64-bit SPEED........

What does speed mean?
What effects the speed calculation?
What are the benefits?
What are the applications?

Consideration must be given to many factors.

What does print speed, processing speed and the overall output (throughput) mean?

Print speed typically only refers to the speed the media is traveling while printing and is normally specified in inches per second = ips. It does not take into account over factors that effect output like idle time for data changes, stopping to cut, back feed or others.

Processing speed can effect the time required to receive data, generate the print image and perform printing functions. Handling all of these tasks simultaneously rather than sequentially provides the fastest output. Very often a printer pauses when receiving or compiling new data for a job. If the printer cannot process simultaneously the pauses are even longer when data is being received while printing. So processing speed has a major impact on how quickly the first label of each job is printed and on the overall output.

CHESS/64-0x printers provide an extremely fast processing speed combined with 12 ips printing at 300 dpi resolution. The rugged and versatile design sets a new standard for "state of the art" output, quality and durability.

But to really appreciate how the 64-bit can improve output the best approach is to set up a test with the particulars of the specific application.

What makes up the 64-bit success formula and what are the benefits?

a) Small Print File Size
b) High Speed Data Transmission
c) Effective Multi-tasking
d) Rapid Processing
e) Fast Print Speed - by Design

= High Performance Output

a) **Small Print File Size** results in short transmission times, especially when printing graphics or large labels like the "Odette" or AIAG label used in the automotive industries. The intelligent and easy to use printer command language, EasyPlug, offers an extensive range of features that minimize the number of format commands required and also includes data compression for graphics.

b) **High Speed Data Transmission** is supported via parallel or serial mode, with serial speeds up to 115Kbaud. This reduces download time to a minimum.

c) The **Multi-Tasking Capabilities** of the 64 bit CPU handle receiving data, compiling the image, scaling fonts, calculating sequential numbers, filling real time fields and printing all simultaneously rather than sequentially. While the current job is printing, the next one or even several more are compiled and queued up in the background waiting to be printed. So delays between jobs are eliminated.

d) The 64-bit CPU, with **Processing Speeds** of 150 MIPS (million instructions per second), represents the fastest performance available today in a label printer. This "supercharged" processor is the basis for the extremely fast computing speed. The Near Edge print head, with its built in intelligent history control, further frees up the CPU so it can focus all of it's processing power on creating and printing labels.

e) **Fast Printing** by design includes 3 separate stepper motors to handle different printer functions; media feed, ribbon feed and print head lifting—-not 1 motor for all. Modular motor drivers, powerful motors, and a large capacity power supply can handle high-end print speeds with high-density printing. Even at 12 ips there is still reserve capacity available. A rugged design and attention to details provides features like a straight (flat) paper path, robust print engine, industrial ball or slide bearings, long travel dancer arm, powder coated steel chassis and housing and...

Bottom line: This design can handle the rigors of running 12 ips in 3 shift operations.

What are the applications?

Rather then naming all the markets already sold into today, a list of job characteristics and examples are provided that will enable the reader to match up their current needs and potentially identify new market opportunities.

a) On-demand singles printing, where the label printed needs to be output quickly independent of complexity and especially if it requires high resolution. For example, in a warehouse maybe only a few hundred labels per day are needed from each printer, but the time to produce a label needs to be as fast as possible in order not to slow down the flow of goods.

b) Frequent data changes, especially with consecutive numbering or font scaling. Applications with many print jobs of 1 or only a few labels with constantly changing data like in retail or shipping areas.

c) When graphics content is significant or if preprint is included along with the variable imprinting. In all cases the output will be still be very high.

d) Large labels like the "Odette" or pallet labels or extra long and wide labels.

e) Everywhere high resolution with high print speed is required.

f) Everywhere a "work horse" printer is needed to support 3 shift operations or where downtimes cannot be tolerated.

g) Where seasonal peaks in label production need to be covered, like in the garment industry. Rather than purchasing additional printers, the 12 ips print speed and high processing speed provide the reserve capacity needed.

h) Everywhere complex bar coding is required, like 2D barcode applications.

i) Everywhere special label and/or heavy tag stock is processed.

j) Where integrated high end finishing devices are needed, like a Rotary Knife, Dispenser, Rewinder, Tear-off Edge, Applicator, Scanner, Infeed Module, ATA cards and more.

k) Any combination of the above

l) All market places where the versatility of the printer, the options and the command language need to exceed today's requirements in preparation for the future.

**Finally the age old question, Price or Performance?,
can be answered. With the 64-bit printer both are realized!**

Test procedure - CHESS/64-0x vs. Competitive Printers

Test Concept and Conditions

Printer Selection
There were several criteria and conditions the printers had to meet to qualify for the comparison. Those included:
- print speeds of at least 8 ips (200mm/sec)
- 300dpi resolution (12dots/mm)
- print width of at least 4 inches (101.6mm)
- preferably a series of printers with print widths of 4" and more
- and printers designated as high performance

Formats
2 formats were tested representing different end use applications:

UCC label: This format primarily used internal printer features, i.e. printer resident fonts and barcodes. The size of the print file was relatively small which means processing speed requirements were not severe. A serial transmission speed of 9600 baud was selected as it is used very often in these applications. A label design program was used that supported the printer's internal routines for consecutive numbering with native fonts. Label size was 4" wide x 8" long (100 x 200 mm).

Graphic label: The entire image was a graphic. This resulted in a relatively large print file requiring more complex data handling. The parallel port was used to minimize transmission time. The application program was MS WinWord® with true Windows 95® drivers. Label size was 4" wide x 8" long (100 x 200 mm).

Time Measurements
The time measurement started when the start button on the computer was pressed and ended when the last line was printed, i.e. the printer stopped. Each routine was repeated 5 times—-the lowest and highest values were discarded and the remaining 3 averaged and recorded. Measuring error was less than +/- 0.2 sec.

The video presentation mode selected for the CD will not require the viewer to load additional programs onto their PC. However, the video sequence on the CD will not be shown in real time. The actual elapsed time will be dependent on the speed of the computer used for the presentation. However, the relative speeds viewed are representative of the performance differences between printers for the test conditions described.

PC Configuration, Application Programs and Drivers
The comparison was performed using a Toshiba® 430CDS notebook with only MS Windows®, MS WinWord® and Jetmark 32 from Map 80 installed. This guaranteed the results would not be impacted from other sources or applications.

The serial port advanced settings were used as the default.

The print driver installed was the original driver supplied with the product or, if not available, a driver from a third party that supported the required functions. No detailed evaluation of different print drivers was performed in an effort to find the fastest driver possible.

Explanation of Terms
Start off "print button" vs. start off "queue"

Start off the "print button" includes the time for the PC to generate the print file, transmit the data (once the print file is completed) and print the job(s). One characteristic of this test is the results include the PC and driver performance, which can affect the overall performance of the printer.
Start off "queue" or job list, first had the PC create and send the print files (jobs) to a queue. After all the jobs

were in the queue, they were released to the printer and the time measurement was started. This method removes the impact of the PC performance and will closely replicate driving a printer from a dedicated application in native mode.

Quantities to Be Printed
There were 3 test routines that represented typical situations in label printing environments. The results allow comparisons of both the printing performance and the printer's CPU.

    a) 1 unique job   indicates "first label out" speed
    b) 10 unique jobs   indicates processing performance overall
    c) 10 equal labels   includes a) and the time to print 10 identical labels
                                   (print speed comparison)

It should be noted that the majority of tests were run with the print speed set at 8 ips (200 mm/sec) since this was also the maximum speed of some of the printers tested. Had the maximum speed of each printer been used during all tests the results for the CHESS/64-0x (at 12 ips, 300 mm/sec) would have been even more favorable.

Interpretations of Results, Especially Processing Speed

a) Generally all printers tend to perform faster when the data "feeding" the printer's CPU arrives faster. Conclusion: The faster the PC, the more the measured delay times are a result of the printer. But in total the fastest printer would still be fastest even with a slow PC.

b) It can be assumed, that if the transmission rate of the print file is set very low (ex. 300Baud serial), all printers would be more or less equally fast (or equally slow) since the processing time for the printer represents a smaller portion of the time for the entire job.

c) The better the multi-tasking capabilities of the CPU the smaller the delays, especially when printing a sequence of unique jobs. End Result: 2 printers can be equally fast when printing only one job. But when printing a batch of 10 unique jobs, in series, one may be much faster.

d) The impact of printer drivers is considerable; independent of whether they are native drivers or true WIN 95® drivers. It appears that drivers from more recently launched printers create smaller print files, which has a positive impact on the results. Drivers from older printers tend to produce larger print files that add to the processing time and lower the overall speed. The "quality" of a driver, i.e. it's efficiency in converting the screen image to a print file, leads to measurable variations in results. End Result: Different application programs and/or drivers may result in different output performance values even when printing the same label format.

e) Printing off "queue" or job list is the most neutral method of evaluating the printer's performance since the impact of the PC and program is minimized. The remaining influence is still the transmission speed and file size, which are dependent on the printer's capabilities and the driver. Both are considered as given conditions related to the tested printer.

f) Generally it can be stated; the larger the label size and the more graphics used (versus internal fonts and barcodes) the more the multitasking and fast processing features of a printer will provide significant performance advantages. Example: Printing a small label with one text field based on an internal font is fast with most printers. A pallet label printed on a legal or DIN A4 format shows the difference!

g) Even a modern state of the art printer with 8 dpm resolution wasn't as fast as the CHESS/64-0x printer with 12 dpm in the comparison test.

h) Had the print speed and transmission speed settings during the tests not been reduced to accommodate the slower printers, the advantages of the CHESS/64-0x would have been even more apparent.