The flexible MD30 laser measurement machine is used for distortion measurement at manually operated machining lines. Distortion and deformation after the casting and heat-treatment process are the major challenges in the production of alloy wheels. With the NUMTEC MD30 machine, alloy wheels can be measured and corrected at two main mechanical process steps:

**Measurement prior to mechanical machining:** The alloy wheels will be measured directly in front of the manually loaded mechanical CNC machining lines. At this production step, the flatness of the outboard flange will be measured. The total circumference of the outboard flange and its chucking areas will be measured with a laser sensor. As a result of this 3D-measurement, the perfect chucking/resting points for the first operation at the CNC lathe will be calculated. This flexible orientation of the wheels in the OP1 chucks has a direct impact on the wheel quality in respect of imbalance and runout. The overall reduction of imbalance issues results in an improvement in scrap and rework rate of wheels. The second application is the **measurement of painted wheels prior to the diamond cut process:** The wheel height levels will be measured at the outboard flange and hub area.

The measured lowest height levels on the wheel will be used to adjust the following CNC machining in the diamond cut lathe. The correction parameters can be entered manually or with a standard Profibus interface. With the measured correction values, the CNC contour can be translated (parallel shifting) or tilted. The resulting increase of good wheels after the first CNC cycle also improves the overall machine capacity due to reduction of the necessary CNC cutting cycles for a certain number of wheels.

Both applications will be done with a precise Laser unit from NUMTEC. With the manually adjustable slide, wheel heights from 4” to 12” can be measured. At a machine cycle, the operator puts the wheel into the 3-jaw chuck and centres it by operating a lever. The following laser measurement runs automatically without any operator intervention.

The machine comes fully assembled and tested on site. Immediately after connecting electrical power, the MD30 machine is ready for operation. Depending on the actual need, the machine can easily be moved by manual forklift to a new position. This flexibility and the variable application are the main advantages of the NUMTEC MD30 machine.

### Your Advantages

- **FLEXIBLE APPLICATION**
  The machine can be used in mechanical machining area AND for measurement prior to the diamond cut process

- **MANUAL LOADING**
  The machine can be loaded manually, no general automation with robots is necessary to use the machine

- **ECONOMICAL INVESTMENT**
  Low investment costs for a wide field of operation

- **FLEXIBLE INSTALLATION**
  The machine can be moved to certain installation places short term without any installation work

- **LASER MEASUREMENT**
  The used laser unit ensures a very high precision without any wear and low maintenance costs
Flexible Installation

Robust Centring Unit

NUMTEC 3
24” STANDARD MONITOR

TURNING AND CENTRING UNIT

KEYBOARD

CONTROL CABINET integrated in machine frame
MEASUREMENT AS CAST WHEELS

MEASUREMENT OF CLAMPING FLANGE FLATNESS

After the wheel type detection and the laser position measurement, the laser measures the front side clamping flange flatness. The sensor will measure the flatness 360° around the wheel at the pre-defined clamping area for the 1st operation. Each 0.1° around the wheel a height value will be stored. With the resulting 3600 measurement values the exact deformation and flatness of the clamping flange will be calculated. The deviation in this area will have a massive impact on the resulting wheel quality regarding unbalance and radial runout. Based on this knowledge, a calculation of acceptable tolerance values individually for each wheel type can also be made in the casting area.

This results in:
1. An early detection of reject parts and just in time introduction of counter-actions at the casting or heat treatment process.
2. Avoiding of useless production steps on reject wheels in casting and machining area.
3. Capacity increase of existing equipment due to immediate separation of reject wheels.

MEASUREMENT OF THE BEST POSSIBLE CHUCKING POSITION

All measurement points from the flatness scanning around the wheel will be used to calculate the best possible chucking position. This individual chucking angle is used when the operator is putting the wheel manually into the OP1 chuck at the CNC lathe. This improves wheel machining and results in overall wheel quality increase. Optionally, the chucking point can be marked with a paint marking device on the side of the wheel.

MEASUREMENT FINISHED WHEELS / DIAMOND CUT

DESIGN MEASUREMENT

Design measurement in the outside flange and cab area. After loading the already painted wheel it will be centred with the NUMTEC quick chucking device and clamped at the rear flange. The measurement is done with the laser sensor from atop the wheel design side. As a standard, 2 measuring circuits are done on the wheel, one on the outside of the flange and a second at the inner area near the cap seat. In case of special design custom measuring positions can be defined. For these measuring circuits, the lowest points are identified and calculated based on the needed correction values for the following turning process. Through these measurements distortions and abnormality in the casting are detected before machining, and the lathe CNC parameters can be adjusted accordingly.

PAINTED SURFACE

With the used laser systems, all usual colors can be measured. The spectrum ranges from unpainted surface to painted and ready for delivery. Thereby the MD 30 measuring machine can be used universally.
**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Measurement principle</th>
<th>Laser sensor</th>
</tr>
</thead>
</table>
| Measurement characteristics | unfinished wheels: - outboard flange flatness  
- hub float distortion  
finished wheels: - individually spoke height / level  
lower spoke |
| Measurement positions | as cast wheels: front side outboard flange, hub area  
finished wheels: front side spoke area, adjustable radius |
| Type recognition | manually type selection at PC |
| Turning unit | 3 - 10 sec. / rotation  
precision mounted with electrical motor |
| Traversing range axis unit | X-axis: fully automatic, 400 mm  
A-axis: endless, fully automatic rotating  
Z-axis: manual, 200 mm |
| Centring unit | with manual quick clamping and adjustable bolts |
| Machine control | Industrial PC with Windows 7, 24" standard monitor |
| Interface to system control | Profinet, optionally Profinet |
| Machine capacity | 50 - 60 wheels / hour |
| Wheel dimension | - diameter 14" to 24"  
- weight max. 35 kg |
| Electrical supply | 230VAC, 1kVA |
| Mechanical dimensions | 840 x 1502 x 1841 mm |

![Diagram of MD 30 machine](image_url)
INTUITIVE SOFTWARE
For operation and set up of new wheel types. Software is available in several languages

POSITIONING / CENTRING
Exact rotary positioning and centring the wheels for the measuring process

ALL-IN-ONE CONCEPT
All components are fully mounted and tested in the workshop. Quick installation on site, only electrical power must be connected.

INDUSTRIAL CONTROL
Only industrial PCs and components are used

COMMUNICATION
The measured distortion points by laser can be transferred via Profibus to the machining line

IMBALANCE / QUALITY
Reduction of unbalance and general quality improvements due to individual chucking angles at OP1

OPTIONS

COLOR POINT MARKING
The best chucking position is marked with a color point

REMOTE MAINTENANCE
Integrated possibility for remote maintenance access, on request