



# Speed thrills in 64-bit upgrade to pit program

MineSight Economic Planner's pit optimization program, MSOPIT, received two powerful enhancements earlier this year. The first, released with v2.0, was multithreading, which increased the program's speed considerably. The second enhancement, released with v2.1, was to make the program 64 bit. The enhancement also increased the speed of the calculation, and dramatically increased the amount of data the program can process. Tests comparing the effects of these changes on the program's performance have produced astounding results. See **Figure 1** for results of some of these tests.

The idea behind multithreading is to break down an algorithm into separate calculations that do not depend on one another. These calculations can then be run simultaneously across multiple processors to speed up the calculation. The algorithm used by v1.05 of MSOPIT is single-threaded, which means that the algorithm has to run the calculations one at a time and on a single processor. With the release of v2.0, the program can now take advantage of multithreading and multi-core processors by breaking the calculations into smaller pieces and running them side by side across each processor. For very simplistic calculations (constant slope, single zone, and a small number of blocks) the increase in speed may not be dramatic. However, complex cases that may have complex slopes with numerous constraints and multiple pits can show a considerable improvement in speed. Test A2 in **Figure 1** shows the multithreaded, 64 bit version ran nearly 70 times faster than v1.05!

A standard 32 bit application has access to a little less than 2GB of RAM while a 64 bit program's access to ram is limited only by the physical properties of the machine used. With the release of 64 bit processing in v2.1, MSOPIT can now exploit newer computers with large amounts of RAM. With modern computers coming standard with 8GB or more RAM, it only makes sense to upgrade the applications that can benefit from the use of that additional memory. Mintec has done just that by making MSOPIT a 64 bit application. This enhancement will make a notable difference for those with very large and complex data sets. Note that in Test A3, shown in **Figure 1**, the 64 bit program was the only one capable of solving an extremely complex problem.

With the addition of multithreading and 64 bit processing to MSOPIT, the program remains on the forefront of Mine Planning technology. Users of MineSight Economic Planner can now take full advantage of their 64 bit, multi-core machines using the new Package Licensing. Contact Mintec to get the latest version of MSEP as well as licensing requirements.

Group A Testing – 64 bit operating system with 24GB of RAM and an Intel® Core™ i7 Processor (4CPU)							
Test # (Block Dimension)	Version	# model blocks	Slope Type	Method	Run Time (minutes)	Completion Y=yes N=no	xTimes faster than v1.05
Test A1 (20x20x17)	v1.5	1,093,500	Complex	LG	12.52	Y	
	v2.0				0.40	Y	31.36
	v2.1				0.33	Y	38.0
Test A2 (25x25x15)	v1.5	2,473,380	Complex	LG	145.35	Y	
	v2.0				2.50	Y	58.1
	v2.1				2.08	Y	69.9
Test A3 (5x5x3)	v1.5	142,500,000	Complex	LG (re-block)		Not Tested	
	v2.0					N	N/A
	v2.1				18.58	Y	N/A
Comments- v2.0 ran into memory problem							
Test A4 (1.8x7.5x3.5)	v1.5	3,900,000	Azimuth	LG	50.53	Y	
	v2.0				39.35	Y	1.3
	v2.1				2.95	Y	17.1
Test A5 (25x25x15)	v1.5	2,473,380	Azimuth	LG	6.14	Y	
	v2.0				5.00	Y	1.2
	v2.1				0.58	Y	17.1

Group B Testing – 64 bit operating system with 16GB of RAM and an Intel® Core™2 Quad CPU							
Test B1 (8x8x6)	v1.5	9,034,740	Constant	LG	45.12	Y	
	v2.0				33.14	Y	1.4
	v2.1				9.91	Y	4.6
(8x8x6)	v1.5	9,034,740	Constant	FC	243.12	Y	
	v2.0				159.66	Y	1.5
	v2.1				115.90	Y	2.1

**Figure 1:** Testing results comparing the single thread 32 bit version (v1.5) to both the multithreaded 32 bit version (v2.0), and the multithreaded 64 bit version (v2.1) of MSOPIT.