



AGRI TECHNICA

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Machinery Trends at *AGRITECHNICA 2009*

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General Trends



- *AGRITECHNICA* 2009 – the world's innovation platform for modern agricultural machinery and equipment
- Over 300 innovations submitted – high level despite economic crisis– agricultural machinery and equipment not (yet) strongly affected
- Agricultural machinery groups and medium-sized enterprises are equally innovative –an altogether highly innovative industry
- Key areas of innovation: electronics, instrumentation and controls, automation and data management
- Special trend innovations in tractors, harvesting machinery, machinery and equipment for plant protection and for forage harvesting, and in electronics
- Innovative machinery and equipment and electronics for boosting quality and improving performance



Key Areas



Tractors



Mowing machinery



Loaders



Choppers



Balers



Grain Harvesting



Transport



Feeder mixer wagons



Grain storage/
conservation



Sugar beet harvesting



Potato harvesting



Tillage machinery



Drilling machinery



Plant protection



Organ. fertilising



Mineral fertilising



Irrigation



Forestry machinery



Municipal
applications



Fruit/vegetable cropping



Bioenergy



Seed



Farm inputs



Agri-electronics



Precision Farming



Software



Academia



Components/spare parts



Workshop supplies



Tyres/Wheels

Trends – Main Focus



Tractors



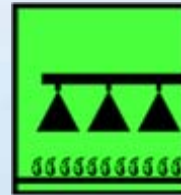
Mowing
machinery



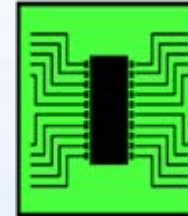
Grain
harvesting



Drilling
machinery



Plant
protection



Agri-electronics



Precision Farming



Software

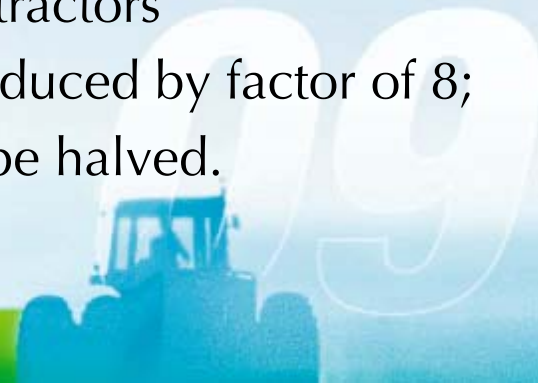




Tractors



- New tractor series– in mid-range performance classes and in large tractors for highly developed markets
- Outputs of more than 400 kW as articulated chassis or tracklayers, with up to 380 kW as all-wheel steering models
- Standard tractor with up to 250 kW
- Uninterrupted trend towards higher outputs
- Asia: High numbers of simply designed tractors– approx. 60 % of the world's production volume
- New engineering due to emission regulations
- As of 2011: Tier III stage B for tractors
 - Particulate emissions to be reduced by factor of 8;
 - Nitrogen oxide emissions to be halved.





Tractors

- Emissions stage 3 B with SCR technology (urea in exhaust flow) or diesel particulate filter
- Enormous challenge for the tractor industry due to the future emission Tier IV stage– consequence: changes in engineering concepts will be necessary
- Electrification of tractors– implementation of initial concepts
- Tractor with diesel-electric drive with 220 kW and 172 kW electric output
- Split power infinitely variable transmission from 50 to 500 kW – automatic engine and transmission management
- Optimal operating comfort for tractors through terminal and multifunction joystick





Tractors

- ABS systems on standard tractors
- ESP with Steer by Wire: steering without mechanical or hydraulic connection between steering wheel and wheels
- Improved riding safety: no more uncontrolled rocking
- With Steer by Wire the tractor industry is setting trends ahead of the motor car industry
- Integrated tyre pressure regulating systems on standard tractors
- New coupling systems – simplified implement mounting
- Tractor control via mounted implements (ISOBUS)





Drilling machinery

- Electric drives for precision drills for optimal, high-precision drilling
- New developments to improve equalising of longitudinal grain spacing – prevents rolling in the row – advantages for cross hoeing
- Trend towards even more precise drilling through reinforced use of electronics
- Precision Farming is state of the art
- High-performing systems with high-level work quality





Plant protection machinery



- EU Framework Directive for sustainable use of plant protection agents: the objective is to improve equipment engineering for plant protection in line with protection of the environment, users and consumers
- New EU Regulations as of 2010 – Amendment of the Machinery Directive
- Consequently innovations thrust in equipment development
- Drift-reducing plant protection equipment– air-assisted injector nozzles; direct feed-in systems
- Precise dosing and reduction of measures through electronics and Precision Farming (DGPS support; ISOBUS terminals)





Plant protection machinery



- Electronically controlled functions on machines
- Automatic shut-off (section control)
- Headland management (sequence control)
- Automatic spacing (distance control)
- Steering aids (track guidance/ tramline systems– track guide)
- Database systems for control and documentation
- Premiere - nozzle lighting for surveillance (night-time work)
- Optimising boom stability / boom guidance, new boom systems for exact application
- Time-saving and water-saving equipment cleaning
- Prevention of dressing dust drift in precision drilling of maize





Combining machinery



- High-power combines for shorter harvesting periods and more difficult harvesting conditions
- Target: optimal quality of work coupled with high throughput rate
- Engineering for higher combining efficiency
- High daily throughputs– tangential rotor combines and straw walker machines with additional separator rotor
- Innovations in the medium performance category – new series with rotary separator systems
- Use of sensors and electronics to inform drivers has become standard
- Telematics systems for combine monitoring





Combining machinery



- New developments for automating threshing (e.g. sensors for the quality of the harvested crop)
- Data management and electronics for controlling combines
- Interactive driver assistance system – Optimising of combine settings
- Technical solutions for greater safety at work: new folding cutter units– new cutting systems
- Harvesting headers with working widths of up to 15 m – lightweight construction





Forage harvesting machinery



- Many innovations in forage harvesting machinery : use of electronics as well as new engineering developments
- Optimal coordination of process chain
– target: production of high-grade feed
- New areas of application for harvesting chains in the field of bioenergy
- Intensive conditioning of large harvest quantities for biogas plants
- High working rates, appropriate logistics, sophisticated transport management
- Efficient and intelligent machine deployment for high-grade and low-cost performance of work – cutting feed costs





Forage harvesting machinery



- Mowers with working widths of up to 10 m (combinations) at working speeds of up to 15 km/h
- Self-propelled harvesters now with working widths of up to 15 m with working rates of up to 20 ha/h
- Self-loading wagons with up to 40 m³ loading volume and 20 t total weight for high collection rates
- Self-loading wagon concepts with additional use options as pure transport vehicle; easier component maintenance
- Chopper-type forage harvesters with outputs of over 600 kW (crops for biogas plants) – new developments
- Optimal crop in-feed in choppers through new technologies
- Sensor control of tractor and machinery through ISOBUS (balers, loader wagons)





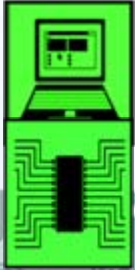
Electronics and Software

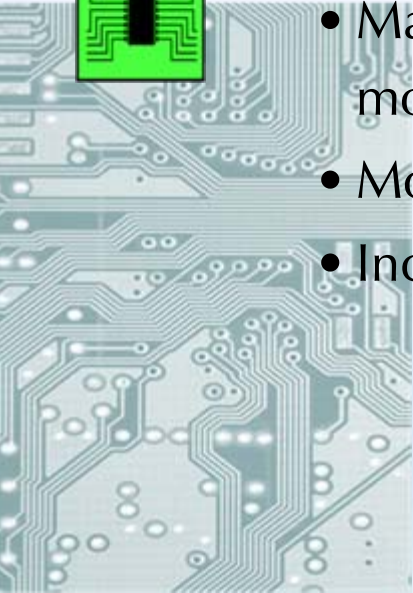
- The ISOBUS has made a worldwide come-back with industry breathing new life into it – oriented to practical farming
- ISOBUS – terminals and operating concepts now available from many manufacturers
- New - compatibility between different systems from different manufacturers
- Data management and machinery combinations coordinated
- Virtually no machine segments without electronic controls any more





Electronics and Software

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- Trend towards more logistic solutions and fleet management, e.g. for biogas plants; combine monitoring
 - Machine monitoring: telemetric systems and fault detection used more in practice
 - Most innovative field of agricultural engineering
 - Increasingly significant segment for all machinery segments



Conclusion



- Number of innovations at *AGRITECHNICA* 2009 at a high level– high innovativeness in selected machinery segments
- Many innovations in the mid-range performance categories
- Electronics introduce intelligence to machines on a wide basis
- Modern machinery deployment offers chance of cost-efficient and thus more profitable production
- State of the art electronics and new information technologies are integrated to boost quality assurance and operating comfort
- Legislative conditions force further development of existing concepts
- Environmental aspects and efficient use of inputs play a key role in low-cost production



The background features a stylized globe with white network lines radiating from a central point. In the foreground, there is a silhouette of a tractor in a field. The overall color palette is dominated by blues and greens.

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**Thank you very much
for your attention!**