The Russian Network for Testing of Agricultural Machinery

Vadim Pronin
Chairman of the Association of Test Engineers of Agricultural Machinery and Technologies of the Russian Federation (ATEAM)
Director of the Volga Testing Station
FORMATION AND DEVELOPMENT OF TESTING IN RUSSIA

1907 year. Beginning of work testing stations in Russia

1975 year. First test of grain seeder

1948 year. Creating a system of machine-stations of the 16 stations

2013 year. June 11. 65 years anniversary
- 11 machine-zonal stations
- 970 employee

HISTORICAL REFERENCE
DISTRIBUTION OF TESTING STATIONS IN RUSSIA

Central Black Earth TS
Kursk city

North-Western TS
Saint-Petersburg city

North-Caucasian TS
Rostov-on-Don city

Podolsk TS
Podolsk city

Vladimir TS
Vladimir city

Kirov TS
Kirov city

Volga TS
Samara city

Kuban TS
Krasnodar city

Siberian TS
Omsk city

Altai TS
Barnaul city
VOLGA MACHINERY TESTING STATION

**165 employees**

**STAFF**
9 workers with advanced degrees
53 dipl. engineers

**-14 °C**
**+20 °C**

**CLIMATE**
250 - 500 mm rainfall
2.26 t / ha grain yield

**4562,5 ha**

**LAND Resources**
12.5 ha under buildings
4550 ha of arable land

**100-120 machines**

**annual number of tests**
Machinery for crop, livestock, electrical installations

**20 km from Samara city**

**TERRITORY OF ACTIVITY**

**VOLGA Federal district**
14 regions
KUBAN MACHINERY TESTING STATION

117 employees
3 workers with advanced degrees
37.3% dipl. engineers

−4 °C
+23 °C
500 – 600 mm rainfall
5.18 t / ha grain yield

29,1 ra
29.1 ha under buildings

90-100 machines
annual number of tests
Machinery for crop production, horticulture, viticulture

180 km from Krasnodar city

TERRITORY OF ACTIVITY
NORTH-CAUCASIAN
Federal district
7 regions
NORTH-CAUCASIAN MACHINERY TESTING STATION

158 employees

STAFF
3 workers with advanced degrees
41.7% dipl. engineers

−7 °C
+23 °C

CLIMATE
400 – 650 mm rainfall
2.68 t /ha grain yield

9,15 га

LAND Resources
9,15 ha under buildings

100-120 machines

annual number of tests
Machinery for crop production, horticulture, viticulture

60 km from Rostov-on-Don city

TERRITORY OF ACTIVITY

SOUTHERN Federal district
6 regions
CENTRAL BLACK EARTH MACHINERY TESTING STATION

**STAFF**
- 123 employees
- 1 worker with advanced degrees
- 31.8% dipl. engineers

**CLIMATE**
- −8 °C
- +19 °C
- 470 – 640 mm rainfall
- 4 t /ha grain yield

**LAND Resources**
- 291.4 га
- 9.4 ha under buildings
- 282 ha of arable land

**annual number of tests**
- 80-90 machines
- Machinery for plant growing, vegetable growing, animal husbandry

**TERRITORY OF ACTIVITY**
- CENTRAL Federal district
- 17 regions

10 km from Kursk city
NORTH-WESTERN MACHINERY TESTING STATION

90 employees

STAFF

2 workers with advanced degrees
28% dipl. engineers

–9 °C
+17 °C

CLIMATE

600 – 700 mm rainfall
3 t/ha grain yield

4331,6 га

LAND Resources

5,6 ha under buildings
4326 ha of arable land

90-110 machines

annual number of tests

Equipment for plant growing, cattle breeding and processing of grain

60 km from Saint-Petersburg city

TERRITORY OF ACTIVITY

NORTH-WESTERN Federal district
10 regions
SIBERIAN MACHINERY TESTING STATION

56 employees

STAFF
49% dipl. engineers

-20 °C
+18 °C

CLIMATE
300 – 500 mm rainfall
1,72 t / ha grain yield

9,25 ra

LAND Resources
9,25 ha under buildings

50-60 machines

annual number of tests
Equipment for plant growing and processing of grain

30 km from Omsk city

TERRITORY OF ACTIVITY
URALS and SIBERIAN Federal districts
12 regions
ALTAI MACHINERY TESTING STATION

- **87 employees**
- **STAFF**
  - 38% dipl. engineers

- **−22 °C to +27 °C**
- **CLIMATE**
  - 230 – 600 mm rainfall
  - 1.38 t / ha grain yield

- **4697,2 ha**
- **LAND Resources**
  - 15 ha under buildings
  - 4682 ha of arable land

- **50-60 machines**
- **annual number of tests**
- **Equipment for plant growing and processing of grain**

**TERRITORY OF ACTIVITY**

- SIBERIAN and FAR EASTERN Federal district
  - 12 regions

200 km from Barnaul city
VLADIMIR MACHINERY TESTING STATION

56 employees

1 workers with advanced degrees
45% dipl. engineers

STAFF

-9 °C
+19 °C

550 – 600 mm rainfall
2 t / ha grain yield

CLIMATE

3,53 ha under buildings

3,53 ra

LAND Resources

90-110 machines

annual number of tests

Equipment for plant growing and processing of grain

TERRITORY OF ACTIVITY

CENTRAL Federal district
12 regions

80 km from Vladimir city
KIROV MACHINERY TESTING STATION

**61 employees**
**STAFF**
44,6% dipl. engineers

**−14 °C +18 °C**
**CLIMATE**
500 – 680 mm rainfall
2 t / ha grain yield

**210,88 ra**
**LAND Resources**
6,28 ha under buildings
204,6 ha of arable land

**50–60 machines**
**annual number of tests**
Equipment for plant growing and processing of grain

**TERRITORY OF ACTIVITY**
Regions of the NORTH-WEST and VOLGA Federal districts
7 regions

40 km from Kirov city
**PODOLSK MACHINERY TESTING STATION**

- **86 employees**
- **STAFF**: 51.2% dipl. engineers
- **CLIMATE**: 
  - Temperature range: 
    - Minimum: -10 °C
    - Maximum: +19 °C
  - Rainfall: 500 – 700 mm
  - Grain yield: 2.78 t/ha
- **LAND Resources**: 
  - 5 ha under buildings
  - 952.8 ha of arable land
- **Equipment for livestock production, electrical installation**

**5 km from Podolsk city**

**957.8 ha**

**70-80 machines**

**annual number of tests**

**TERRITORY OF ACTIVITY**

**CENTRAL Federal district**

**12 regions**
Scientific Research Institute ROSINFORMAGROTECH

130 employees

STAFF
23 workers with advanced degrees
61.2% dipl. engineers

-10 °C
+19 °C

CLIMATE
500 – 700 mm rainfall
2.78 t/ha grain yield

2212.1 ra

LAND Resources
19.7 ha under buildings
2190.4 ha of arable land

10-20 machines

PRODUCT INNOVATIONS
of agricultural machinery

30 km from Moscow city

ACTIVITIES
METHODOLOGIES OF TESTS;
INFORMATION AND PUBLISHING;
LEGISLATIVE AND REGULATORY FRAMEWORK

FEDERAL LAW «ON TECHNICAL REGULATION»

International and national standards (GOST R, GOST R ISO and others)

Standards ATEAM- **160 PCs**
<table>
<thead>
<tr>
<th></th>
<th>TYPES OF ASSESSMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Technical expert examination</td>
</tr>
<tr>
<td>2</td>
<td>Evaluation of design safety</td>
</tr>
<tr>
<td>3</td>
<td>Agrotechnical (zootechnical) evaluation</td>
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<td>4</td>
<td>Energy parameters assessment</td>
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<tr>
<td>5</td>
<td>Operational and technological evaluation</td>
</tr>
<tr>
<td>6</td>
<td>Evaluation of design reliability</td>
</tr>
<tr>
<td>7</td>
<td>Evaluation power and fuel-economic properties of tractors</td>
</tr>
<tr>
<td>8</td>
<td>Evaluation of traction properties of tractors</td>
</tr>
<tr>
<td>9</td>
<td>Analysis of quality fuel and lubricants</td>
</tr>
<tr>
<td>10</td>
<td>Evaluation of economic indicators</td>
</tr>
</tbody>
</table>
Assessment of the coating quality

Load distribution measurement
EVALUATION OF DESIGN SAFETY

- Static and dynamic stability
- Cabin and operator workplace ergonomics
- Observability and dirigibility
- Mounting of attached equipment
- Safety during transportation
- Design evaluation in operation environment

Evaluation of the sustainability

Evaluation of lighting devices

Operator workplace ergonomics
AGROTECHNICAL ASSESSMENT

Harvesters
- losses of grain;
- crushing;
- contamination;
- throughput;
- grinding straw

Seeders
- irregularity of seeding;
- instability of seeding;
- norm;
- crushing;
- depth of seeding

Tillage machine
- crushing of soil;
- depth;
- quality of stubble;
- smoothness of arable land

Sprayers
- norm of consumption and irregularity;
- drops size;
- density of coverage drops;
- concentration of the working fluid;
- damage to plants
ENERGY PARAMETERS ASSESSMENT

- tractive resistance;
- consumed power;
- specific power consumption
OPERATIONAL AND TECHNOLOGICAL EVALUATION

5

- production rate;
- fuel consumption;
- consumption of time on operations

Instant fuel consumption.

Fuel consumption per hectare
EVALUATION OF DESIGN RELIABILITY

- mean time to failure;
- repair time;
- wear of the working elements;

Assessment of the wear of the working elements

Reliability is estimated in operating hours not less than:
- 100 hours for agricultural machinery;
- 1000 h for tractors.
ENGINE TESTS

- collecting regulatory characteristics;
- power engine;
- torque;
- specific fuel consumption

Test engine power up to 400 kW
DRAWBAR POWER AND FUEL CONSUMPTION

- maximum Drawbar Pull;
- power at the Drawbar;
- slipping;
- traction efficiency;
- range of operating speeds

Drawbar Pull up to 200 kN
TEST STANDS FOR HYDRO MOUNTED SYSTEMS OF TRACTORS

Force load........... < 100 kH;

Time of retention of stable load;

The maximum height of the force.
FUEL AND LUBRICANTS QUALITY ANALYSIS

- Content of acids and alkalis
- Fractional composition
- Octane or cetane number
- Kinematic viscosity
- Flash point
- Coefficient of filterability
- Water content
- Density at 20 °C
- Content of mechanical impurities
ECONOMIC INDICATORS EVALUATION

Kirovetz-744R3 (287 kW)

- Amortization: 18640 RUR/kW
- Wage: 1618 RUR/h

10

Structure of cost of technology

<table>
<thead>
<tr>
<th>Наименование</th>
<th>Сумма, руб/га</th>
<th>Вес, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Прямые технические затраты</td>
<td>3553.72</td>
<td>26.1</td>
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<tr>
<td>Семена</td>
<td>1980</td>
<td>14.5</td>
</tr>
<tr>
<td>Минеральные удобрения</td>
<td>1944</td>
<td>14.3</td>
</tr>
<tr>
<td>Хим. средства защиты растений</td>
<td>5482.9</td>
<td>40.3</td>
</tr>
</tbody>
</table>
GRAIN HARVESTERS EFFICIENCY ASSESSMENT

<table>
<thead>
<tr>
<th></th>
<th>VOLGA</th>
<th>KUBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>HARVESTING COMBINE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Дон - 1500Б</td>
<td></td>
<td>Дон - 1500Б</td>
</tr>
<tr>
<td>Mega - 208</td>
<td></td>
<td>Lexion - 480</td>
</tr>
<tr>
<td>CROP YIELD, C/ha</td>
<td>22,0</td>
<td>64,2</td>
</tr>
<tr>
<td>PRODUCTION RATE, ha/h</td>
<td>3,22</td>
<td>3,89</td>
</tr>
<tr>
<td></td>
<td>2,36</td>
<td>4,23</td>
</tr>
<tr>
<td>FUEL CONSUMPTION, kg/ha</td>
<td>11,8</td>
<td>10,2</td>
</tr>
<tr>
<td></td>
<td>18,1</td>
<td>15,1</td>
</tr>
<tr>
<td>COST OF HARVEST, RUR/ha</td>
<td>457,4</td>
<td>793,9</td>
</tr>
<tr>
<td></td>
<td>827,1</td>
<td>735,8</td>
</tr>
</tbody>
</table>
SCIENTIFIC RESEARCH WORK

✓ Research of machine-tractor Park of Samara region;
✓ Research of efficiency of machine technologies in plant growing;
✓ Investigation of the technology of cultivation of soybeans in the Samara region;
✓ Development and implementation of an online agricultural Advisory system;
✓ Development of perspective design of the soil-cultivating machines;
✓ Development of import-replacing equipment of dairy farms;
PRESENTATION OF THE TEST RESULTS
Websites of MTS:
more 1500 visitors a day

Periodicals:
«Annual bulletin each of MTS»;
«Annual bulletin of agricultural machinery testing» (1000 copies);
«Monthly Agro-Inform» (3000 copies) rubric «Tested on the Volga MTS»
«Monthly Information Bulletin of the Ministry of agriculture in Russia» (5000 copies) rubric «Verifiers recommend»
REGULAR PUBLICATION ON THE WEBSITES

http://

- www.mcx.ru
- www.aist-agro.ru
- www.povmis.ru
- www.altmis.ru
- www.kirovmis.ru
- www.sibmis.ru
- www.kubmis.ru
- www.szmis.ru
- www.podolskmis.ru
- www.chmis.ru
- www.vladmis.ru

More 1500 visitors a day
Volga TS is a base for Annual Federal Volga Agricultural exhibition. Participated more than 400 companies and more than 30 000 visitors last year.
In 2012 comparative tests of 102 agricultural machines in different zones of Russia: Samara, Krasnodar, Rostov-on-don, Kursk, St. Petersburg, Omsk

- Grain harvesters: 20
- Forage harvesters: 6
- Wheeled tractors: 20
- Tillage machines: 28
- Sowing complexes and seeders: 18
- Machines for fertilizer application: 5
- Machines for plants protection: 5

Test participants:

<table>
<thead>
<tr>
<th>CLAAS</th>
<th>New Holland</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Deere</td>
<td>Deutz Fahr</td>
</tr>
<tr>
<td>Versatile</td>
<td>MTZ</td>
</tr>
<tr>
<td>Amazone</td>
<td>Quivogne</td>
</tr>
<tr>
<td>Flexi-Coil</td>
<td>Horsch</td>
</tr>
<tr>
<td>Hardi</td>
<td>Unigreen</td>
</tr>
<tr>
<td>Jar-Met</td>
<td>Rauch</td>
</tr>
</tbody>
</table>

...and 30 Russian enterprises
Thank for attention!

For more information please contact us:

VOLGA TS
Phone: (84663) 46-1-43
E-mail: povmis2003@mail.ru
www.povmis.ru