

ITEM OPPORTUNITY SYNOPSIS

Name of the item to be scouted: Counting Head with Axle Counter Sensor

State item to be used in: Nevada

Describe the Item:

Please describe the item application/the end use of item. Axle Counting System (ACS) with Counting Head as an integral part of the Signaling System. For further description please see attachment. Please note that the equipment will be installed and shall be delivered to California and Nevada.

Supplier Information:

Type of Supplier being sought (select from list below)

Manufacturer

Contract Manufacturer

Distributor

Other (please specify)

Reason for scouting submission (select from list below)

2nd Supplier

Price

Re-Shore

Past supplier no longer available

New Product Startup

Other (please specify) BABA

Summary of Technical Specifications and Performance Requirements:

Describe the manufacturing processes (elaborate to provide as much detail as possible). Please see attachment.

Provide dimensions / size / tolerances / performance specifications of the item. Please see attachment.

List required materials needed to make the product, including materials of product components, if applicable. Please see attachment.

Are there applicable certification requirements?

Yes

No

Please Explain: Please see attachment.

Are there any applicable regulations that apply to the production of this item?

Yes

No

Please Explain: Please see attachment.

Are there any other standards, requirements?

Yes

No

Please Explain: Please see attachment.

Additional Comments:

Additional technical comments: Please see attachment.

Volume and Pricing:

Estimated Potential Business Volume (i.e. #Units per day, month, year): Please see attachment.

Estimated Target Price / Unit Cost Information: Target Price to be determined upon further analysis and review with possible manufacturer.

Delivery Requirements:

When is it needed by? (Immediate, 30 days, 6 months, etc) Please see attachment.

Describe packaging requirements (i.e., individually/ group packaging). Please see attachment.

Where will this item be shipped? Nevada and California site

Information for the National Institute of Standards and Technology – Manufacturing Extension Partnership (NIST-MEP) scouting

**Wayside equipment for Signaling Applications
with operational speed up to 220 mph**

1 Axle counter system

The electronic axle counting system shall be based on tried-and-tested fail-safe microcomputer system safety principles and shall be issued with a system-independent safety approval.

The axle counting system shall be in accordance with the safety requirements of the European CENELEC standards EN 50126, EN 50128 and EN 50129 and shall conform to the highest safety integrity level, SIL 4.

The Axle Counting System shall fulfill the CLC/TS 50617-2 standard and the technical requirements regarding interoperability (ERA/ERTMS/033281).

The main function of the system is to issue vital clear and occupied indications for track vacancy detection sections. The vital clear and occupied indications are established based on the signals transmitted by the wheel detection equipment. In addition, the system shall provide further features:

- redundant communication
- NeuPro communication
- WNC+ communication to Siemens Westrace interlockings
- flexibly usable floating relay outputs
- flexibly usable floating optocoupler inputs
- output of a "pulse detected" indication of the wheel detection equipment
- easy diagnostics and configuration via the integrated website

The axle counting system shall consist of a wheel detector (wayside system) and the evaluation unit, which form an integral system to provide information regarding track vacancy, to the interlocking system.



Figure 1-1: Axle Counting Head with Sensor

1.1 Counting Head with Axle Counter Sensor

The Counting Head shall supply reliable wheel detection signals for trouble-free rail operations. All wheel detection equipment variants are distinguished by the following main features:

- high mechanical stability
- compatible with most common rail profiles up to the maximum permissible level of wear
- no mechanical adjustment necessary
- reliable operation with very short wheel detection times at traversal speeds of up to 450 km/h at a wheel diameter of ≥ 830 mm
- immune to traction return currents, current step changes in the catenary supply, magnetic or electromagnetic interference, interference from signaling equipment operating in the audio-frequency or medium-frequency range, and the effects of magnetic rail brakes
- fault-free operation at ambient temperatures from -40 °C to $+80$ °C, in icy, snowy and humid conditions and even with brief flooding
- detection of all wheels whose dimensions correspond to the TSI/EBO and ERA/ERMTS/033281 standards
- integration of overvoltage protection components possible

Characteristics/Requirements of the Counting Head

Safety Integrity Level	SIL 4 (according to EN 50126-1 and -2, EN 50128, EN 50129)	
Hazard rate	$< 6.8 \times 10^{-10}/h$ (annual traversal cycle) $< 2.1 \times 10^{-10}/h$ (Semiannual traversal cycle)	
Mtbf	134 years (40°C)	
Maintenance	Low maintenance due to self-calibrating sensor system and autocalibration	
Declaration	CE Declaration Declaration of Conformity according to TSI CCS Regulation (EU) 2016/919	
Certificates	IP 66 / IP 68 (EN 60529)	
Maximum speeds (Depending on wheel diameter, correspond ERA/ERMTS/033281)	wheel diameter	Maximum speed
	≥ 900 mm	0 to 450 km/h
	≥ 830 mm	0 to 400 km/h
	≥ 600 mm	0 to 250 km/h
	≥ 360 mm	0 to 160 km/h
Rail Profiles	compatible with most common up to the maximum permissible level of wear	
Mounting options of the track devices	rail web mounting with bolts rail foot mounting with a rail foot clamp	
Vertical weight carrying capacity	up to 1000 kg (rail web mounting)	
Sleepers	wood, steel, concrete, slab railroad track	
Mechanical Adjustment	not necessary	
Temperature range for fault free operations (in icy, snowy and humid conditions and even with brief flooding)	-40 °C to $+80$ °C	
Test voltage	10 kV _{DC} to rail	
Power supply and signal transmission	30 V _{DC} to 72 V _{DC} via the two cable wires of the signal cable	

	26 V _{AC} to 72 V _{AC} via two additional wires
Possible traction types of the trains	Diesel traction, Diesel-electric traction DC traction AC voltage traction
Immunity to reverse currents for operational driving currents	< 6 kA _{AC} (16 ² / ₃ Hz, 50 Hz, 60 Hz) < 10 kA _{DC}
Brake systems	Immunity to eddy current brakes, magnetic rail brakes, power regeneration brakes, mechanical brakes
overvoltage protection	integrated
Installation site (wheel detection equipment)	Max. altitude above mean sea level: 3000 m

Special requirements

Due to the required sensitivity under various environmental conditions, special manufacturing processes (e.g. special foaming technologies), machines and tools are required.

The axle counting head consists of several components, electronics in a siding housing and a wheel detection unit. The detection unit consists of two housings, one containing two transmitting units, the other two receiving units. This detection unit is mounted on the track and is therefore subject to strong mechanical forces, which must not leave any damage to the detection units for decades under any climatic conditions.

The electronic transmitter and receiver units are subject to extremely tight tolerances and must be manufactured with highest precision.

The dimensions of the mechanical components are also subject to as tight tolerances. The manufacturing process requires correspondingly precisely manufactured injection molds, and the housings must be carefully post-processed so that the form required to fix the transmitter and receiver units reliably connects with the housing parts.

The form compound itself must be introduced into the track unit housings in a complex process using a special, high-precision injection molding machine in such a way that all components are reliably fixed, and the dimensions of the housings do not change.

1.2 Evaluation unit

The main component of the axle counting system is the axle counter module (ACM).

The ACM processes and evaluates the wheel detection equipment information and transmits the results to the interlocking.

In addition to the output of clear and occupied indications, it is possible, for each track vacancy detection section, to output a reset restriction and a reset acknowledgment on a single channel.

Characteristics/Requirements of the Evaluation unit

Safety Integrity Level (according to the standards)	SIL 4 (according to EN 50126-1 and -2, EN 50128, EN 50129)
Hazard rate	< 6.1 x 10 ⁻¹⁰ /h (annual traversal cycle)

Mtbf	27 years (25°C)
Maintenance	Low maintenance due to self-calibrating sensor system and autocalibration
Declaration	CE Declaration Declaration of Conformity according to TSI CCS Regulation (EU) 2016/919
Physical data of ACM	H × W × D: 151 × 63 × 222 mm Weight: 1675 g
Protection Class	IP 20 (EN 60529)
Maximum speed (Depending on wheel diameter, correspond ERA/ERMTS/033281)	0 to 450 km/h
Interfaces to interlockings	NeuPro communication to Siemens SIMIS D interlockings WNC+ communication to Siemens Westrace interlockings Digital I/Os to relay interlocking
Technical data of the relays (output)	<p>Low-current range:</p> <ul style="list-style-type: none"> switching voltage: 10 V to 60 V AC/DC switching current: 2 mA to 250 mA switching power: max. 7 W <p>If one of the limit values above is exceeded, the ability to conduct currents of < 10 mA via the relay contacts can no longer be ensured.</p> <p>Relay contacts for DC:</p> <ul style="list-style-type: none"> switching voltage: 10 V to 72 V DC switching current: 10 mA to 250 mA switching power: max. 15 W <p>Relay contacts for AC:</p> <ul style="list-style-type: none"> switching voltage: 10 V to 150 V AC, if the ACM is operated in an environment of Class PD1 as per [EN 50124-1], Table A.4 switching voltage: 10 V to 100 V AC, if the ACM is operated in an environment up to Class PD2 as per [EN 50124-1], Table A.4 switching current: 10 mA to 1 A switching power: max. 15 W
Technical data of the optocoupler (input)	<p>dual-channel optocoupler inputs</p> <ul style="list-style-type: none"> signal voltage: 21.6 V to 72 V DC <p>input current range:</p> <ul style="list-style-type: none"> active: 3 mA to 6 mA passive: < 200 µA
Internal interface	Ethernet
Maximum length of sections	Not limited
Superstructure system	Scalable modular system
Installation	Modules installed by latching onto mounting rail, flexible installation of mounting rail possible in racks and cabinets
Counting capacity	32767 axles per track vacancy detection section permanently 20 axles per second and set of wheel detection equipment
Power consumption (ACM)	Typically 12 W + 4 W per set of wheel detection equipment

	Max. 14 W + 5 W per set of wheel detection equipment
Inrush current limitation	2.4 A
Supply voltage (ACM) In normal operation:	21.6 V to 26.4 V DC
Ambient temperature range	-40 °C to +70 °C
Insulation of wheel detection equipment	3.1 kV reinforced insulation as per EN 50124- 1 of wheel detection equipment to all other potentials of ACM
Installation site (wheel detection equipment)	Max. altitude above mean sea level: 2000 m
overvoltage protection	integrated

2 Scope and delivery dates

Wheel Detectors: 210

Evaluation units: 120

The delivery dates, ex-works is scheduled for January, 2025.