

Electro Optical product range

Electro optical metrology in the machine tool industry

Our Electro Optical product range (which includes the Micro Alignment Telescope, Autocollimators, Clinometers and Talyvel Electronic Level) is ideally suited to the demands of manufacturing environments in machine tool and general engineering industries. These products improve set-up procedures, reduce downtime and wastage and hence increase accuracy, reliability and profitability throughout industry. This application report illustrates some typical examples:

“Improve set-up procedures, reduce downtime and wastage and hence increase accuracy, reliability and profitability throughout manufacturing environments.”

Simultaneous 2 axis straightness measurement of machine tool slideways

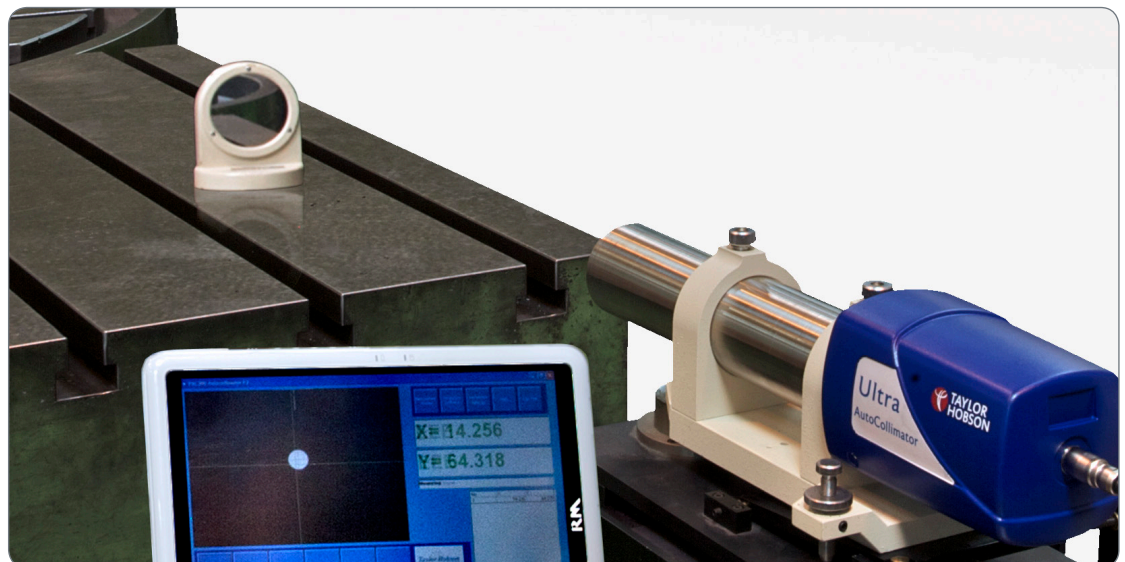
This is the most popular application for the Ultra Dual Axis Autocollimator. Measurements are automatically entered into the PC for both X and Y directions at each measuring position along the slideway. Typically a ten metre slide can be checked in a few minutes – a considerable reduction in the amount of time taken compared with more conventional methods. With the addition of the Talyvel electronic level, twist or roll can also be measured. With the addition of the optical square, parallelism can also be checked.

For further details please request a copy of our technical note T128.

Checking indexing heads over any angle

The fixed angles provided by standard polygons limit the calibration of precision dividing heads. By mounting a TB microptic clinometer and reflector on the indexing head in place of the polygon and setting an autocollimator square to the reflector to give a zero reading, the head can be calibrated at any angle from a few seconds of arc to 360°.

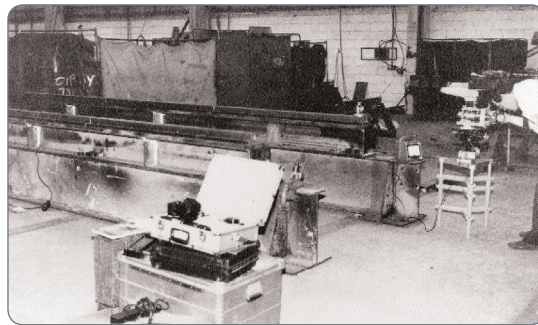
For further details please request a copy of our technical note T130.



“The Micro Alignment Telescope used with Talyvel electronic level provides a simple, accurate solution to problems associated with rail alignment.”

Setting rails straight and level

Engineers involved with transportation rails in factories or in processing plants are conscious of the necessity to set and maintain rails straight and level. Any misalignment results in excessive vibration, strain, noise and wear and possible container spillage during transportation of fluids or components. The Micro Alignment Telescope used with Talyvel electronic level provides a simple, accurate solution to problems associated with rail alignment.



Polygon and index tables measurement

For high accuracy checking of indexing tables in the laboratory the Ultra High Precision Autocollimator can be used. It can also be used, for example, to check the accuracy of an indexing table.

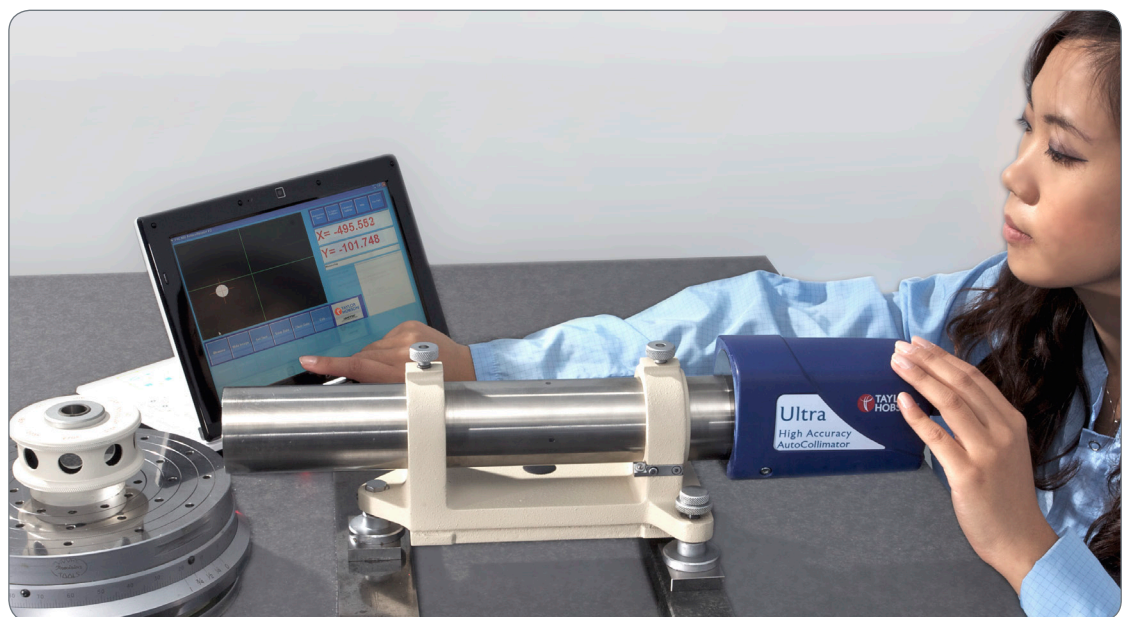
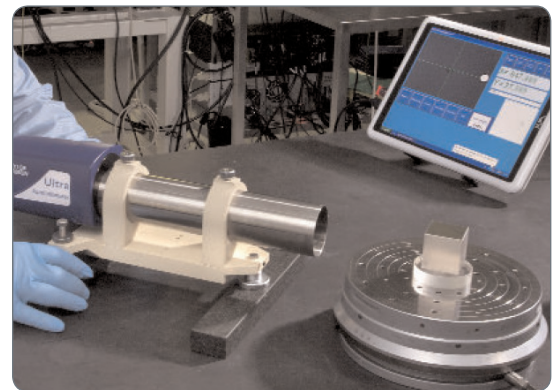
The Ultra High Precision autocollimator is also commonly used in the laboratory to determine the errors of a polygon when used with a calibrated index table.

Portable machining systems

The manufacturers of portable machining systems are often faced with the problem of aligning the machining centre to the original datum of the component being machined on site. The Micro Alignment Telescope has been applied to this alignment problem many times, for example in the refurbishment of steel mill roller frames.

Air bearing slide/datum

Air bearing slide/datums on 3-axis coordinate measuring machines are of prime importance to the accurate operation of the measuring system. The straightness accuracy of these components needs to be known to very fine tolerances, as is possible with Taylor Hobson Ultra Autocollimators.



“A datum line of sight was established between the Micro Alignment Telescope (mounted concentric to one end of the machine spindle) and a target set centrally at the opposite end.”

Machine tool rebuild and refurbishing

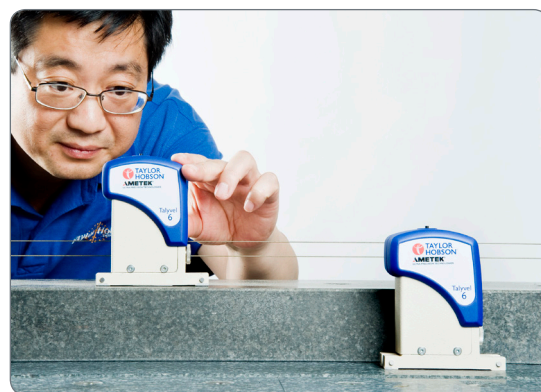
Buying, refurbishing and selling used machine tools is a very profitable business for those companies with the expertise required to do the work involved. In the past, purchasers of these machines have accepted the equipment without any guarantee of accuracy and accordingly have paid a reduced price. Prospective purchasers are now being pressed to obtain certificates of accuracy of all machines, including refurbished items. Autocollimator systems, Micro Alignment Telescopes and Talyvel are all valuable for machine tool build and calibration. Investment in the instrumentation will not only satisfy the prospective machine buyer, but also result in a higher market price for the machine supplier.

Plate cutting and profiling machines tables

Plate cutting and profiling machines require large guideways which are straight and parallel to carry the bridge with the cutting head. Errors in the geometry of these rails are reproduced on the components themselves. This in turn may prevent welding of edges due to mismatch and introduce scrap. The Micro Alignment Telescope with Talyvel and accessories can be applied to solve this problem.

Manufacturing plant relocation

The problems of relocation of a complete manufacturing plant are numerous and include a large amount of realignment, re-calibration

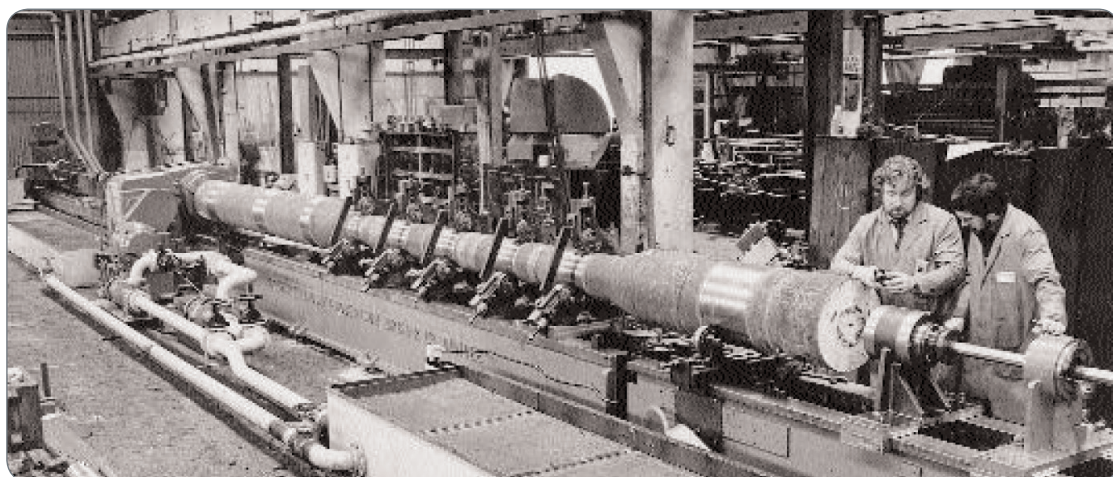


and machine installation work. We can propose a package of instruments to cover all eventualities, including straightness, parallelism and squareness measurements.

Alignment of workhead, bed and steadies of deep hole boring machines over long distances

To achieve this, a datum line of sight was established between the Micro Alignment Telescope (mounted concentric to one end of the machine spindle) and a target set centrally at the opposite end. An illuminated second target, mounted centrally on the boring bar drive head, was traversed down the bed in one metre increments and at each position readings from the telescope micrometers enabled the bed to be adjusted horizontally, vertically, straight and parallel to the workhead axis.

Alignment of the boring guide bushes with the workhead spindle was also verified using a similar procedure, and measurement from the opposite end of the spindle allowed the remaining bed to be set accurately.



Our electro-optical metrology product range comprises:

Micro-Alignment Telescope



Used for checking and setting for example:

- Alignment: (series of bores or bearings)
- Squareness: (column to a base)
- Parallelism: (series of rollers)
- Level/flatness: (machine bed foundation)
- Straightness: (rails or guideways)

...with its optical and mechanical axes aligned to within 3 seconds, a typical accuracy of 50–70 um at 30 m is achievable.

Autocollimators

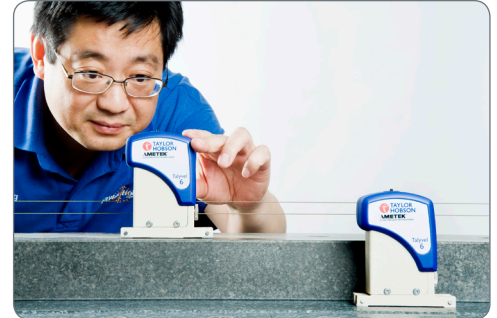


Used for measuring for example:

- Angle: (indexing head accuracy)
- Straightness: (machine tool slides in two axes)
- Squareness: (spindles to slideways)
- Parallelism: (slideways)

...from inexpensive visual to dual axis digital systems capable of measuring 0.01 second, equivalent to 50 nm per m.

Electronic Levels and Clinometers



Used for angle and level measurements:

- Level/flatness: (granite tables)
- Straightness & twist: (machine slides)
- Squareness: (of machine columns)
- Angle: (remote monitoring of movement of structures)

...from full 360 degree measurement to level measurements to 0.1 second.

Windows® based software programs are available for computer processing and graphic output of flatness, straightness, squareness, twist and polygons up to 72 faces.

Calibration of all instruments is traceable to international standards.

This application note demonstrates just one of the applications for the Taylor Hobson electro-optical metrology range.

Contact Spectrum Metrology to discuss your own measurement requirements.



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