AJ ENGINEERING GmbH

INDUSTRIEPARK WAGGONBAU AMMENDORF

ERSATZTEIL-SERVICE & TECHNIK-CENTER

PROJECT
OF DEVELOPMENT / SUPPLY
OF TESTING ROLLER RIG
FOR DYNAMIC TESTING
RAILROAD ROLLING STOCK
WITHOUT TRACTION

STATUS 2016

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TESTING ROLLER RIG
FOR ROLLING RAILROAD STOCK WITHOUT TRACTION

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SECTIONS

- GENERAL INFORMATION
- THE SURVAY OF TECHNICAL EQUIPMENT
- THE SURVAY OF RIG DESTINATION
- BUILDING CONDITIONS PROVIDED BY CUSTOMER
- TESTING RIG EQUIPMENT MOUNTING
- REFERENCES

TESTING ROLLER RIG
FOR ROLLING RAILROAD STOCK WITHOUT TRACTION
GENERAL INFORMATION(1)

- **PROJECT**
  - includes the development and supply of the testing rig for dynamic bench testing of rail vehicles (passenger carriages) without traction, with railroad gage of 1.435 mm and 1.530 mm at the velocity up to 200 km/h;
  - is based on existing technical equipment for dynamic, running and operational testing of passenger carriages on a stationary rig which is now the property of «Maschinen & Service GmbH", Ammendorf » company owner; checked in practice during a large period of time and has always been in the maintenance. The equipment requires restoration and modernization;
  - is based on the methods of testing and reception of undercarriages, brake equipment, drives for generator units, electrical and air conditioning equipment of passenger carriages, with railroad gage of 1.435 mm and 1.520 mm before their setting into operation. Methods are confirmed by Russian Railways.

TESTING ROLLER RIG
FOR ROLLING RAILROAD STOCK WITHOUT TRACTION
GENERAL INFORMATION(2)

- **Project**
  - in addition to sales and technical consulting includes technical assistance in the planning, design and construction work performing for the rig as a preliminary condition for the subsequent installation of its machinery - technical equipment.
- **TESTING ROLLER RIG**
  - is designated for testing of rail vehicles without traction
    - with variable truck centers with the length 11.400, 17.000 and 19.000 mm,
    - with variable bogies wheelbase, with the length 2.400 and 2.500 mm,
    - with variable carriage length between buffers from 17.286 to 26.323 mm;
  - is designated for vehicles testing in both directions of movement;
  - creates an opportunity to drive wheel sets with axis middle part drive of generator for autonomous carriages power supply with power up to 40 kV.

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GENERAL INFORMATION (3)

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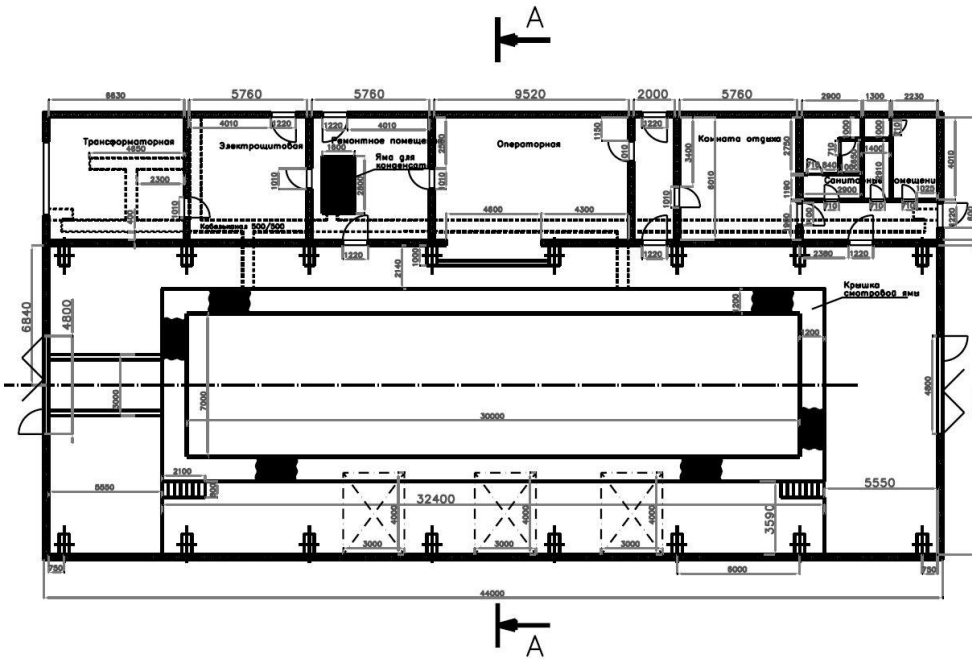
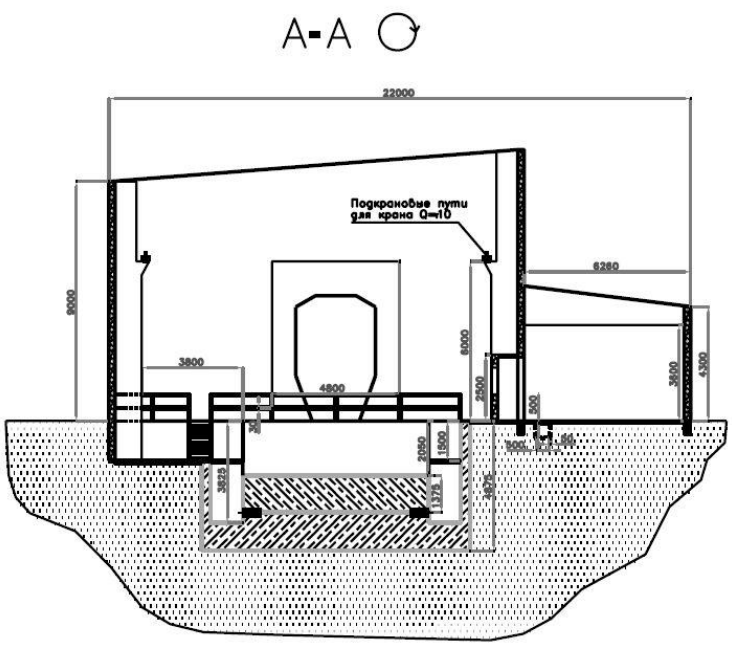
THE EXAMPLE OF TESTING ROLLER RIG PLAN





- **2 UNITS OF DRIVE SECTIONS**
  - Mobile section with independent electro - hydraulic drives to move distances of wheel sets (bogie wheelbase), track and for automatic moving of the section at the truck centers change. Each section is designated for rolling of one biaxial bogie with variable railroad gage and central distance;
  - Each section has one carrying frame
    - with a device for movement by means of hydraulic groove- roller detents;
    - with motor - gear for gear - rack and pinion drive for movement from section;
    - with a centering device of the positioning unit by means of hydraulic clamping cylinders;
    - with a traction device by means of hydraulic clamping cylinders;
    - with hydraulic clamping cylinders;

THE SURVAY OF TECHNICAL EQUIPMENT (2)

- Each section has 2 hauling blocks. Each hauling block is designated for rolling of one wheel set and has:
  - a carrying frame,
  - a motor to drive two wheel disks,
  - 2-wheel drive kits, each with bearings, bodies and wheel discs,
  - 1device to move the wheel disk to change the railroad gage,
  - 1 transitional descending bridge with the railroad gage of 1,435 mm and 1,520 mm

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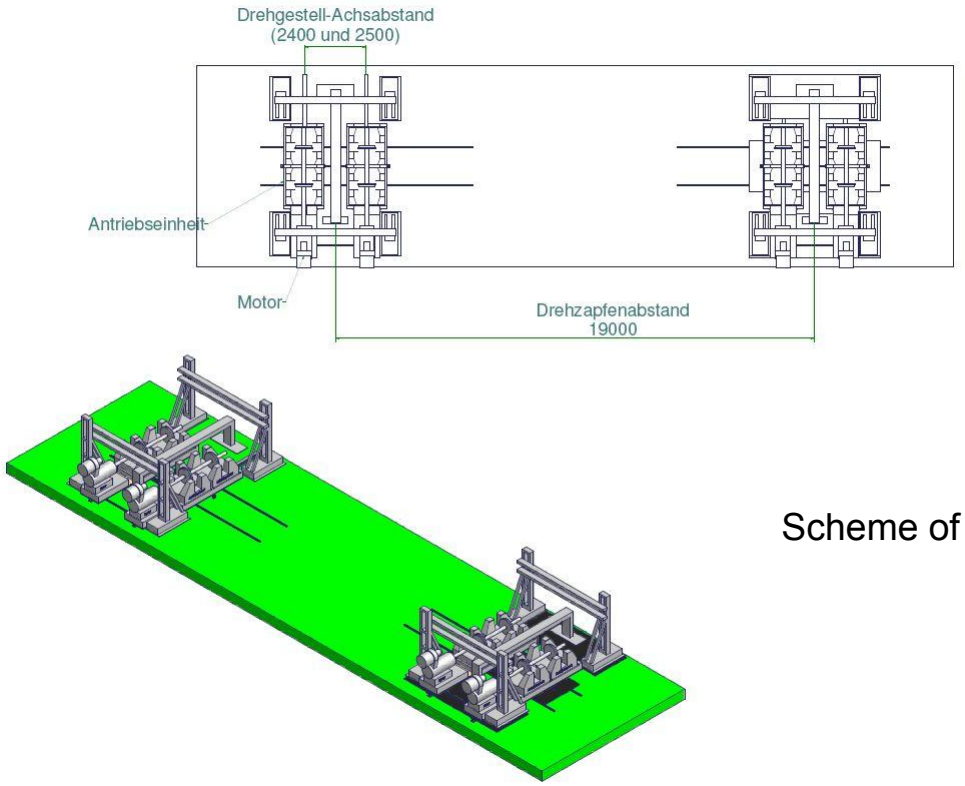
THE SURVAY OF TECHNICAL EQUIPMENT (3)



Scheme of mobile drive sections

- **2 UNITS OF DRIVE SECTIONS**
  - Composed of 1 pc. of hydraulic equipment
  - with hydraulic pump unit with a spare tank
    - with hydraulic pipelines,
    - with a lifting cylinder,
    - with a pushing cylinder,
    - with a clamping cylinder;
  - Composed of 2 pc. of transverse forces exciters
    - of 4 pc. pneumatic cylinders,
    - of cylinders pneumatic control,
    - of pneumatic tank and pneumatic pipelines,
    - of mate racks with variable cross beam for clamping cylinder;

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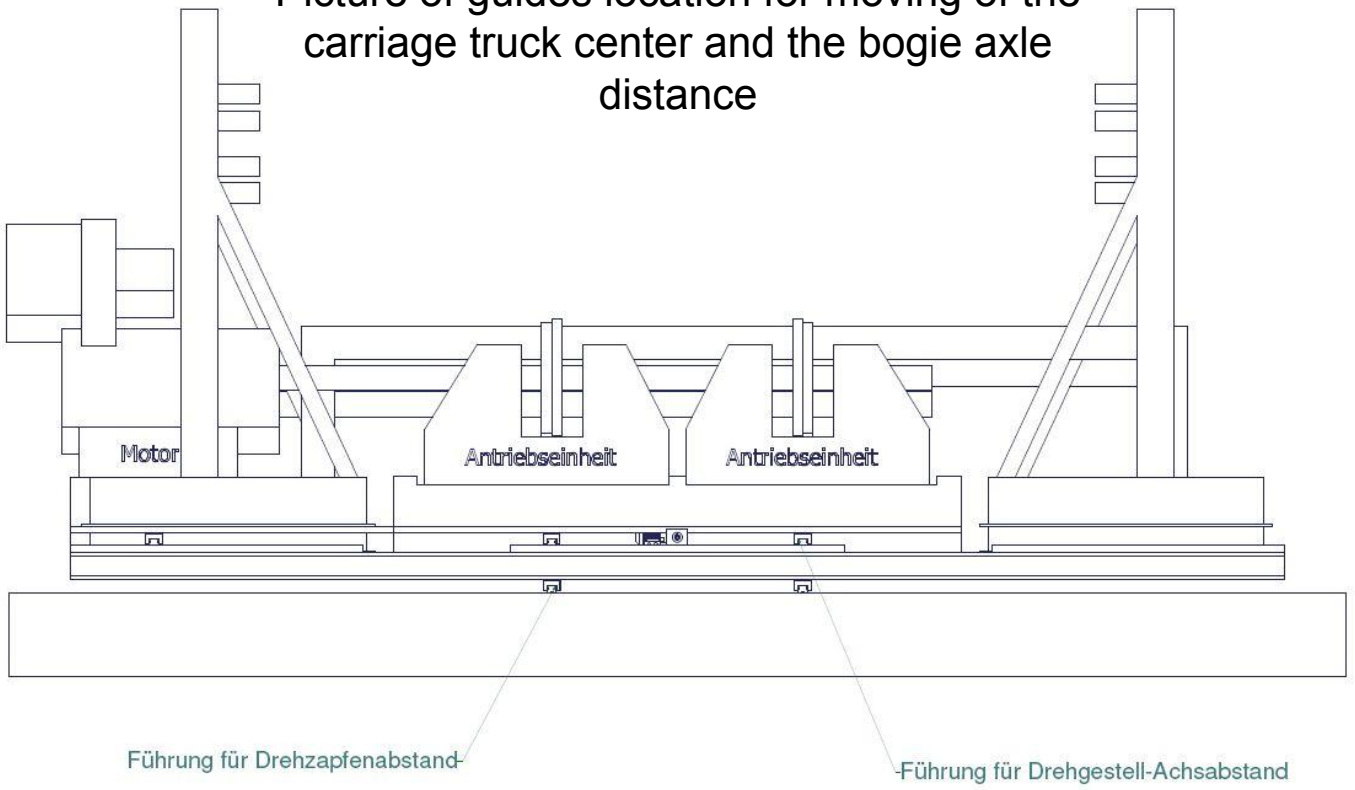
THE SURVAY OF TECHNICAL EQUIPMENT (5)

Picture of guides location for moving of the carriage truck center and the bogie axle distance



- **1 pc. LANE FOR THE DRIVE SECTIONS**
  consisting of :
  - motion path;
  - linear guide;
  - fixing plates for positioning and mounting of the drive sections at predetermined locations.
- **1 pc. RAIL TRACK ON RACKS for the railroad gage of 1.435/1.520 mm**
  consisting of :
  - unified bridge sections;
  - fitting bridge sections;
  - brackets with coupling crossbeam for fixing the carriage by automatic coupling.

- **EQUIPMENT FOR CARRIAGE BRAKE CONTROL**
  consisting of **:**
  - carriage brakes control desk for the central control room of the testing roller rig;
  - pneumatic equipment for the carriage brake control supply.
- **RIG ELECTRICAL EQUIPMENT (1)** consisting of **:**
  - 4 pc. of transmitters for wheel sets drive motors including their control;
  - 1 pc. of control cabinet for the central rig control (3000x2200x600 on the plinth of 200 mm) powered from one of the cabinets of transmitters for wheel set drive ;
  - 1 pc. central control desk(1.200x1.500x1.000 mm) of the testing rig;
  - 2 pc. parallel control desks (800x1.500x1.000 мм) for drive sections;

- **RIG ELECTRICAL EQUIPMENT (2)** consisting of **:**
  - Distribution cabinets (800x760x300 mm) to connect measurement probes and sensors / actuators;
  - Automatic control equipment, consisting of :
    - safety: PILZ-PNOZmulti for safety regulations,
    - control: SIEMENS S7-317,
    - splint system: ProfibusDP,
    - external devices: SIEMENS ET200M,
    - Visualization
      - for the central control desk: SIEMENS MP377-19“ TFT-Touchpaneel
      - for the parallel control desks: SIEMENS MP277-7,5“ TFT-Touchpaneel
    - Change of wheel set drive position: SEW Movidrive MDX16B

- **RIG ELECTRICAL EQUIPMENT(3)** consisting of **:**
  - Providing of measuring results through the black - white laser printer or via the USB - port;
  - Full cabling of rig equipment network including trolley (scraper) electrical pathways for mobile drive sections;
  - Power supply of drive motors including control, consists of repaired, tested transmitters and the control desk of the company ABB / production in1993.

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- **RIG DESTINATION**
  - Rig running tests of rail vehicles without traction in the speed range up to 200 km / h in both directions of movement;
  - Rig tests of carriages with railroad gage of1.435 mm and 1.520 mm with different truck centers, with different interaxle distance;
  - The rig test of passenger carriages in whole, undercarriages, autonomous carriage systems such as generating devices, brake systems, heating and air conditioning systems, electrical systems with the relevant electrical consumers;
  - Carrying out of acceptance tests with consistent supply of rolling stock into operation;
  - Attestation and logging of test results;

TESTING ROLLER RIG
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THE SURVAY OF RIG DESTINATION (2)

- Working modes:
  - Testing rig setting up;
  - Automatic mode of the testing rig operation;
  - Repair and maintenance testing rig mode.
- Safety functions:
  - "Emergency Stop" on all rig control desks and special switches in the test room;
  - Key-locked switches, “Blocking the swith-on state” on all control desks;
  - Protective caps;
  - Automatic locking of the testing rig start at:
    - Opened test room gates;
    - Unfixed / cable-stayed drive sections;
    - Unfixed / cable-stayed drive units;
    - Unfixed wheels disks blocks;
    - Not descending transitional bridges.

- **ELECTRONIC TESTING PROGRAM**
  - Data storage up to 100 roadormance trials in the testing rig control memory,
  - 100 freely programmable for each individual test commands in the program,
  - The ability of different measuring sensors binding to the appropriate program segment.

BUILDING CONDITIONS PROVIDED BY CUSTOMER (1)

- **BUILDING CONDITIONS PROVIDED BY CUSTOMER**
  - The CUSTOMER provides a corresponding test room for installation of the testing rig equipment.
  - The room for testing is prepared by the CUSTOMER for installation of the testing rig equipment (foundations, industrial gases, electricity etc.)
  - Production and installation of vibration-damping foundation is performed by the CUSTOMER with CONTRACTOR providing of special vibration dampers.

- **THE SCOPE OF SERVICES PROVIDED**
  - Providing of technical documentation and calculations for the production of vibration-damping foundation;
  - Inspection and acceptance of all the foundations for the installation of a testing rig equipment;
  - Grading and preparation of passing elements installation for driving sections on the vibration-damping foundation;
  - Unpacking and preparation of the supplied equipment for installation in the testing room;
  - Preliminary assembly and installation of all equipment at specified places in the testing room;
  - Electrical cabling and wiring of all equipment in the testing rig;
  - Connecting the system of technical gases, hydraulic and pneumatic equipment of the rig;

TESTING ROLLER RIG
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CONTRACTOR INSTALLATION WORKS (2)

- Partial mastering of individual parts of the testing rig equipment;
- Mastering of the testing rig without a vehicle;
- Mastering of the testing rig with a vehicle;
- Organizing and cleaning of construction site;
- Training of CUSTOMER personnel;
- Handover of mastered testing rig to the CUSTOMER;
- Control over the work and monitoring the testing rig operation and elimination of possible rig equipment failures within a specified period of time.

TESTING ROLLER RIG
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REFERENCIES (1)

- **Testing roller rig of Ammendorf carriage-building plant**
  - Initial putting into operation in1966.
  - During the period since 1966 to 2000 approximately 15.000 passenger carriages were tested
- **Testing roller rig of former Institute of Railroad Equipment in Berlin**
  - Identical execution
  - Approximately 1.500 carriages were tested