individual ore classes are input apart from the targets for the various processes. Figure 5 shows the targets for ore classes. Notice that OC2 (corresponding to PC4) is routed such that at least 50% of the material goes to Type 2 mill ore.

Define Ore Class Target Constraints

To sort, click a column header:

Ore Classes	Processes	Lower Limit	Upper Limit	Period
OC1	Type 1 mill ore	100	100	1
OC2	Type 2 mill ore	50	100	1
OC2	Type 3 mill ore	0	50	1
OC3	Type 2 mill ore	100	100	1
OC4	Type 3 mill ore	100	100	1

Figure 5 Defining the ore classes.

← Figure 5

ENHANCED STOCKPILE HANDLING

MSSP 3.00 introduces several enhancements to the stockpile usage. In previous versions, the stockpile types were tied to the mill ore type with a one-to-one relation. For example, a Type1 Mill Ore Stockpile1 can only be reclaimed to Type1 Mill ore destination. This restriction has been removed in MSSP 3.0 and thus the Stockpile can be reclaimed to any mill ore type (Figure 6). The default reclaim destination for Type1 Mill Ore Stockpile remains the Type1 Mill Ore Destination as in previous versions.

↓ Figure 6

Figure 6 Type 2 mill stockpile (ST21) being reclaimed to Type 1 mill ore (OR1) destination

Define Stockpiling Requirements Manually by Period

To sort, click a column header:

Requirement Type	To-From Destination	Required	Period
Required tons	OR1 -ST21	1000	10

There are also two additional reclaim techniques. Previous versions of MSSP used the average method of stockpile reclaim where the tons were accumulated and grades averaged over all the lifts of a stockpile. MSSP 3.00 can be used to reclaim using the First In First Out (FIFO) or Last in First Out (LIFO) reclaim method (Figure 7). The tons and grades are accumulated and averaged over a lift, and thus the FIFO and LIFO methods apply to full lifts of a stockpile.

Finally, MSSP 3.00 has an additional panel for forced manual stockpile reclaim. Apart from reclaiming a specific tonnage target from a stockpile, you can also reclaim to a particular elevation (useful for FIFO and LIFO reclaim) and reclaim a certain percentage of a stockpile.

Miscellaneous Options

Number of PCF model benches to print in assumption file : 10

Optional constant to be added to \$/ton grades : 0

Schedule materials for those below period cutoff : Type 1 waste

Stockpile reclaim option: **Average**

Assumption file phase reserve reporting option: Ore class: First In First Out, Last In First Out

Stripping ratio option: Mill ore type as ore; others as waste

← Figure 7

Figure 7 Stockpile reclaim options