



**INNOVATIVE ECONOMY**  
NATIONAL COHESION STRATEGY



**EUROPEAN UNION**  
EUROPEAN REGIONAL  
DEVELOPMENT FUND



# Industrial Institute of Agricultural Engineering

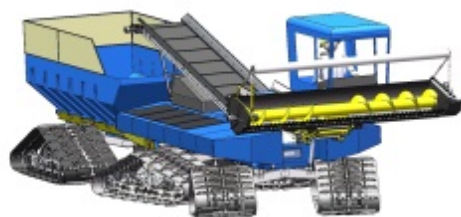
*Przemyslowy Instytut Maszyn Rolniczych*

*Starolecka 31, 60-963 Poznan ; tel: +4861 8712230 ; fax: +4861 8793262*

*Project number: WND-PIG.01.03.01-00-164/09*

## New generation of vehicles for harvesting of biomass and modern method of forming biomass bales train

[New generation of vehicles for harvesting of biomass and updated method for forming train that consists with "wetland" tractor and a several connected together the biomass bales]



Adam P. Dubowski, Krzysztof Zembrowski, Tadeusz Pawłowski, Sylwester Weymann, Radosław Karbowski,  
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PIMR - Industrial Institute of Agricultural Engineering in Poznan, Poland realises two R&D project No. *WND-POIG.01.03.01-00-164/09* and *N R 03 0077 06/2009* on implementation technologies for works related to stopping unwanted (grass, reeds, bushes) greenery succession on wetlands and restoring the breeding areas of endangered species of birds.



The Biebrza National Park, Poland



**Existing technology in Poland – adapted ratracks with low quality of service and not professional repairs. Hydraulic oil is mineral not biodegradable one**

*1 cc of mineral oil can spoil up to 5000 cc of clean water and it is in ground or water for years*



**Ratrac adapted for work in wetlands near Biebrza river.**

*Sometime farmer is so busy to work efficiently as possible ...  
that rear door of trailer is kept open during all day...*





„Home-made changes” , damages in equipment (broken track) and traces made by ratrack unit in the field



## Terrain devastation by ratrac unit that is working during August and September





**Terrain devastation by ratrac unit**  
that is working during August and September





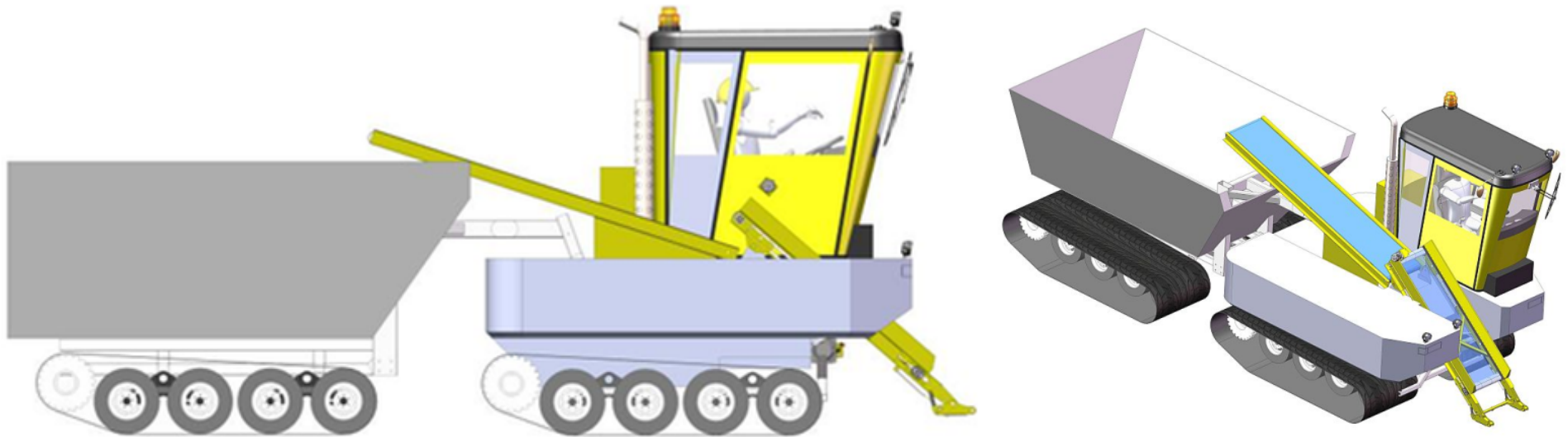
**Terrain devastation made thanks method: one by one biomass  
bale transportation using farm tractor**



**We are working on - how to improve technology for cutting and transporting biomass to temporary magazines.**

In two main R&D projects our team is working on:

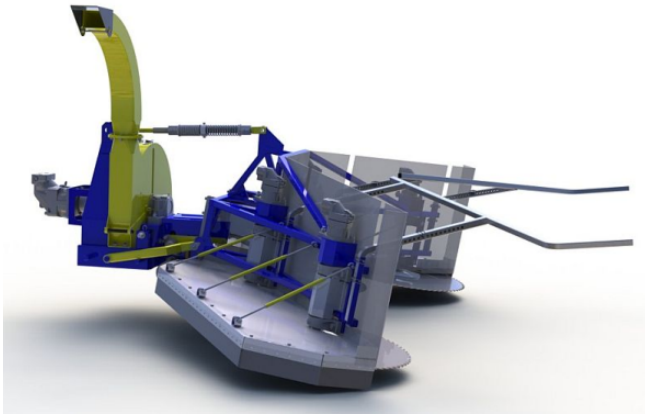
1.new Crawler type Units for work on boggy terrains -  
supported by grant No. *WND-POIG.01.03.01-00-164/09*



Virtual models of AMPHIBIAN-TRACKED VEHICLES (ATV)



New virtual models of tool modules:

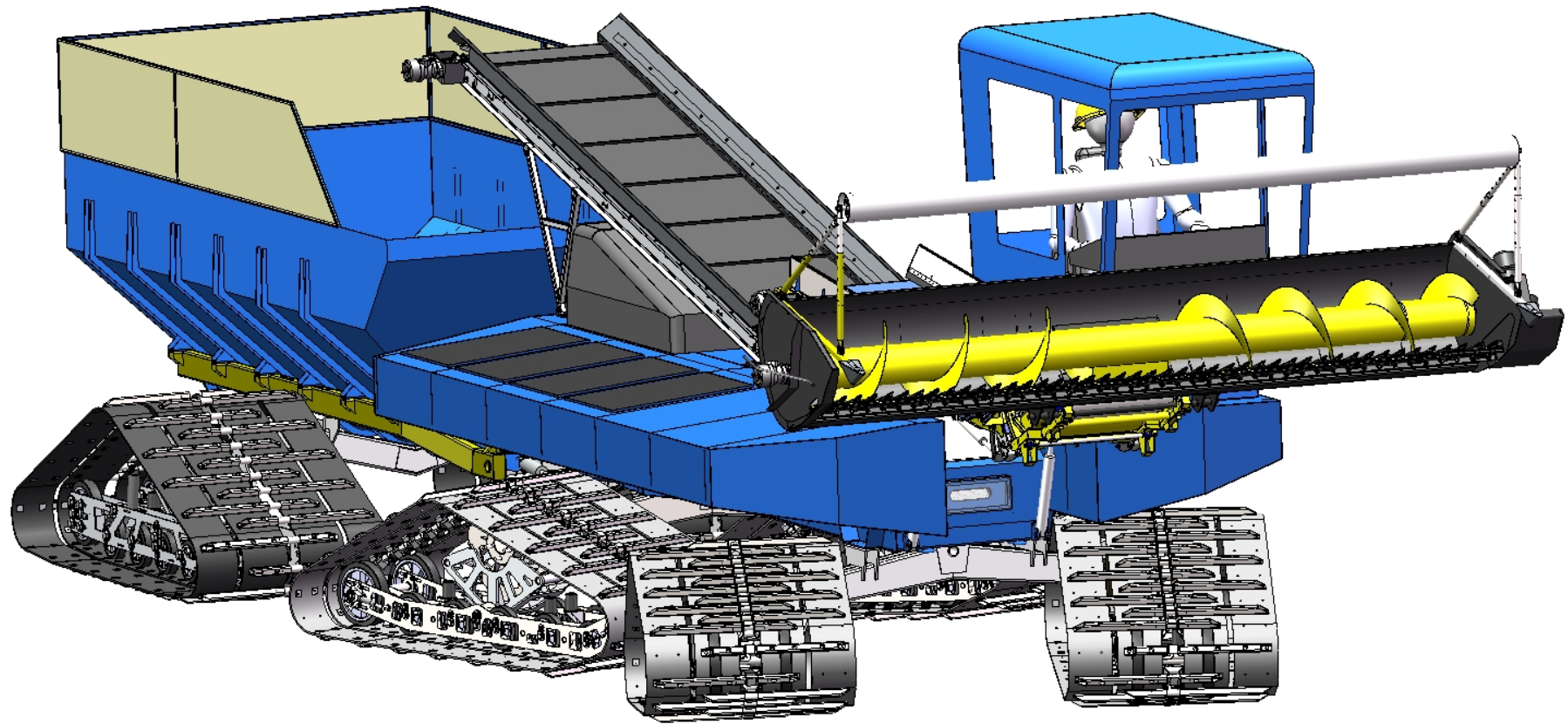




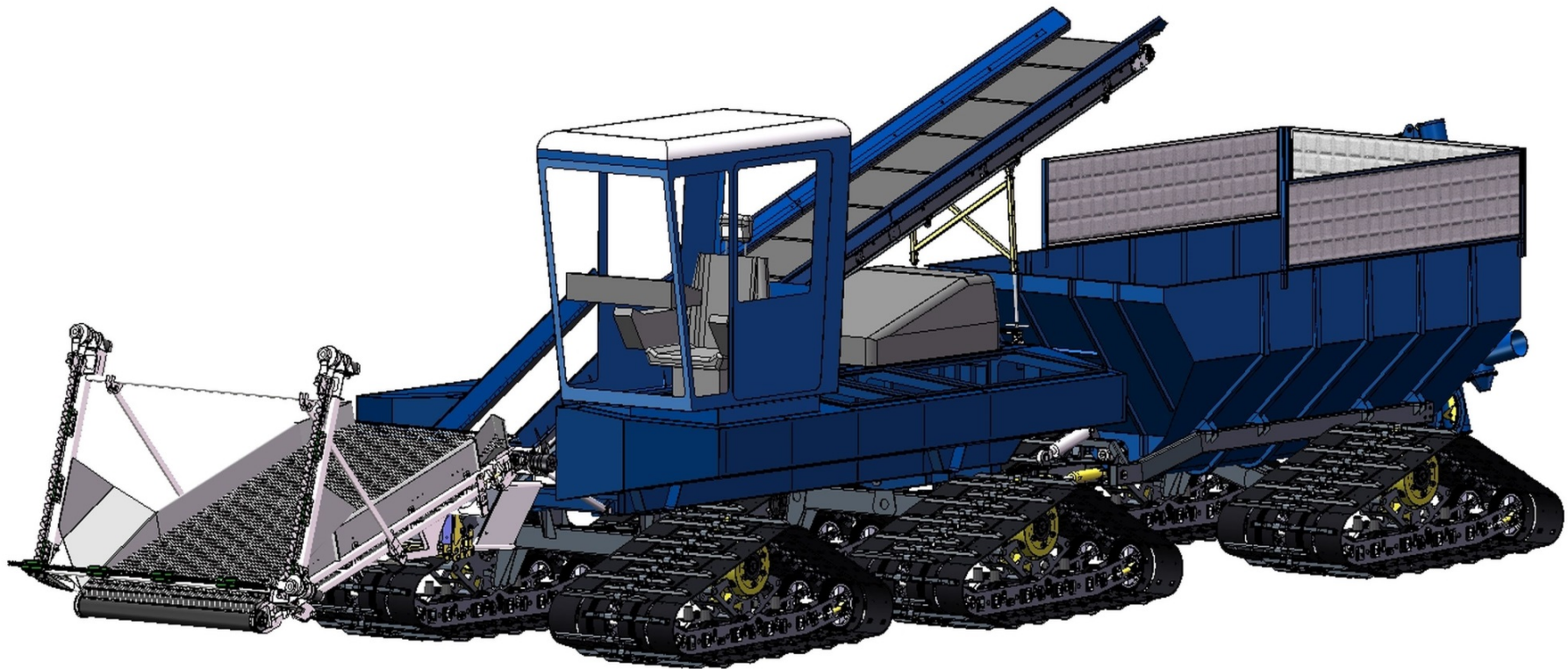
The real model of the pre-prototype



## Final option: ATV units with track modules



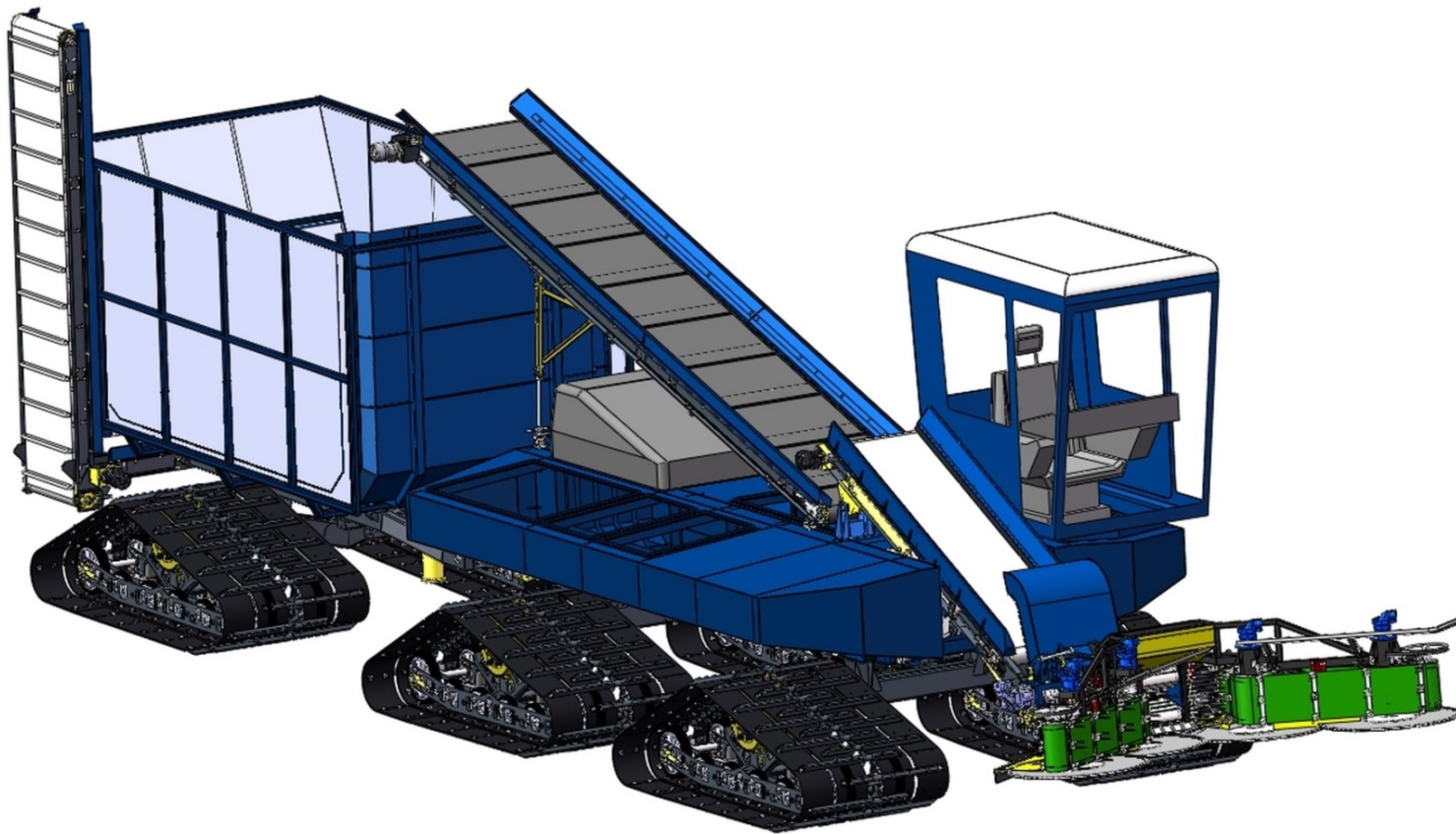
The newest virtual model of ATV prototype with track modules that are powered by 6 hydraulic engines and independently steered



The newest virtual model of ATV prototype  
for cutting reed, underwater plants on lakes



# AMPHIBIAN-TRACKED VEHICLES (ATV)



The newest virtual model of ATV prototype for cutting grass and reed

**Real models of ATV unit will be build in April 2013**



**The hot news:** real model of ATV's track modules (February 8,2013)



# Implementation of the innovative biomass train technology



PIMR's new method for forming biomass train : farm tractor is towing several biomass bales.

On ground you can see deep traces, rinen made by tractor's wheelles.

## New PIMR's patent disclosure

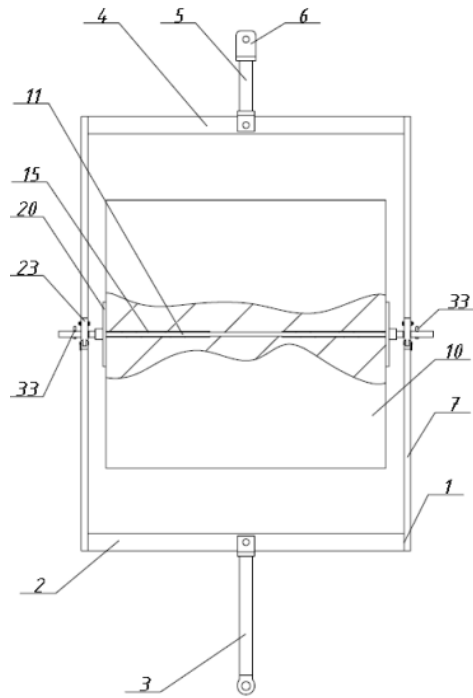


Fig. 1

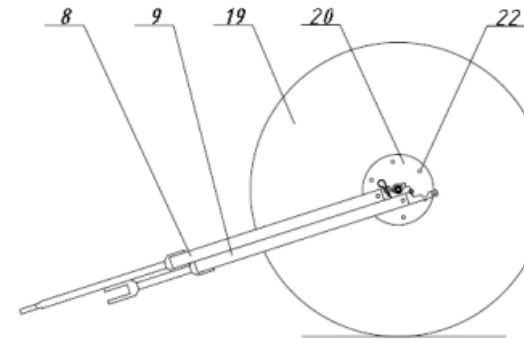


Fig. 2

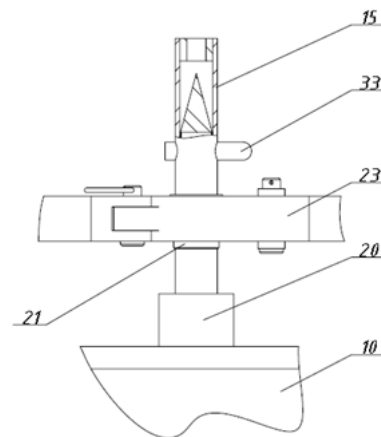


Fig. 3

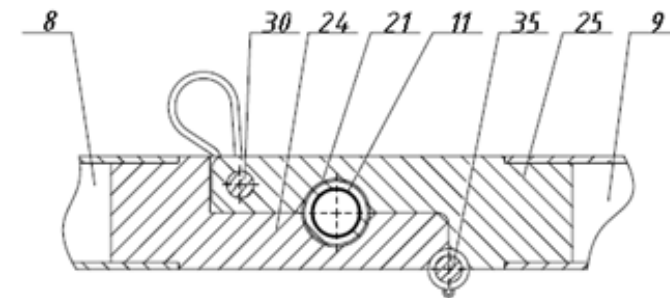


Fig. 4

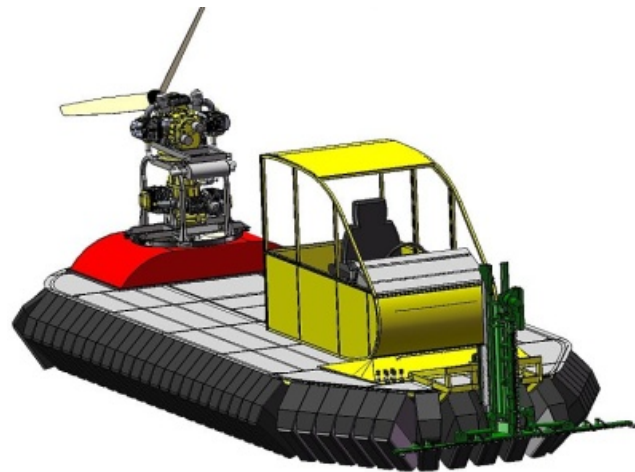
*New adapter should be built and tested with other elements of technology that is needed for final implementation in the wetlands*



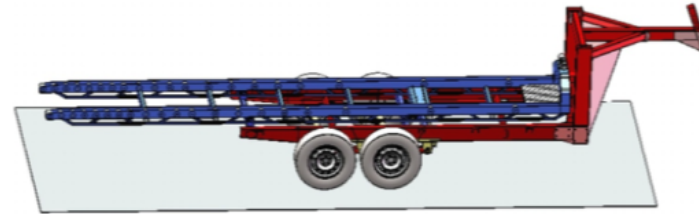
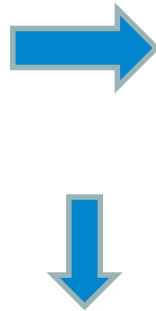
New PIMR's tracked tractor with SOUCY TRACK modules, should work better on peatlands especially as biomass bales power unit of the biomass bales train



## 2. implementation of Hovercraft technology - project supported by grant No. N R 03 0077 06/2009



Agricultural Hovercraft Tool Carrier (AHTC)



Mitsubishi L200 coupled with gooseneck trailer PIMR N1+ AHTC





### Hovercraft Tools Carrier and Transportation Module as a unit

- System is not ready for implementation – aircraft type engines are too small and can not be used in agricultural field because of too many problems with electric starter, with proper work in winter ....



# AGRICULTURAL HOVERCRAFT TECHNOLOGY

## Agricultural Research Hovercraft Tools Carrier (AHTC)



The AHTC „finale stage” of rebuilding research version of AHTC



## Hovercraft Tools Carrier Prototype during first flights in January 2013 on PIMR's yard covered with small layer of snow



Telescopic pole for cameras one on extension cable is Sony HD Video VBOX, Second mounted on the mast top - is small Sony Webbie camera for taking 1hours video movies. It can move on snow covered terrain but it has too small engine – at the weight of AHTC should have engine 200-400kW





## GENERAL SUMMARY:

- 1) The new vehicles have a great potential to ease farmers' work safety, to improve environment protection, by decreasing negative impact on protected areas of the National Parks, and the Natura 2000 areas.
- 2) Implementation of hovercraft technology requires more research and field tests to estimate the bio-economic values on the sustainable development of the mires and the peatlands.
- 3) New rules and procedures should be developed to control a proper work of the vehicles, machines and tools in the fields; especially, for checking place where the working machines and equipment have unexpected stops.
- 4) In case of breakdown of the equipment (spillages of oils, especially mineral oils) such action should start remediation procedures on site of the oil spillage, and supervising inspector from the National Park Services should inspect site during action and after closing it.

- 5) The international multidisciplinary research teams and manufacturers should get more information of benefits and negatives sites of used in wetlands machines and special tools modules.
- 6) Existing technology together with the new technologies should be closely observed to find how really good or bad they are. What procedures should be improved or as soon as possible stopped because of negative impact on environment protection and sustainable biodiversity development.
- 7) Maybe, obligatory wetland-machines and tools technical inspection procedures should be developed and implemented to avoid environmental pollution (oils spillage, ground devastation etc.).
- 8) *Using ratracks in winter is surely much better idea – because there is no any damage to surface like during summer months. Only question mark is what type of oil they are using? Mineral oils should be banned and biodegradable oils should be implemented at once.*





*Mateusz Matysiak - author of Aquatic Warbler's pictures ([www.mateuszmatysiak.pl](http://www.mateuszmatysiak.pl))*

**Thank you very much...**

**and I hope that thanks results of our R&D projects  
somewhere in Poland and Europe as well,  
we will see more often nice Aquatic Warblers ...**



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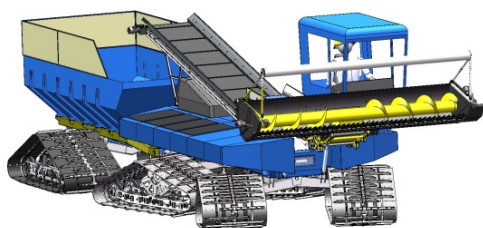
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*R&D project No. WND-POIG.01.03.01-00-164/09 ;  
PIMR's patent is supported by WND-POIG.01.03.02-00-045/10.*

**Thank you for your attention  
and welcome to visit our team at PIMR....**

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