Welcome to AEF

Communications Networking on Agricultural Machinery

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Content

➔ Introduction and history on ISOBUS
➔ AEF and its products
➔ Future of Communications Networking
➔ Conclusion
Market situation – Lots of different tractors and implements

Most of them are equipped with ISOBUS
Why standards
History – Electronic Standards

➔ The 90th

- Rapid increase of Electronics in Tractors and Implements (multi-brands)
- Protocol needed for data communication between tractors implements based on CAN
- The most important standard developed was ISO-11783
History – Electronic Standards

![Diagram of agricultural machinery with cloud/Internet integration]

- **Connector Tractor - Implement**
- **Virtual terminal (VT)**
- **Data transfer to farm computer**
- **Bus terminator**
- **Tractor internal monitor**
- **Connector Implement - Implement**
- **ISOBUS - cable**
- **Electronic control unit (ECU)**

Tractor ISOBUS electronic control unit (Tractor ECU)

Tractor internal bus

Cloud / Internet

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What is ISOBUS?

➔ Brand name of a data bus for agricultural use

➔ Based on Standard ISO 11783

➔ ISOBUS as mutual communication between implements and tractors as well PCs on the farm

➔ For tractors and implements the ISOBUS standard has been introduced 2001
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**ISOBUS market introduction**

➔ Early 2000s
  - ISOBUS started slowly in 2001
  - Since 2005 rapid growth in ISOBUS applications
  - Many companies involved worldwide
  - Different interpretations of the standard ➔ *the standard is extensive!*
  - Incompatibility issues

➔ Need for Conformance Testing!
History – Industry awareness

➔ Mid 2000

- Typical ISOBUS systems sold in high quantities
- Only one testing institute: DLG, still incompatibility issues in the field
- Non-aligned, unstructured approach to market
- ISOBUS ‘prepared’ or ‘light’, what does it mean...?
- In practice: Customers losing confidence in manufacturers!
Content

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Founding of AEF

➔ Agricultural Industry Electronics Foundation
  ▪ Founded on October 28, 2008 by 7 manufacturers and 2 Associations

➔ Today 8 major agricultural equipment manufacturers and 3 Associations
  ▪ Worldwide support of ISOBUS implementation
  ▪ Structured in 11 project teams with different scopes
  ▪ Supported by 5 international test lab to certify products
AEF combines ISOBUS and Ag industry needs

Main goals

- Create solutions based on ISOBUS
- Define standards for Ag industry
- Focus on Tractor – Implement connection
- Coordinate activities and developments
- Communicate via interfaces
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AEF growth

→ AEF has gone through a tremendous development over the past 6 years!

2008

Few members no products

2010

120 members
Development of own products
- AEF ISOBUS Database
- AEF ISOBUS Conformance Test
- Plugfests
- Project Camera and High Voltage

2012

Funding:
- Cost allocation Core Members

2014

180 members
Licensing of products:
- AEF ISOBUS Database
- AEF ISOBUS Conformance Test
- General Manager started
- New project teams started
  - High Speed
  - Wireless
  - Data management
  - Tractor-Implement Management

Funding:
- Cost allocation Core Members
- Service Charge General Members
- Plugfests

2016

Funding:
- Cost allocation Core Members
- Service Charge General Members
- License fees AEF Database
- License fees AEF Conformance Test

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AEF products

➔ Component certification with AEF **Conformance Test**
➔ AEF ISOBUS **Database**
➔ Organization and hosting of **Plugfests**
  - Up to 250 participants testing equipment
➔ AEF publishes **Guidelines**
  - Implementation or Functional Safety guidelines
➔ AEF works with 5 recognized Test Labs
  - Certified Equipment will be stored in the AEF Database
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**ISOBUS functionalities**

➔ AEF Functionality; a separate “module“ on the ISOBUS
➔ One or more can be bundled together into a retail product, intended to interconnect with other products that contain AEF Functionalities (client/server)
➔ AEF Conformance Test and Database make full use of this functionality concept

➔ An open concept, new functionalities will be defined in the future …
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**AEF Database**

![AEF Database Screenshot](image)

**www.aef-isobus-database.org**
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Future Networks and Connectivity (AEF Scope)

➔ TIM – Tractor Implement Management
➔ Data Management / FMIS interfaces
➔ Always Connected: ISOBUS and Telematics
➔ High Speed ISOBUS
➔ Wireless Infield Communications
➔ High Voltage / High Power network
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Connectivity – Data Management

Product System

Smart Product

System of Systems (example)

Weather Data System

FMIS

Irrigation System

Seed Optimization System

Source: Harvard Business School, 11/2014

* FMIS = Farm Management Information System

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General conditions of data exchange

**MICS**: Mobile Implement Control System

**FMIS**: Farm Management Information System
General conditions of data exchange

„Hey, put 120 kg of seed to field #8 and log totals for documentation!“

„I did it and it took me 2.3 hours, I spent 875 kg of seed, 68 liter of fuel and I worked on 7.26 hectar“
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General conditions of data exchange

Extended FMIS Data Interface (EFDI) with embedded ISOXML

Continuous data streaming
Always connected – Focus of AEF
Always connected – EFDI interface definition
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Conclusion

➔ Ag Electronics Industry successfully joined forces in 2008 through AEF
  ▪ Complex standards require coordination and cooperation
  ▪ Electronics Standards succeed because global acting players accept, align and enforce them

➔ AgTech development is ramping up rapidly
  ▪ Standards & Organizations are key
  ▪ Connectivity and Data become key
  ▪ Need to streamline it to the markets
  ▪ Complexity increases
  ▪ Changing business models

➔ Common interface has to be defined
  ▪ **Extended FMIS Data Interface**

•But keep in mind:
  ➔ **Farmers just want it simply to work!**
How to contact AEF?

➔ AEF web site: www.aef-online.org
  - General information and news about AEF
  - Become a new member
  - Sign up for newsletters

➔ Smartphone dB App available
  ![App Store](download.png)  ![Google Play](download.png)

➔ General support: office@aef-online.org
Thank you for your attention.

Questions?