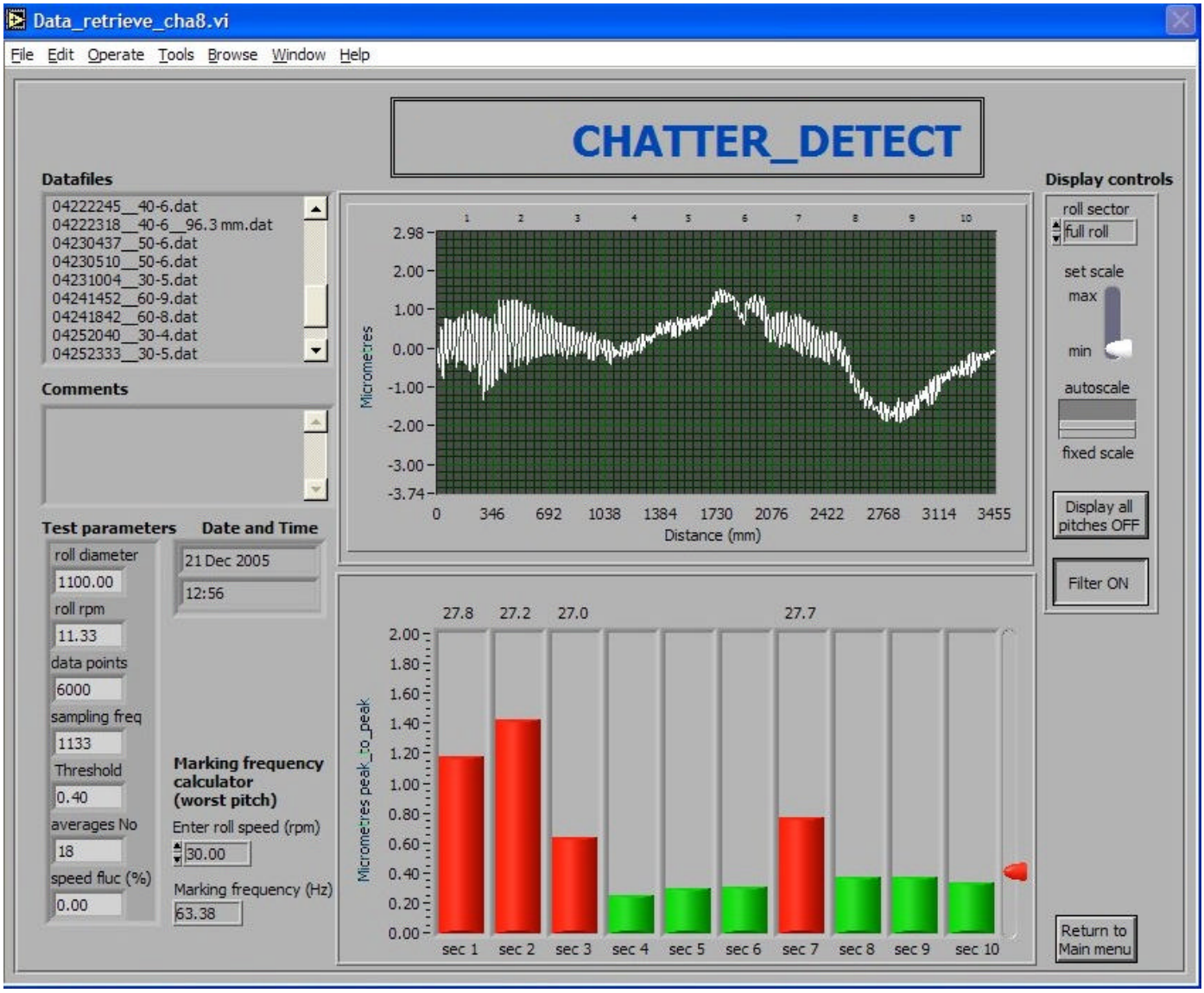
CHATTER_DETECT

SYSTEM FOR DETECTING CHATTER MARKS IN THE SURFACE OF GROUND ROLLS

UNIVIB
Universal Vibration Solutions



The system has been designed for use as a post-process inspection system on a roll grinding machine. It is semi-portable and can either be installed permanently on a particular machine or can be easily moved from machine to machine, as desired.

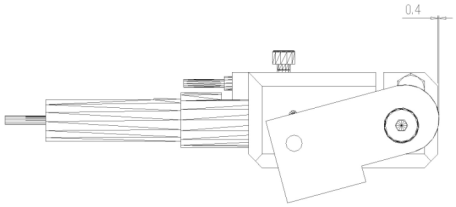
It incorporates a highly sensitive, non-contact displacement transducer mounted to the wheelhead that is used to measure the topography of a roll surface on completion of grinding.

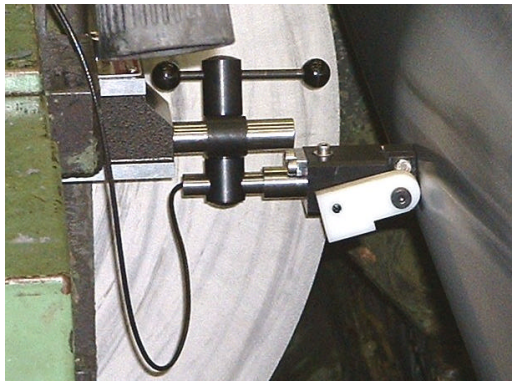
A proximity sensor is supplied for the detection of roll position. This provides a once-per-rev trigger to ensure that multiple data-samples are acquired over precisely the same region of the roll surface. This sensor can be attached either temporarily (using a magnetic stand) or permanently to the headstock.

The signal conditioning electronics is supplied in a compact, portable enclosure.

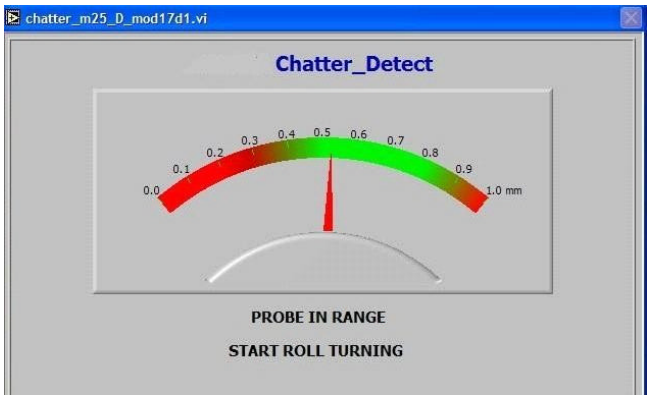
A National Instruments data acquisition (NIDAQ) card is supplied for installation in standard PCMCIA slot in laptop computer (in the case of a portable system) or in a spare PCI slot in a desktop or industrial PC (in the case of a permanent system). The NIDAQ card is connected to the signal conditioning enclosure via a multi-way cable.

The measuring transducer is mounted to the wheelhead of the grinding machine using a specially-designed detachable support bracket incorporating a simple two-step setting system designed to ensure correct stand-off of the transducer from the roll surface. This ensures no fiddly setting up is required of the user.





The software incorporates a data-entry screen where the user enters key data such as roll number and diameter. The configuration of the system (number of measurement samples, sampling rate, alarm thresholds, etc.) can also be accessed by authorised persons at this screen.



A set-up screen is provided to enable the user to confirm that the measuring transducer is correctly set within range of the surface of the roll. Consistency of roll speed is also checked at this stage. The measurement process cannot be initiated until both these parameters are detected as being in tolerance.

Once the test has been initiated, the data is acquired automatically with no further intervention required by the user. Time synchronous averaging is used to maximise signal-to-noise ratio. This helps ensure that the system is capable of identifying regular marks with a depth as small as **0.05 µm**, these being invisible to the naked eye.

The results are presented on a simple, easy to understand screen incorporating:

- a histogram in which the circumference of the roll is split into 10 equal sectors and the depth of any regular marks detected in each sector is represented by the height of the bars (coloured green or red depending whether the detected marks exceed a user-settable threshold or not). The actual depth is displayed numerically above each bar. The position of the marks around the circumference of the roll relative to the trigger point is also displayed.
- a graphical plot of the roll surface to provide an exact visual representation of the topography of the roll surface (helpful if the marks are not entirely regular).

A software band-pass filter is provided to filter out the effects of any unwanted electrical noise or machine vibrations. A handy calculator is provided that calculates the frequency of vibration that might have been expected to have produced marks with the measured pitch.

Any particular sector can be selected for more detailed analysis in which the distribution of pitches of marks detected in that sector is displayed, also in histogram format. This is helpful when the system is used in a troubleshooting role, where knowledge of the predominant pitch of marks (and the pitch of any underlying marks) is essential.

All measurement data is saved along with roll identification as a record of the surface finish for the roll concerned. Surface measurement records can be recalled by means of time and date or roll number.

TECHNICAL SPECIFICATION

Measurement Accuracy

Mark depth measurement accuracy of the system (in the quoted pitch range –see below) in an "ideal" environment will be better than ± 5%.

Measurement Range and Resolution

Maximum mark depth	50
Minimum mark depth	0.05

all figures in micrometres

The above figures are theoretical values based on quoted instrumentation sensitivities. In practice, the minimum displacement threshold (smallest depth of marks) that can be discerned by the system will be dependent on the levels of ambient vibration and electrical noise.

Range of Pitches

The range of mark pitches that can be measured by the system, with the quoted measurement accuracy maintained, is 10 – 75 mm. The system will be capable of measuring marks outside this range but, in this case, the quoted depth measurement accuracy may be reduced. Marks with a smaller pitch can be measured to the same degree of accuracy by switching to a contacting LVDT-type sensor (contact us for details).

The system is supplied complete with measuring transducer, mounting bracket, signal conditioning electronics and all other associated hardware required for installation. Also supplied is a cd with the Chatter_Detect software for installation on a desktop or notebook PC (note that the PC is not included). A fully detailed Installation Manual and Operator's Manual are provided.

A visit to the customer's site for commissioning and training will form part of UNIVIB's proposal.

Available Options

Roll Eccentricity and Ovality

As an option, the measurement and display of roll eccentricity and ovality is offered as an additional feature of the software.

Vibration Analysis

An option for single-channel vibration measurement and spectrum analysis is also available. An industry standard icp-type accelerometer with magnetic mount will be supplied along with the required signal conditioning hardware housed in the enclosure. If this option is selected, the software can be switched to a mode in which the continuously updating spectrum of the vibration signal is displayed. With this option included, the system becomes the complete tool required for the troubleshooting of grinder chatter problems.