

# HARMONIZER<sup>TM</sup>

## CNC

*“The scientific means to find dynamically optimized chatter-free stable spindle speeds”*



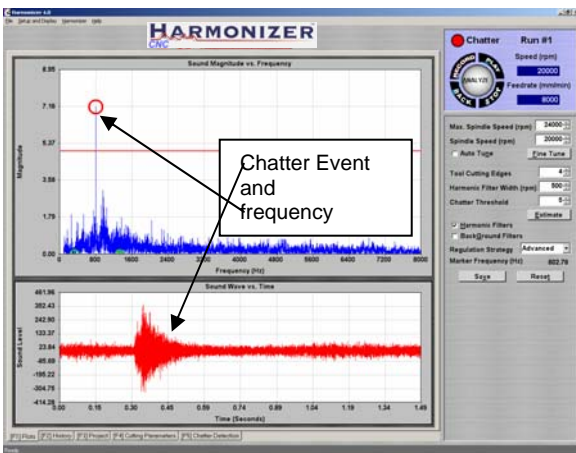
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*Specialists in Dynamically Optimized High Speed/Performance Machining*

**CNC Harmonizer<sup>®</sup> is a machine monitoring packaged that can be directly linked to the machine tool controller.** It continuously monitors cutting vibration through use of a microphone and additionally an accelerometer. It functions theoretically the same as the Harmonizer (same user interface). It can rapidly identify chatter, suggest or implement spindle speed changes, distinguish chatter from suspected resonance vibration, and track CNC part program blocks to provide feedback to the NC programmer.

Harmonizer<sup>®</sup> can operate as a simple machine monitoring/warning device to alert operators or other personnel when adverse cutting vibrations are present, or it can be linked with the machine control to automatically affect changes, or be used in implementing six-sigma process to better monitor processes at the source and more quickly reduce waste and maintain optimal operating conditions.

The CNC Harmonizer<sup>®</sup> can be linked to the machine tool controller by a TCP/IP (for remote monitoring), or direct wire connection. It can reside on the controller's host computer or on a Panel PC Touch Screen type computer.



- **Platform generic.** The package can operate on any Windows PC equipped with an audio card. A unidirectional microphone, signal interface module and accelerometer are included and if a CNC host/third party Windows PC is not available a touch screen PC can be additionally provided and connected to the machine control.

- **Chatter Detection.** As a minimum the user is only required to enter the approximate spindle speed and the number of teeth on the cutter. The CNC Harmonizer<sup>®</sup> then automatically sets the threshold (if requested), and indicates the presence or absence of chatter in the recorded data.

- **Spindle Speed Insensitive.** Estimate the current spindle speed and the package automatically ignores spindle speed components and sets chatter thresholds to reliably detect chatter. When chatter is detected, the Harmonizer<sup>®</sup> recommends a stable spindle speed, if one exists, and can automatically affect speed control if so directed.

- **Dynamically complex systems.** Because the package incorporates MLI's patented "CRAC" algorithm can easily identify cases that exhibit more than a single chatter mode. Additionally, the package can quickly determine if there are no spindle speeds that will eliminate the chatter and suggest alternative machining strategies.

Requirements for the NC Harmonizer are:

- A single expansion slot (PCI type) is required for an A/D card or an audio card on either the host computer or supplied PC. The A/D card is also supplied with Harmonizer\_CNC.
- If a host computer is not available; a Panel PC Touch Screen is supplied at additional cost.
- If *continuous control and interpretation* of the NC program is desired, the machine tool controller must be able to exchange F and S words or each must be able to read and write to shared memory locations on the controller.
- Better performance will be realized if the M codes are available to turn chatter control on and off from the NC program and the parameter values in the S and F works (e.g. S#1 or F3@) where speed and feed words can be read and modified in the NC program.

### Ordering Information:

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