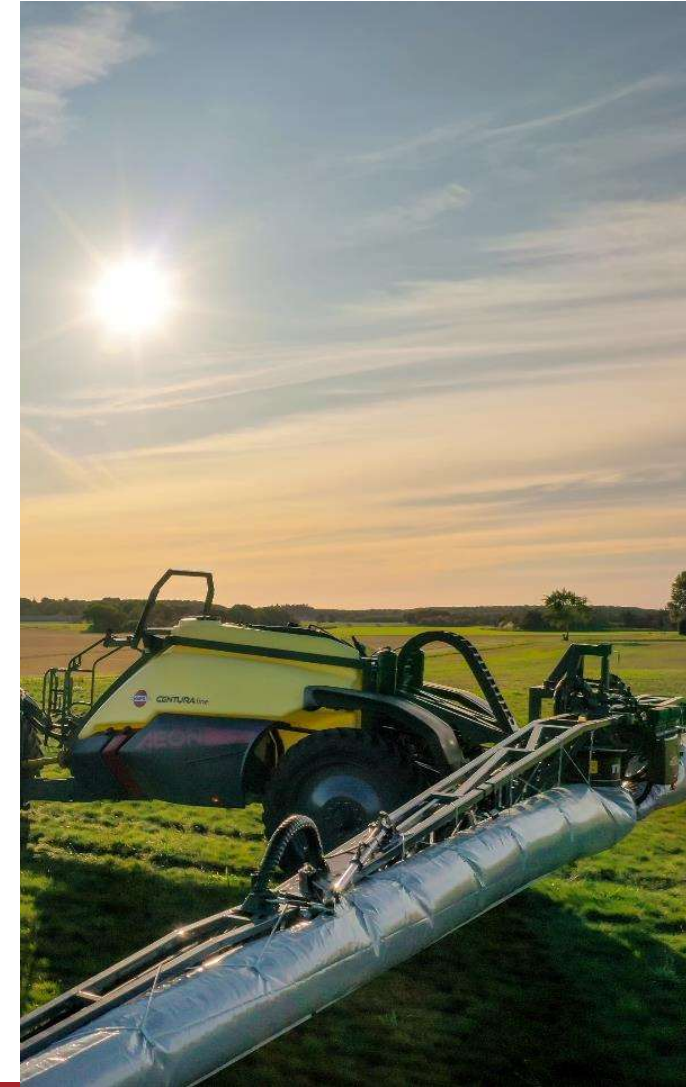


25 years of sprayer inspection Report sprayer manufacturer

Christoph Schulze Stentrop



Your Crop Care Partner



Content

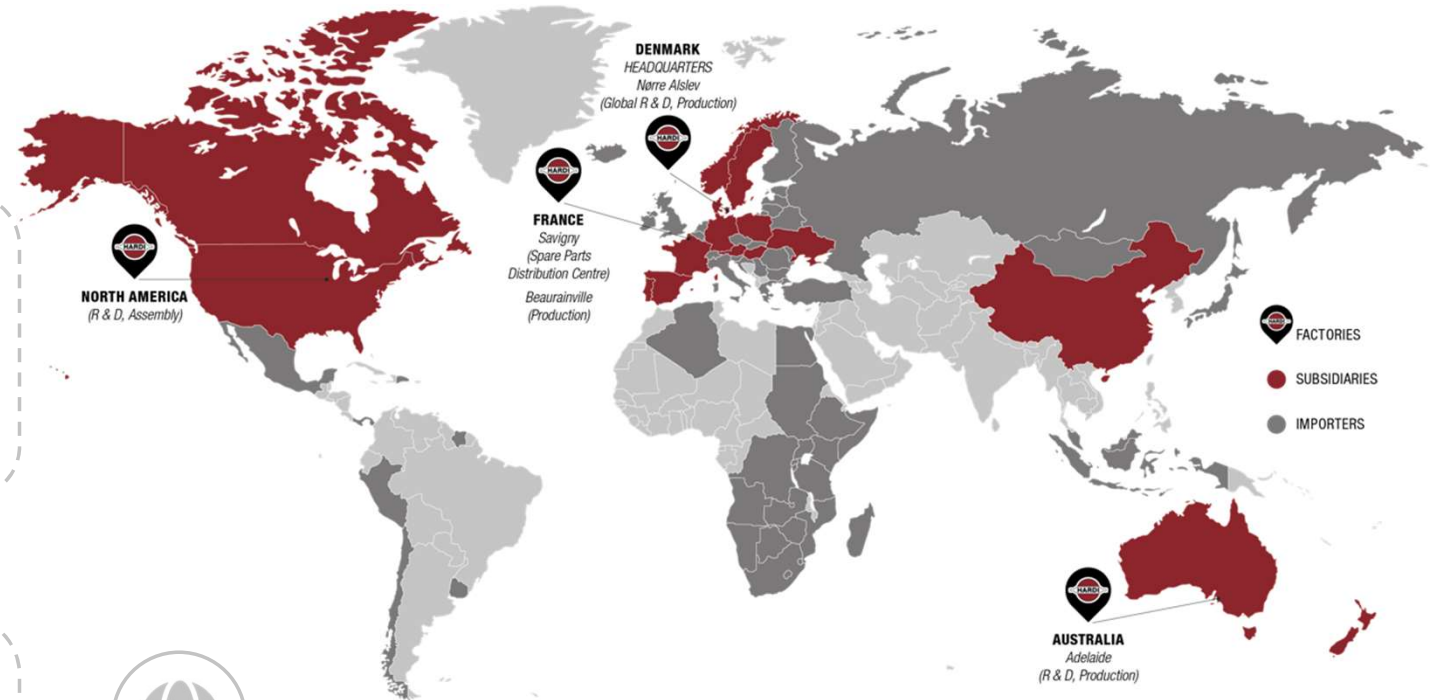
- HARDI International
- History of sprayer inspection in HARDI
- Sprayer testing and inspection of new sprayers
- Experience and challenges



Company history

” For more than 60 years, we have continuously improved the efficiency, quality and sustainability of global farming.

Global presence



R&D, PRODUCTION AND SPARE PARTS

DENMARK: HQ, Nørre Alslev
FRANCE: Savigny
AUSTRALIA: Adelaide



SUBSIDIARIES

- HARDI North – Denmark, Sweden, Norway, UK
- HARDI GmbH - Germany, Poland, Austria
- ILEMO HARDI – Spain, Portugal
- HARDI North America – USA incl. Canada
- HARDI Australia – Australia, New Zealand
- HARDI China – China



40 Importers worldwide

2.000 Dealers worldwide

100+ Export to more than 100 countries



HARDI at a glance



FOUNDED

1957

Nørre Alslev,
Denmark



REVENUE

115+

mio. EUR



EMPLOYEES

600+

70% in Denmark
30% in our subsidiaries



SPRAYERS

250.000

More than 250.000 sprayers
sold since 1957



INNOVATIONS

70+

HARDI has gained more than
70 patents since 1957



The HARDI Group is a division in
the Agricultural Spraying segment
of French Exel Industries S.A.

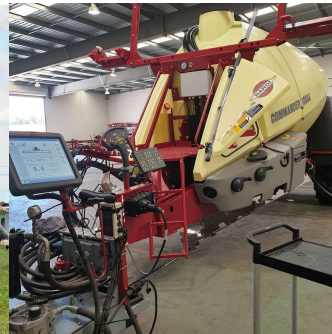
Updated 2022



HARDI INTERNATIONAL A/S – HQ and production site



HARDI AUSTRALIA – Full-size subsidiary and production site



HARDI INTERNATIONAL A/S – Self-propelled production



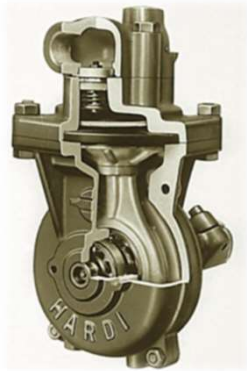
HARDI INTERNATIONAL A/S		HARDI	
Luk for vandtilførsel			
Suget tom på _____ sek. (skal kunne suges tom på max. 25 sek.)			
2.7	Spuledysa/stangerulle		OK <input type="checkbox"/>
2.7.1	Kontrolleret at vand er aftappet i under spuledyseniveau og spuledyse testet		OK <input type="checkbox"/>
2.7.2	Kontrolleret slangerulle pulsierende (hændsluk) anvendelse af pistolen		OK <input type="checkbox"/>
2.7.3	Kontrolleret stangerulle for gennemløb, samt tilbagegang på de sidste 2 m iht. 65085700		OK <input type="checkbox"/>
2.8	Dyser		OK <input type="checkbox"/>
2.8.1	Kontrolleret at samtlige anvendte dyser er samme størrelse		OK <input type="checkbox"/>
2.8.2	Kontrolleret at stopfunktion triplet virker, og er let betjnelig		OK <input type="checkbox"/>
2.8.3	Kontrolleret tæthed		OK <input type="checkbox"/>
2.8.4	Bom prøvet ved max. tryk 8 bar (sæt triplet/pentalet neutral)		OK <input type="checkbox"/>
2.9	Test af spray valve uden prime flow.		OK <input type="checkbox"/>
2.9.1	Indstillet sprøjte til 5 bar		OK <input type="checkbox"/>
2.9.2	Valgt "Fykt" på smart valve med dyser åbne		OK <input type="checkbox"/>
2.9.3	Kontrolleret at dyser stopper helt med at sprøjte		OK <input type="checkbox"/>
2.9.4	Gentaget 1.7.2 – 1.7.4 med pos. tryktæmning, turbofilter og spuledyser		OK <input type="checkbox"/>
2.9.5	Flexpumpe		OK <input type="checkbox"/>
Luk omrøring			
Luk reguleringsventil			
Stop hovedpumpe			
Start Flexpumpe			
Aktiver dyserne, min. 6 bar på bommen eller min. 200/min. afløst på Controller			
2.10	Test af spray valve med prime flow:		OK <input type="checkbox"/>
2.10.1	Aktiver prime flow i menu 8.1.2.6		OK <input type="checkbox"/>
EFC Ceramics			
Prime Flow Ceramics			
2.10.2	Demøst menu 8.5.4.2		OK <input type="checkbox"/>
Dyseposition tildeles			
Dyseantal			
2.10.3	Demøst menu 8.6.4.1		OK <input type="checkbox"/>
Kontrolleret at rækkefølge er korrekt			
2.11	Filtere		OK <input type="checkbox"/>
2.11.1	Kontrolleret at filtre er monteret så de ikke beskadiges		OK <input type="checkbox"/>
2.11.2	Kontrolleret at der er filtre ved sug- og trykslang		OK <input type="checkbox"/>
2.11.3	Kontrolleret at easyclean filter kan åbnes uden tilbage løb		OK <input type="checkbox"/>
2.11.4	Kontrolleret at filterindsatse er intakte		OK <input type="checkbox"/>
2.11.5	Kontrolleret at filterindsatse kan demonteres		OK <input type="checkbox"/>
2.12	Sprayscannertest		OK <input type="checkbox"/>
2.12.1	Sprayscanner test udført i henhold til vejledning 64004200	resultat _____ %	OK <input type="checkbox"/>
2.12.2	Kontrolleret at CV er under 7 %	max _____ %	OK <input type="checkbox"/>
2.12.3	Overstiger ikke 15 % fra middelværdien Spray Scanner		OK <input type="checkbox"/>
2.12.4	Kontrol af Non-dryp funktion		OK <input type="checkbox"/>
Foretag flowmåling vha. dysemedoden med min. 1 dyse			
v / flowhus Ø20 nom. PPU 60 (+/-5) _____			
v / flowhus Ø36 nom. PPU 17 (+/-2) _____			
v / SUPRAY flowmåler (i-mode) PPU iht. 64024500 _____ Aflest: _____			
2.12.5	"Nozzel Size Q 3bar A" værdi skal svare til størrelsen af den monterede dyse (se evt. dysetabel)		OK <input type="checkbox"/>
Kontrolleres i menu 4.5.5.7			

140713	CPL	Fl. 4.3.1.1	Hardi International A/S	Sign. 04072012	CPL
140813	CPL	"Kraner" til s. 9 af 9		Seal. 19122012	BKP
060314	HOL	Tilf. test af koneskive sprøjter	Tjekliste for færdigmonterede Commander 11 sprøjter		64023900
100413	CPL	Vejl. f. frostsikring pkt. 4.2.5.10f.			

Side 3 af 9



10 selected HARDI innovations that helped to change spraying



1957



1974



1987



2007



2018

1970

1982

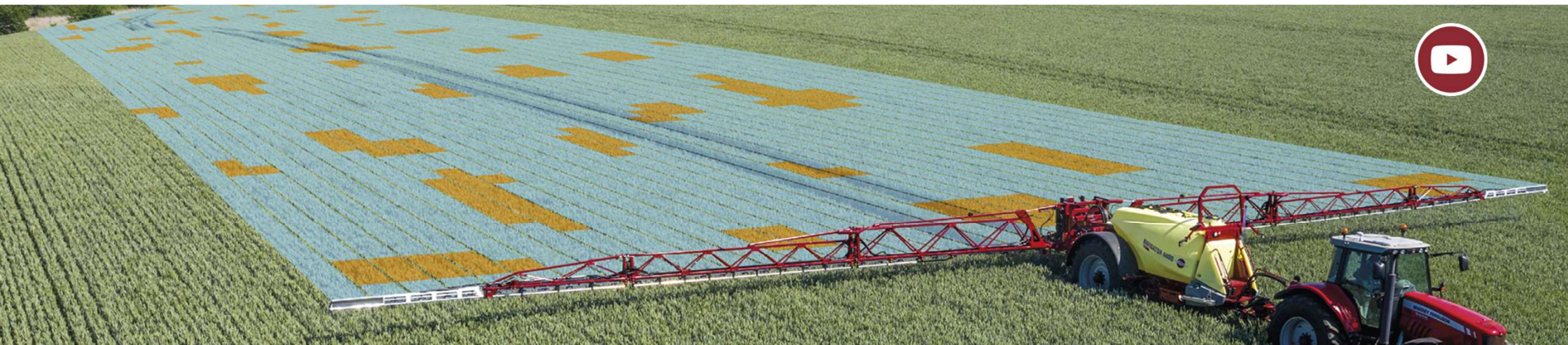
2006

2012

2021

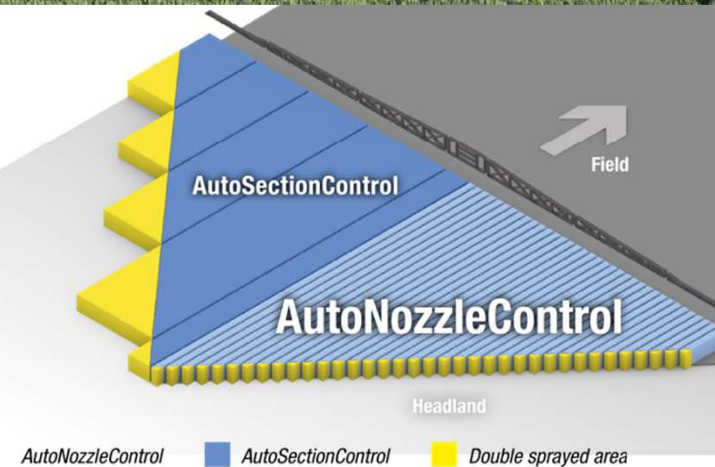


Our contribution – Maximum precision



Save on chemicals with no compromise

- Obtain full control of the spray job
- Reduce the amount of PPP
- Avoid crop damage
- Minimise the environment impact



Our contribution – Minimise drift



Save time, money and environmental impact

- Increase spray capacity by **at least 100%**
- Reduce drift by **up to 80%**
- Save on plant protection products by **up to 30%**
- Save water by **at least 50%**
- Improve crop penetration and coverage
- Improve spray economy
- Faster spray speeds
- Optimal field timing
- 30+ years' experience

Our contribution – Precision farming

GeoSelect

- Pre-programmed
- Pre-scanned
- Precise
- Proof of placement

Field mapping

- High application precision
- Less usage of chemicals
- No overlapping areas

PulseSystem

- Lowest drift potential in the market
- Controls the application rate for each individual nozzle
- Curve control ensures that the overall dosage remains

AgriRouter

- Connect your agricultural machinery
- Exchange all data
- Create individual data routes

HARDI SERVICE – Spare Parts Distribution Center



History sprayer inspection

- Accredited test station in Germany since 1993
- HARDI Spray Scanner – cross distribution test - AAMS
- Test in Denmark since 2002 – Outlet of German subsidiary
- NSTS test since 2003 in factory



Timeline - Inspection of sprayers in Germany

End of the sixties to the beginning of the seventies

Acquirement of uniform requirements for the inspection of fieldsprayers by official plant protection service

1970

First test-benches for testing cross-distribution, Pump-capacity and pressure-gauge are available

1976

Publication of „BBA-Leaflet 44“ with guidelines (requirements) for the inspection and a code of the inspection

1983

First inspections of sprayers for wine, hops and fruits

1993

Obligatory inspections for field sprayers every two years (since 1991: electronic test-benches for cross distribution are available)

2002

Obligatory inspections for sprayers for wine, hops and fruits every two years

2003

EN 13790 is established

voluntary

obligatory

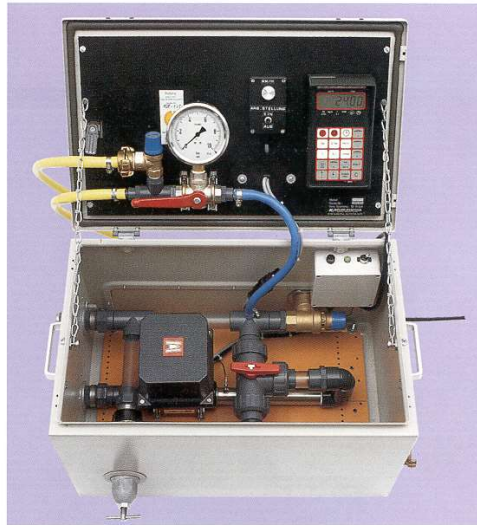
The official start

- Test of sprayers obligatory since July 1993 - Distribution test
- Demands to test sprayers:
 - Approved measuring equipment
 - Mechanics must have a licence
- Plant protection offices check the test stations
- Reduced test protocol for new sprayers



Test equipment

- Spray Scanner in all assembly stations since 1994
- Pump test obligatory – but not required for new sprayers
- Certified test staff

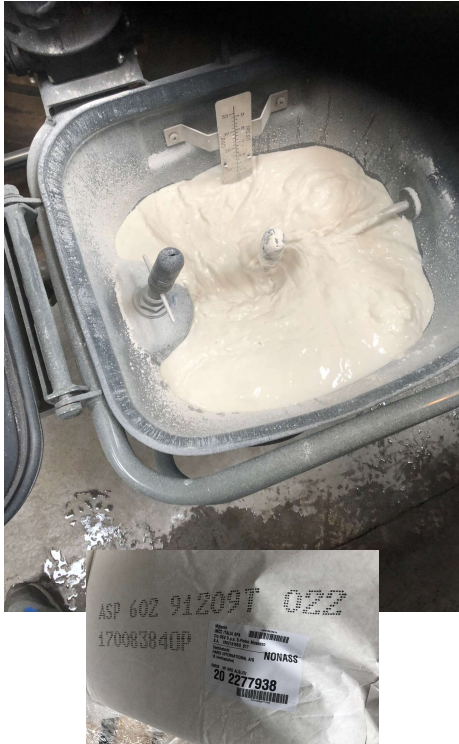


Certified test staff



- In the beginning qualified service staff
- Danish staff certified following JKI rules EN 13790
 - German authorities certified in Germany and in Denmark
 - NSTS certification in Denmark
- Danish certification following EN 13790
- Our staff mainly has new sprayers to test
- Only HARDI sprayers
- No consultant work to end-users

Challenges - remarks



- What needs really to be tested on a new sprayer – components are tested, verified during development – no need for testing
- Often country specific solutions – some are added locally we have not always the complete sprayer
- Sprayers are not always complete – ISOBUS terminals, wheels, nozzles



Challenges - remarks

- Transport of complete sprayers is expensive – disassembly for transport
- Not all farmers liked to receive a certified sprayer



Test protocol

- Different reports over the years
- Report is send direct to end-user
- CEMA decal

Kontrollbericht Nr. _____

einzel. Prüfanschlagsgröße nach Bk-Buchst. 1.3.2.1

Prüfung nach §7 Abs. 2 PflSchMVO
 Nachprüfung
 Prüfung nach §7 Abs. 3 PflSchMVO

Einheit: _____ G: _____

Anschrift des Bestellers: _____

Fabrikant bzw. Hersteller gem. BBA-Codexliste: _____

Typ: _____

Bezeichnung: _____ Maschinen-Nr.: _____

Anbaugerät Autobaugerät Antriebsgerät Selbstfahrer
 Prägegerät Langgerät Gemeinheitsgerät

Bemerkungen, Implikationen, gefundene Mängel

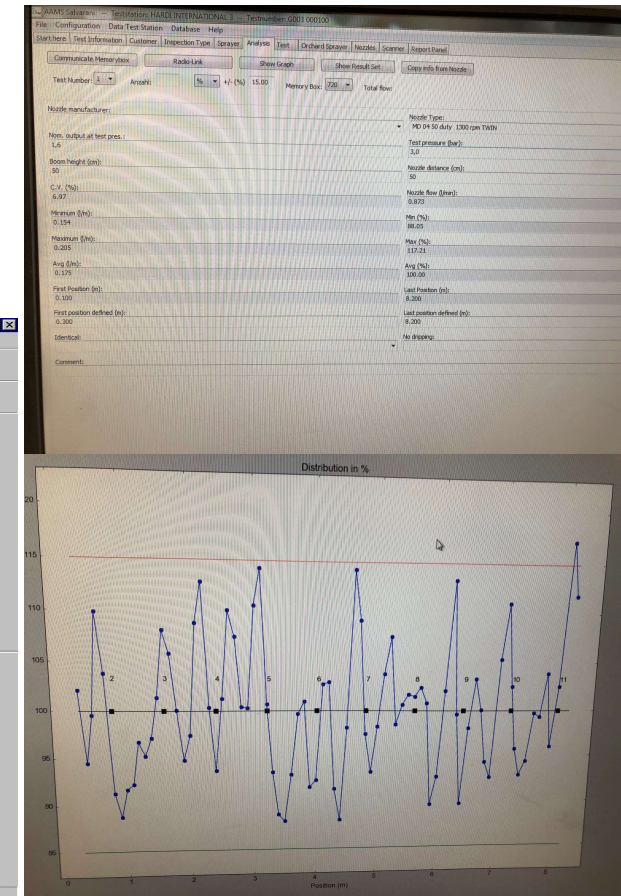
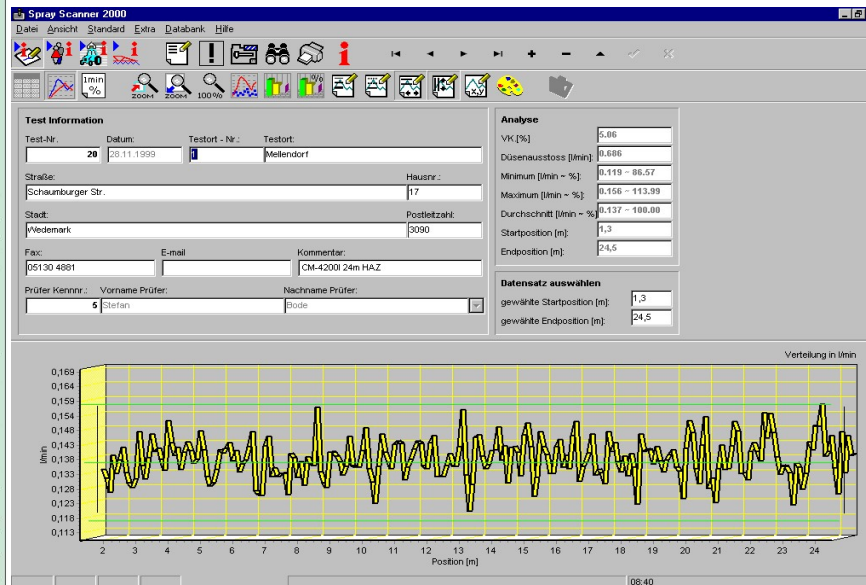
Prüfung auf Einhaltung der Umkehrleistungsbeschränkung

1. Antrieb	K.1.1 Funktion	<input type="checkbox"/>	K.2.2 Rastlöcher	<input type="checkbox"/>	K.2.3 Drehzeit	<input type="checkbox"/>
2. Pumpe	K.2.1 Kolumentrom	<input type="checkbox"/>	K.4.2 Düsenausgleich	<input type="checkbox"/>	K.4.3 Düsenabgleich	<input type="checkbox"/>
3. Rührwerk	K.3.1 Umwälzung	<input type="checkbox"/>	K.4.4 Düsenreinigung	<input type="checkbox"/>	K.4.5 Düsenreinigung	<input type="checkbox"/>
4. Behälter	K.4.1 Dichtung	<input type="checkbox"/>	K.4.6 Düsenreinigung	<input type="checkbox"/>	K.4.7 Düsenreinigung	<input type="checkbox"/>
5. Armatur	K.5.1 Ventill. Funktion	<input type="checkbox"/>	K.5.2 Düsenreinigung	<input type="checkbox"/>	K.5.3 Düsenreinigung	<input type="checkbox"/>
6. Leitungssystem	K.6.1 Dichtung	<input type="checkbox"/>	K.6.2 Düsenreinigung	<input type="checkbox"/>	K.6.3 Düsenreinigung	<input type="checkbox"/>
7. Filtration	K.7.1 Ventill. Funktion	<input type="checkbox"/>	K.7.2 Düsenreinigung	<input type="checkbox"/>	K.7.3 Düsenreinigung	<input type="checkbox"/>
8. Spaltgestänge	K.8.1 Ventill. Funktion	<input type="checkbox"/>	K.8.2 Düsenreinigung	<input type="checkbox"/>	K.8.3 Düsenreinigung	<input type="checkbox"/>
9. Düsen	K.9.1 Ventill. Funktion	<input type="checkbox"/>	K.9.2 Düsenreinigung	<input type="checkbox"/>	K.9.3 Düsenreinigung	<input type="checkbox"/>
10. Gehäuse	K.10.1 Ventill. Funktion	<input type="checkbox"/>	K.10.2 Düsenreinigung	<input type="checkbox"/>	K.10.3 Düsenreinigung	<input type="checkbox"/>
11. Sonstige Ausübung	K.11.1 Ventill. Funktion	<input type="checkbox"/>	K.11.2 Düsenreinigung	<input type="checkbox"/>	K.11.3 Düsenreinigung	<input type="checkbox"/>

Land / zuständige Dienststelle: _____

RZ: _____

Kontrollort: _____ Datum: _____ Unterschrift des Prüfers: _____



CEMA Approach in detail

- The selected authority may visit and inspect the manufacturing facility (to check items related to ISO16122-2 / ISO 16122-3 only).
- The manufacturer will conduct the testing of the sprayer according the test protocol and will be authorized to issue the testing report and place the local authority decal on the machine.
- The manufacturer will pay fees related to the approval as test cen
- The different national schemes (authority, testing records and decals) will be kept as they are today.
- The CEMA decal can be attached by the manufacturer as a sign that above procedures are followed and as support for the mutual recognition.



Summary

- Inspection of sprayers is a standard procedure
- Inspection needs staff, time and space
- A simplified / lean approach is required for the future – one European level



