Measurement of railway & tram vehicles wheel travel profiles

PROFILE METER

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This PROFILE METER is an electronic device designed to measure the travel outlines of the railway and tram vehicles wheels in continuous mode.

Practical PROFILE METER applications are as follows:

- Checking the wheels for their wear (wheel flange height, width, inclination, and offset),
- Wheel testing before re-profiling,
- Measurement of track rail cross profile values.

Meter Description

This PROFILE METER is an electronic device designed to measure the travel outlines of the railway/tram vehicle wheels. A contact method is employed to determine the wheel cross profile in steps of 0.5 mm. The measuring point can be lowered/raised with a lever on the meter's front panel. The PROFILE METER is affixed to the tested wheel with the Somet pole-reversible magnets and adjustable stops. The latter makes is possible to measure the wheels having between 300mm and 1250mm in diameter. The Y-axis sensor and the measuring point drive is carried together with a trolley moving along a trajectory perpendicular to the plane of magnets. The spring-mounted point slides on the surface measured with its motion along Y-axis being converted via a friction gear to the Megatron rotary incrementing sensor. The trolley is moved along the X-axis by the Maxon mini-motor with its gearbox. Other Megatron incrementing sensor, designed to count the trajectory traveled, is linked to the gearbox (via a friction coupling). Motor stop, start-up, and speed are under control of a measuring computer. In the event the end switches would fail, the gearbox is fitted with a friction coupling to protect the PROFILE METER drive from potential damage. The trolley position at both end mechanical stops is reported by means of the end switches on the measuring computer display.

The determined values are available on the measuring computer LCD display as the diagrams showing the wheel cross profiles (PROFIL_M.EXE measurement program). These data are simultaneously stored on disk, ready to

further processing, graphic representation, and analysis by the PROFIL_V.EXE program which makes it possible to view up to five diagrams, to determine the co-ordinates of two diagrams, to edit measurement descriptors, to enter mileage traveled, wheel diameter, flange offset. Within the analysis, the wheel flange width, height, and inclination are calculated.

At its output, the analysis gives printed diagrams and tables with account of the wheel values measured.

Measurement Ranges & Accuracy

The X-axis range is given by the adjustable mechanical stops with their end switches. For the trams the X range is from 0 to 100 mm, for railway craft from 0 to 150 mm. Sensor stop accuracy at its end position, which defines the origin of co-ordinates (magnet stops), is from 0 to ± 0.04mm. The wheel cross profile is being sensed in steps of 0.5mm with 0.02mm in preciseness.

The Y-axis range is given by the measuring point length, being from 0 to 35mm for trams and from 0 to 55mm for railway craft. The Y sensing accuracy (on curved surfaces) is ± 0.04mm.

PROFILE METER PARTS

Measuring computer: A standard notebook. Optionally, a heavy duty HUSKY MP 2500 industrial version (processor Intel 386EX, 8MHz, 2 MB DRAM with MS-DOS 6.22, sized 242x132x44mm, weight 0.7kg, IP 65, resilient to falls from 1.5 m above ground, ambient temperature range from -30^{o}C to +60 ^{o}C) can be used.

Serial cable: A triple-core non-standard cable with KANON 9 connectors for interconnection between the measuring computer and card box and power supply.

Card box and power supply: The card box contains a card for motor control, reading the IRC sensors, lead battery (to power the sensors and motor), and a rechargeable module capable to detect and indicate the battery capacity. On the box, there is a (red coloured) sensor powering/battery recharging mode selector. The battery capacity indicator (green = enough capacity / red = insufficient capacity). The battery low/high diode indicator (green = battery high / red = battery low). Connector of the notebook's external power adapter used to recharge the LONG 6V 4Ah built-in battery. A 2m long communication cable (a standard printer cable) is lead out of the box, ended with the KANON 25 PROFILE METER control connector.

PROFILE METER: Mechanical section, motor, gearbox, end micro-switches, trolley guides, trolley with a measuring point and IRC sensors, friction coupling, structure with magnets, point housing and control.

PROFILE METER: Main Technical Characteristics

Electronic system power supply: Lead-cell batteries (maintenance-free) LONG 6V 4Ah, sized 45*70*101mm, weight 0.92 kg. The capacity will cover 20 hour of measurement without any intermediate battery recharging.
Measuring computer power supply: From batteries inside the computer (see the manual supplied c/w your computer).
Measuring computer weight: Texas Instruments Extensa 600 – 2.5kg.HUSKY MP 2500 0.7kg.
Profile meter weight: some 3.0 kg.
Weight of card and battery box: some 3.0 kg (inclusive of the lead battery).
Operating staff: One person.
Profile meter held on wheel: with Somet pole-reversible magnets.