Programme: CAPACITIES
Module: I – development of public infrastructure RD
Project Type: IP-RD Investment Projects
Contract no. 157CP I / 12.08.2008

Project Goal:

The general goal of the project is to boost the institute research capacity in the field of mechanizing technologies assessment as a safe openinig source towards the international scientific environment and organic connection to national socio-economic environment.

Specific Objectives:

Increasing the competitiveness of mechanizing technologies, technical equipment, services provided by the institute as well as the efficiency of our research results (applied by public high education institutions, small enterprises, SME-s, big enterprises, agricultural farms, etc.) through:
- strengthening the knowledge base presented by the institute;
- boosting the technological transfer based on institute cooperation with economic agents in the field;
- attracting young people and highly skilled specialists towards research carriers;
- developing the assessement laboratory through the purchase of state-of -the art apparata.

Stages/ Activities

Year	Stages/ Activies	Deadline	Results / Supporting documents of results
2008	Stage I. Setting down the purchasing procedures. Drawing up the purchasing documents. Equipment acquisition and delivery. Taking over and registering the eqiupment purchased.	10.12. 2008	Technical and economic report
	INMA		
	Activity I.1 Establishing the purchasing procedures		Substantiating Notes Investment necessity / opportuneness
	Activity I.2 Drawing up the purchasing documents		Terms of supply
	Activity I.3 Delivery taking over and registering the purchased equipment: Laboratory 45 HP tractor, Laboratory 65 HP tractor, Laboratory 140HP tractor, Electronic system for fuel consumption measuring, Torsion transducer , Data acquisition board DAP 5200 (software included) with accessories (BUS PCI box included and power supply), Software data processing GLYPHWORKS, Equipment of ultra-rapid filming with CMOS camera and high dynamics.		Acquisition contracts, Inventory notes.

Year	Stages/ Activies	Deadline	Results / Supporting documents of results
2009	Stage II Setting down the purchasing procedures. Drawing up the purchasing documents. Equipment acquisition and delivery. Taking over and registering the eqiupment purchased.	10.12. 2009	Technical and economic report
	INMA		
	Activity II.1 Establishing the purchasing procedures		Substantiating Notes Investment necessity / opportuneness
	Activity II.2 Drawing up the purchasing documents		Terms of supply
	Activity II.3 Delivery taking over and registering the purchased equipment: Weather report station, POCKET PC with GPS control, Software(Labview 8, LabView PDA Module, Microsoft ActiveSync, MapSource, Autodesk OnSite Enterprise 2, Autodesk Survey, Autodesk Land Desktop), Well set for soil sampling, Digital Penetrometer (Penetrolloger)+sofware, Self-laboratory Logan MCV LaureateVan, Microscope with video camera incorporated,		Acquisition contracts, Inventory notes.
2010	Stage III. Establishing the purchasing procedures. Drawing up the purchasing documents. Equipment acquisition and equipment taking over. Delivery taking over and registering the purchased equipment Auditing of investment. Creating a “webpage”.	30.09. 2010	Technical and economic report
	INMA		
	Activity III.1 Establishing the purchasing procedures.		Substantiating Notes Investment necessity / opportuneness.
	Activity III.2 Drawing up the purchasing documents :		Terms of supply
	Activity III.3 Delivery taking over and registering the equipment purchased: Notebook, Gravity bottle, Flame photometer, Digital displaying automatic refractometer, Laser telemeter, Chemical portable hood, Working table made of laminated plastic, Computer table, Laboratory cabinet.		Acquisition contracts, Inventory notes.
	Activity III.4 Investment auditing.		Audit report
	Activity III.5 Creating a webpage.		Webpage

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Project abstract

The reduced financing level (both private and public) of research-development and innovation activities, in the field of mechanizing technologies and specific technical equipment manufacturing has had important and direct consequences on RDI infrastructure state, as it has been obsolete in terms of scientific and technical features and, consequently on its performances. The lack of funds has led to RDI system limited opening towards international scientific environment and its organic connection to socio-economic environment.

In order to surpass these deadlocks, the project aims at developing the research infrastructure for assessing the mechanizing technologies through the acquisition of RDI equipment and consolidating the „COMPETENCE CENTRE of INMA Bucharest", according to HG 217/2007 on „National strategy in the field of research, development and innovation 2007-2013". This way, researchers will be able to work under performant conditions, with apparata and equipment complying to those existing at European level and intensively use the recently purchased equipment within RDI integrated networks, created within The Partnership Programme in prioritary domains.

By performing this project, researchers within INMA Bucharest will be able to promote their researches results, firstly by actively collaborating within integrated networks, being interested in innovation as added value source, secondly, by communicating and disseminating them and, third time by opening towards international community through international projects works.

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CHARACTERISTICS OF PURCHASED EQUIPMENT

The investments proposed within the project **„Development of research infrastructure of mechanizing technologies assessment laboratory"** have consisted in purchasing state-of-the art equipment, apparata and modern research means, necessary for assessing the mechanizing technologies, namely:

1. Laboratory tractor of 45 HP. It is used for facilitating the movement of existing equipment on the field, achieving the soil texture mapping, pH and N level by specific conductivity (EC).



Main technical characteristics

- Power 47.6HP at 2800 rot/min
- Max. moment : 141Nm at 1200 rot/min
- Number of speeds: 12 forward × 12 backward
- Max. speed: 30 km/h
- Depolluting level: EURO 3

2. Laboratory tractor of 65 HP. It is equipped with appropriate apparata aiming at ensuring the movement on the field of technical equipment necessary for evaluating the mechanizing technologies.



Main technical characteristics

- Rated capacity kW/HP: 69
- Max.torque at 1500rot/min: 250 Nm.
- Max speed: 40km/h
- Number of speeds forward-backward: 12x12
- Cabin: endowed with conditioned air, heating and venting system, reduced noise.
- Depolluting level: EURO 3

3. Laboratory tractor of 140 HP. It is equipped with appropriate apparata for ensuring the movement on the field of technical equipment necessary to evaluate the mechanizing technologies.



Main technical characteristics

- Rated capacity kW/HP: 141
- Max. torque, Nm: 625
- Torque increment: 39%
- Capacity: 6728 cm^3
- PTO's rotative speed: 540/1000 rot/min
- Cabin: endowed with conditioned air, heating and venting system, reduced noise EC77/311:73dB
- Depolluting level: EURO 3

4. Electronic measuring system of fuel consumption. It is used for determining the fuel consumption during the mechanizing technologies assessment.


Main technical characteristics

- It is endowed with detector consisting of two turn-return measuring chambers and a indicating unit set with a support on laboratory tractor panel;
- Three memory levels, independent one from another;
- Indicates the following data: momentary consumption, absolute consumption, average consumption, average speed, run distance , operating hours.

5. Torsion transducer. It is in accordance with data acquisition system.


Main technical characteristics

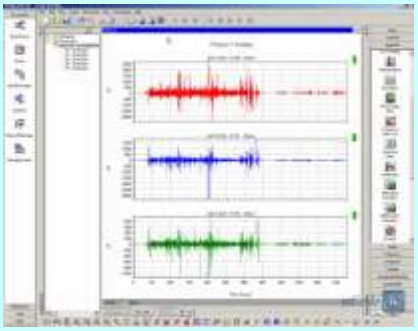
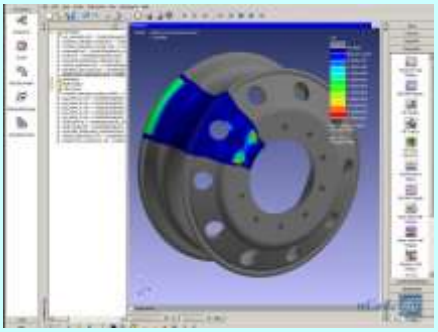
- Rated torsion: 2 KNm
- Perceptible distance: 0…1.8mm
- Supplying voltage: 10…30Vcc
- Load current: 100mA
- Switching frequency: 600Hz
- Working temperature: -20…+ 70^oC

6. Data acquisition board DAP 5200 (software included) with accessories (BUS PCI box and power unit included). It is used for data acquiring in order to be processed by specialized software of a PC, for determining the energetic indexes of technical equipment involved in mechanizing technologies assessment. It is mounted on laboratory tractors.


Main technical characteristics

- Processor: 400 MHz AMD K6-III+
- Memory: 32M of DRAM
- Transfer rate to PC:1666k/sec
- Compatibility: EMC Directive 89/336/EEC

7. GLYPHWORKS data acquisition software. It is used for processing the data supplied by acquisition board, in order to determine the energetic indexes of technical equipment involved in mechanizing technologies assessment.

Main technical characteristics

- CAE analyses and great amount of multichannel data reporting.
- Identifying and removing the unappropriate data.
- Analysis of noise and vibration data.
- Advanced Options for fatigue, frequency analysis, accelerated tests, GPS data surveying.

8. Equipment of ultra-rapid filming with CMOS camera and high dynamics (HDRC) (System of image surveying). It is used for synchronously analyzing the data and images obtained during the experiments by using the technical equipment appropriate to assessing the mechanizing technologies.



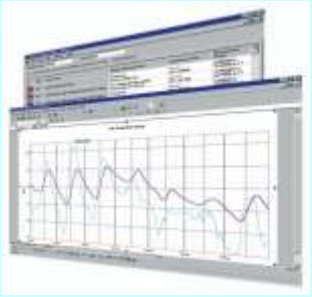
Main technical characteristics

- Internal memory : 12 Gigabytes DRAM
- Sensor: CMOS of 2.400 x 1.800 pixels
- Colour scan: 14-bit (standard)
- Sensitivity: 600 ISO/ASA colour
- Capacity of setting the speed necessary for seizing one photogram for any value: starting from 1 up to 1000 images/sec.(fps)
- Images per second (FPS): 480 images/sec.(fps)
- Interface: Gigabyte Ethernet
- Video output: PAL/NTSC/HD-SDI

9. Weather forecast station. It is a professional station of Delta-T Weather Stations-WS-STD1 type, used in agriculture and designed at measuring and registering wind speed and direction, air temperature and relative humidity, barometric pressure, solar radiation and rain.

a. Weather forecast station

b. Data Logger



c.Specialized software

Main technical characteristics

- Measures and registers:
  - air temperature: -30...70±0.3ºC
  - relative humidity: 5...95±2RH
  - barometric pressure: 15…115kPa with <±1.5% accuracy
  - rainfalls: swinging unit
  - solar radiation: 0...1.1kW.m^2, 300...1100±5%nm
  - wind direction: ±4º
  - wind speed: 0...75±0.1m/s
- It is directly connected by RS232, wireless RF(VHF/UHF radio), satellite modem, IP modem/ server module or ground telephonic line and cell phone modems with antenna kit.
- Data Logger for registering and downloading the respective data with RAM 64kB memory
- It has a software specialized in data direct downloading and storing through serial port on the receiver accompanying it- RF400 on PC or POCKET PC
- It is endowed with power supplying- batteries charged by means of a photovoltaic module
- It is protected agains rainfalls for Data Logger

10. Pocket PC with GPS (UMPC) functions Asus R50A model. It is used at processing the signals provided by weather forecast station and data rapid evaluation on the field.

Main technical characteristics

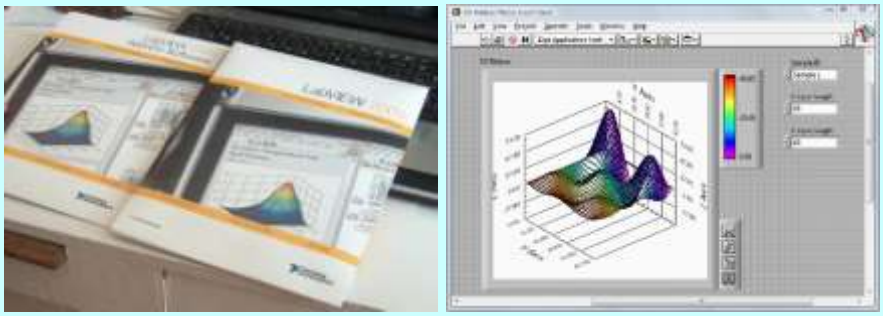
- GSM/GPRS/EDGE: Quad-band 850, 900, 1800, 1900 MHz
- HSDPA/UMTS: Three-band 850, 1900, 2100 MHz
- Display type: Diagonal display: 5.6 - 7 inch, Resolution display: 800 x 480 TFT-LCD or 1024 x 600 pixels Touchscreen
- Slot memory: microSD™ or external DVD-RW
- Internal hard disk : 1.8", 32, 40 or 60 GB
- Internal memory: 1GB RAM
- Processor model: Intel® Stealey 800MHz, Qualcomm® MSM 7200, 400MHz or Intel® Atom 2520, 1330MHz, 512KB

GPRS

- HSDPA: up to 384kbps for loading and 3.6Mbps for dopwnloading
- Wireless technology: Wi-Fi®: IEEE 802.11 b/g
- Connecting devices: Bluetooth v2.0
- Interface: USB HTC ExtUSB™ (11-pin mini-USB), mini-USB
- Operating system : Microsoft Windows Vista® Business
- Camera: 1.3 or 2 mega-pixels
- Ports I/O: 1 USB 2.0

11. SOFTWARE:

- LabView Professional Dev System, Windows, Includes 1 Year SSP Stand. Serv provides free, automatic upgrades for your software & access to NI App. Engr's via phone/email for technical support
- LabView Mobile Module, Includes 1 Year Standard Service Stand. Serv provides free, automatic upgrades for your software & access to NI App. Eng's via phone and email Tech support



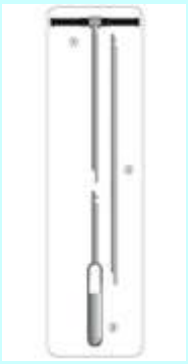
a. NI LabVIEW Professional Development System for Windows version

b. NI LabVIEW PDA Module version

Main technical characteristics

- LabVIEW: NI LabVIEW Professional Development System for Windows version on CD. Includes 1 year free standard service and automatic update system of software package
- LabVIEW PDA Module: NI LabVIEW PDA Module version for developing the applications available at most recent PDA-s with operating systems Windows Mobile on CD

12. Set of wells for soil sampling. It allows drilling in almost any soil type, over the phreatic layer. This set can be used by a single person, being easily movable on the field. It is used at soil sampling from the experimental field.



Main technical characteristics

- Manual common well 60 cm
- Well of 100 cm length with detachable lever, clay soil drill Edelman of 7. 10 cm Ø
- Mixed drill well of 7 and 10 cm Ø
- Sand soil well of 7 and 10 cm Ø
- Edelman well for harsh sand soils of 7 and 10 cm Ø
- Well for water meadow soils of 7 and 10 cm Ø
- Well for gravel soils of 7 and 10 cm Ø
- Spiral well of 4 cm Ø

The drills shape ensures a minimum friction force during the screwing and soil extracting, thus diminishing the physical effort. The adjusting rods serially added can be expanded up to 5 m working depth.

13. Digital penetrometer (Penetrolloger)+sofware. It is designed at measurig the resistance put up when penetrating into soil (in N/m2 or MPa). It includes an internal system facilitating the positioning on the ground (GPS), and then, the measurements results are digitally processed by a PC and a specialized soft (software penetroviewer). Optionally, once the penetrating resistance being determined one can measure the exact humidity amount by means of a sensor connected to the device.



Main technical characteristics

- Internal system facilitating the positioning on the ground (GPS), and then, the measurements results are digitally processed by a PC and a specialized soft (software penetroviewer (software penetroviewer)
- Sensor for measuring the force in the field 10 Mpa
- Ultrasonic measuring of maximum 80 cm depth, 1 cm measuring interval

Measuring soil humidity for each penetration

- Annexes: LCD screen, Memory 1000 measurs, battery NiMH, Cones 1 2, 3 and 5 cm, Ø 8 mm elongation and 80 cm length for cones of 1 and 2, Ø 8 mm elongation and 80 cm length for cones whose size surpasses 2 up to 5, accumulator for penetrolloger input 11/240V 50/60Hz, output 15Vcc, CD-rom soft for penetrolloger for Windows 2000 and XP, cable RS232/IBM PS, 150 cm length, standard board for cones, suitcase for penetrolloger.

14. Self-laboratory. It is suitably equipped for specialists and apparata movement on the field.


Main technical characteristics

- Engine power: 63kW/85CP
- Max torque: 200 Nm.
- Capacity: 1461c^3.
- Transmission: manual transmission type, 5+1 speeds.
- Depolluting level: EURO 4

15. Microscope with incorporated video camera. It is used for experiments on experimental fields and connecting to a notebook for image seizing and processing.


Main technical characteristics

- Binocular tube: 30º TF 1x
- Eyepieces 10x wide field with adjustable intrapupilar distance and eye compensation ametropia
- Phosphorescent light: HBO 50 unit (lighting source with collector, mirror, support and heat absorbing filter, lamp Hg 50 W and cable)
- Achromatic objectives mounted in capstan head: 10/0.25, 40/0.65, 50/1.0 (with immersion) and 100/1.25 (with immersion)
- Video camera

16. Notebook. It is used at taking over the signals directly from the field by digital system for monitoring the microclimat for post processing, displaying and long time archiving.

Main technical characteristics

- Processor: Centrino Core 2 Duo
- Frequency of processor (GHz): 2.4 GHz
- Cache processor dimension (KB): 4 MB L2
- Capacity HDD: 200GB SATA
- Standard memory: 2048
- RAM type: 667MHz Dual Channel DDR2 SDRAM

17. Picnometer. It is used at determining the volume and density of solid, semi-solid and liquid components in experimental field.

Main technical characteristics

- capacity of 100 cm^3
- maximum discrepancy of 0,5%

18. Flamephotometer. It is used at ensuring the routine determinations of Na, K and optionally of Li, Ca, Ba in experimental fields.

Main technical characteristics

- It is a digital reading instrument
- Flamephotometer is an apparatus based on alkaline metals and alkaline-earthy metals excited with flame (Na, K and optionnally of Li, Ca, Ba), the initial state being reached by means of light energy emission
- Wave length of emitted light is appropriate to each element
- Light intensity is in proportion to sample concentartion

19. Automatic refractometer with digital display. It is used at accurately measuring the liquids, solids, semi-liquids and powders on experimental fields.

Main technical characteristics

- Refractive index, grade brix and temperature are automatically displayed on LCD
- Measuring domain: Refractive index (nD) 1.3000 - 1.7000 Brix 0.0 - 95.0%
- Precision: Refractive index (nD) ±0.0002 Brix ±0.1%

20. Laser telemeter. It is used at directly measuring the experimental field dimensions and surfaces.

Main technical characteristics

A single person measures distances between 0.05m and 200 m with laser precision

- Measuring accuracy ±1.0 mm
- Operating range between 0,05 m and 100 m without target plate and 200 m with target plate
- Individual and continuous measuring

21. Chemical portable niche. It is used at determinating in laboratory conditions the chemical composition of agricultural products as well as safely storing the chemical materials.

Main technical characteristics

- Structure made of steel 30x30 mm of 1.5 mm thick, covered by acid-resistant paint, endowed with 4 rubber wheels, among which two are self-blocking wheels
- Working surface made of acid-resistant plates.

22. Laminated plastic working table. It is used at performing experiments in laboratory conditions according to security conditions.

Main technical characteristics

- Structure made of steel 30x30 mm of 1.5 mm thick, covered by acid-resistant paint
- Working surface covered by laminated, acid-resistant fireproof and scratching-resistant plastic
- It has 2 electric panels, each of them with 2 plug devices of 220V/15 A with safety cover

23. Computer table. It is used at working in laboratory according to hygiene and safety requirements when processing the experimental data.

Main technical characteristics

- It is manufactured in compliance with European norms regarding the size and ergonomics: UNI EN 527-1; UNI EN 527-2 and UNI EN 527-2
- Has 3 holes of Ø 60mm: 1 hole on working surface for monitoring device and keyboard cable; 2 holes on lateral side for electric cables

24. Laboratory cabinet. It is used at storing and archiving the materials used in laboratory or documents resulted after assessing the mechanizing technologies.

Main technical characteristics

- Has two wood doors made of agglomerated double-laminated and non-ignitable panels of 18 mm thick, endowed with 4 internal shelves.
- The doors are mounted on hinges adjustable with a spring allowing an opening of 90°.

ST SERVICES

ST services supplied by Laboratory for assessing the mechanizing technologies allow to accurately evaluate the above technologies in order to embrace agricultural field sustainable use systems which prevent or minimize soil damage, restore its productive capacity and vital processes and ensure agro-food output increasing:

1. Evaluating the impact of agricultural works mechanizing technologies upon soil agro-physical state;

2. Evaluating the potential risk of soil degradation;

3. Analysis of soil agro-physical state dynamics

CONTACT PERSONS

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PERFORMANCE INDICATORS

- Total amount of RD state-of-art equipment purchased within the project: 24

- Number of ST services supplied by the project: 3

- Number of young people involved in RD training as a result of project: 3

- Number of international project calls submitted as a result of project: 1 (Project proposal FP7-244318/09.01.2009 „Informational computer-aided system of soil data regarding the soil quality state necessary to precision agriculture technologies", Call FP7-KBBE-2009-3)

STAFF COMPETENCES

The team involved in ST services supplied by the project comprises professors as full members and corresponding members of Agricultural and Forestry Academy „Gheorghe Ionescu Şişeşti", Ist, IInd and IIIrd degree scientific researchers, Ph.D engineers and trainers for a doctor degree in the field of Agriculture and Mechanical Engineering, with expertise in the domain of processes, technologies and technical equipment of mechanizing and automating the works in agriculture and food industry.

WORKING PROCEDURE

Assessing the mechanization technologies (soil works, setting and maintaining agricultural crops) is performed according to INMA applicable procedure.