

*The Innovation in Professional Sample Preparation*

*for Dioxin Analysis.*



**DECS**

SOLUTIONS BY

**LC** *Tech*

# Major Advance in Dioxin Analysis.



From time to time, you may have considered switching from the manual method to an automated type of sample preparation. With DECS (Dioxin Extraction and Clean-Up System) time has come to move into automated sample preparation in dioxin analysis (PCDD/F and PCB). DECS is particularly suitable for the following areas of sample preparation:

## Food and animal feed

e.g. fish, fish oil, animal fats, eggs, vegetable oil, feed mixtures, etc.



## Plants and green fodder (e.g. lucerne)

Herbs and spices (e.g. oregano)



## Environmental samples

e.g. soils, sludge, sediments, dusts, fly-ash, etc.



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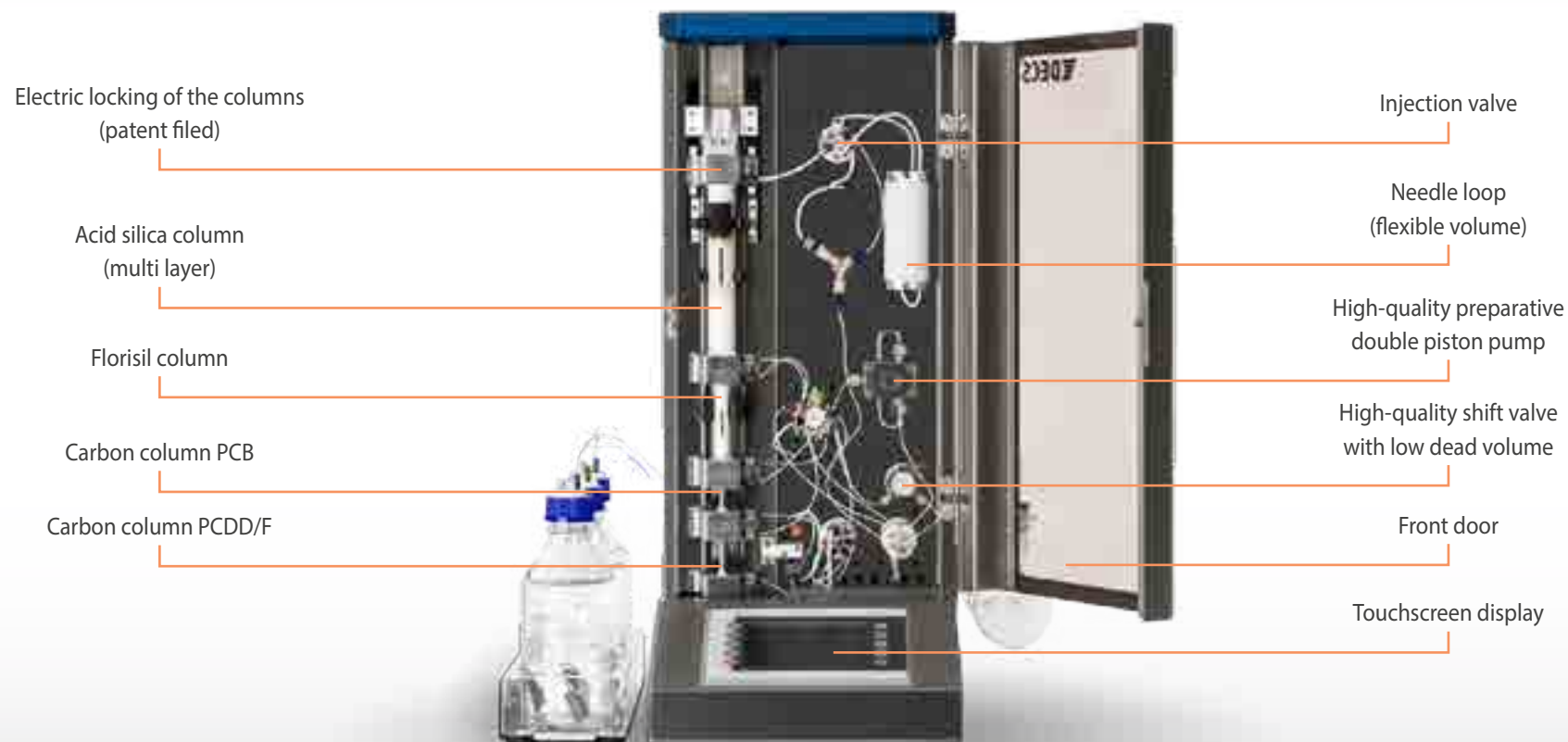
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# Sometimes the complicated appears quite simple.



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# Speed achieved by thorough optimisation of every detail.



DECS is a new, professional system for sample preparation in dioxin analysis. This system can be used for food and animal feed as well as for environmental samples.

DECS offers to both large and small laboratories many advantages – combined in one compact unit – that have never been offered before. Some of the most interesting advantages are presented in the following:

## Relaxation even with speed.

If you still prepare your samples manually, you will experience speed as an enjoyable feature. LCTech offers with DECS not only a device that includes ready-to-use columns, but also a method developed by experts. This method has been tested and can be easily and quickly applied; method development is not necessary. With DECS, you will soon appreciate the operational speed: compared to the manual methods, there are no evaporation steps required between loading the sample and elution. No filling of columns, no pre-tests of materials, no preparation and no rinsing of the glass columns – in short, no labour-intensive steps.

## Speed simply achieved.

Unpack and insert the ready-to-use columns. As soon as you press the "start" button, conditioning, separation and fractionation begins. Finished fractions can be removed at any time and further processed, e.g by evaporation.

## Our definition of speed.

Speed refers to the total of processing steps, which one person or one machine can do in a certain time. Naturally, fewer processing steps are completed faster than many. In our view, speed is only meaningful when as many as possible working steps are included. With DECS we definitely set new standards:

**From raw extract to finished fractions in only 1 hour and 40 minutes!**



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***We combine economy  
with efficiency.***



**Economy and efficiency – again one of the outstanding features of the DECS system for dioxin sample preparation.**

**Markedly reduced solvent consumption.**

In the standard method, DECS uses less than 700 mL solvent, which even includes conditioning. This is a huge solvent saving especially in comparison with the manual methods, but also in comparison with other systems. And, of course, what is not used does not need to be evaporated and disposed of.

**Change made easy.**

The included standard method is free of charge and facilitates a straightforward transition from the manual procedures to automated sample preparation. Lengthy and expensive evaluations are not necessary.

**Greater efficiency due to low time requirement.**

Especially the advantages for daily laboratory life are the most important: in next to no time, the inexpensive, ready-to-use columns can be fitted into the system without any screw connections or the need for additional tools. Just inject the sample and press the "start" button in the display.

**That's what we call efficient!**



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# Getting rid of fat!



By thorough degradation of fat and other interfering matrix components, the analytes can be separated from the sample without chromatographic interferences and hence be better analysed under such optimised conditions. DECS can process up to 5 g fat within one fully automated run. No manual intervention is required.

## DECS cleans the samples and separates the analytes accurately in the major groups:

- ndl-PCB (non-dioxin-like-PCB) and mono-ortho-PCB  
The fractions can be separated for analysis or collected together.
- non-ortho PCB
- Dioxins (PCDD/F)  
The fractions are collected. These can be taken out for further processes at once.



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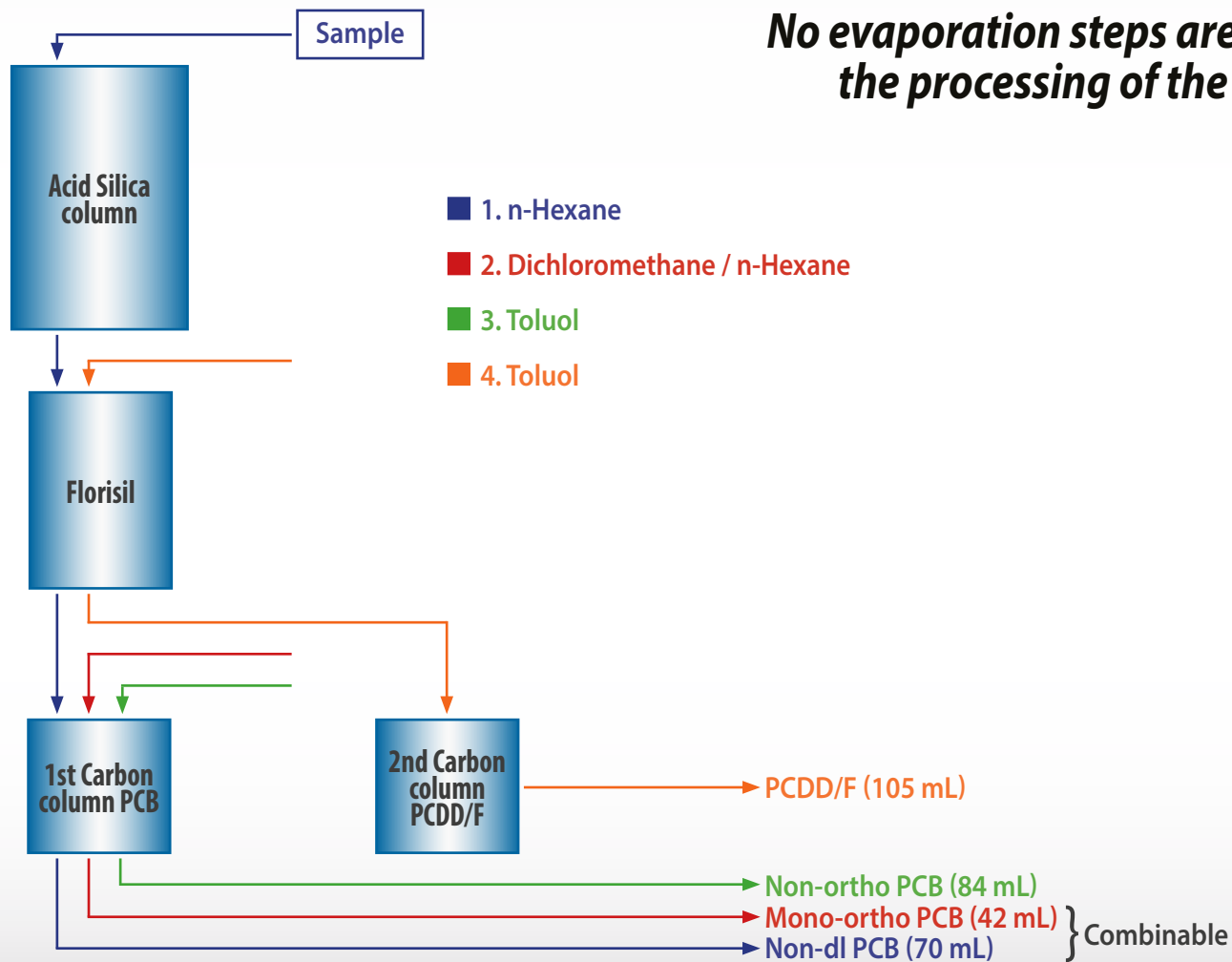
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# Evaluated and universal default method



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# *Flexibility is not only a function but a design principle.*



## **Flexible through interplay between software and hardware.**

Storing methods and settings in the software makes DECS extremely flexible. Change the method easily and quickly via the DECS touchscreen keyboard. If required, simply modify the process via touchscreen: flow rate, column material, rinsing, solvent selection, optimised cutting of the fractions ... save and you are done!



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# Simple is often the most difficult.



The production of a system for sample preparation is often a complex design task. For maximum benefit, the device should be able to conduct as many as possible processing steps, needs to be used flexibly and yet should be easy to operate. Owing to the option to prepare and save processing sequences in the software, usage and operation of DECS in laboratories with different users is very easy.

## Simply touch and DECS knows what to do.

The touchscreen makes the operation of such a complex machine very easy. Methods can be easily programmed and retrieved. During processing, a running time bar informs you at which stage the device is currently operating and how much time is still left to process end.

## Enjoy your work without tiresome processing steps.

Forget manual processing steps – these are now done for you by DECS. Simply inject the sample, select the method and press the "start" button.

## The principle is simplicity.

Columns are clipped in and then locked in by the device; they do not need to be screwed in. All contaminated parts are either exchanged (e.g. columns) or effectively rinsed during the process (e.g. sample loop for ca. 15 min in-line). Thereby, cross-contamination is avoided. In addition, LCTech has made no compromises with regard to the performance of the valves, and has invested in high-quality, proven shift valves; blockages are avoided and solvent-intensive cleaning is not necessary.



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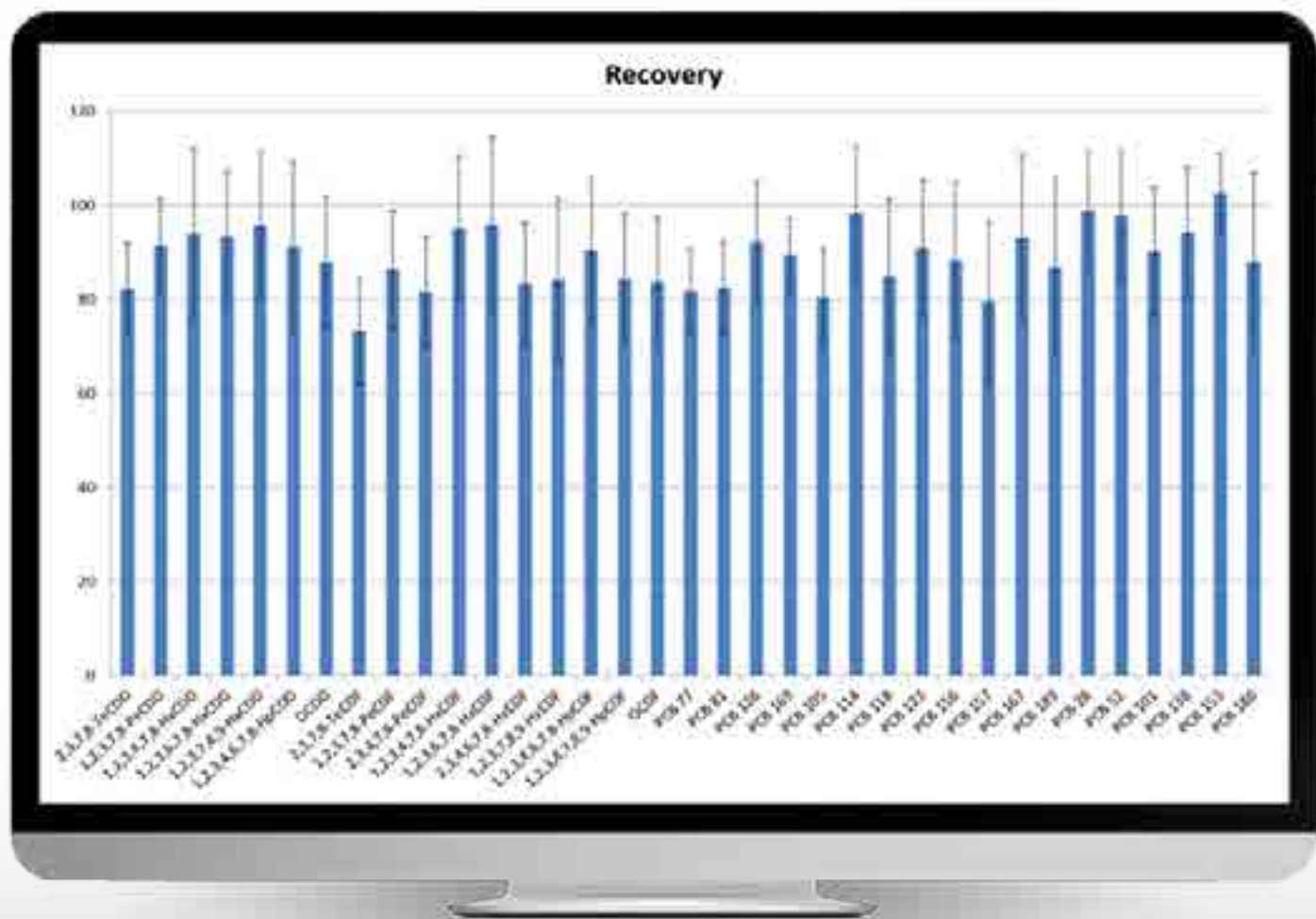


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In addition to the analysis of many different food and feed samples, the DECS system was tested at the CVUA Münster (Prof. Dr. Fürst/Dr. Bernsmann) by analysing materials chosen for interlaboratory testing proficiency test “Feed Fat 2013” of the EURL for Dioxin and PCB, Freiburg. The obtained recovery rates for the proficiency test-material using automated sample preparation are presented in figure 1 for each congener. In all experiments (n = 9), recovery rates satisfy the statutory criteria and lie within the required limits of 60 % to 120 %.

**Figure 1:**  
Recovery rates for all dioxins (PCDD/PCDF) and PCB obtained from a 9-fold analysis of the proficiency test sample processed with DECS.

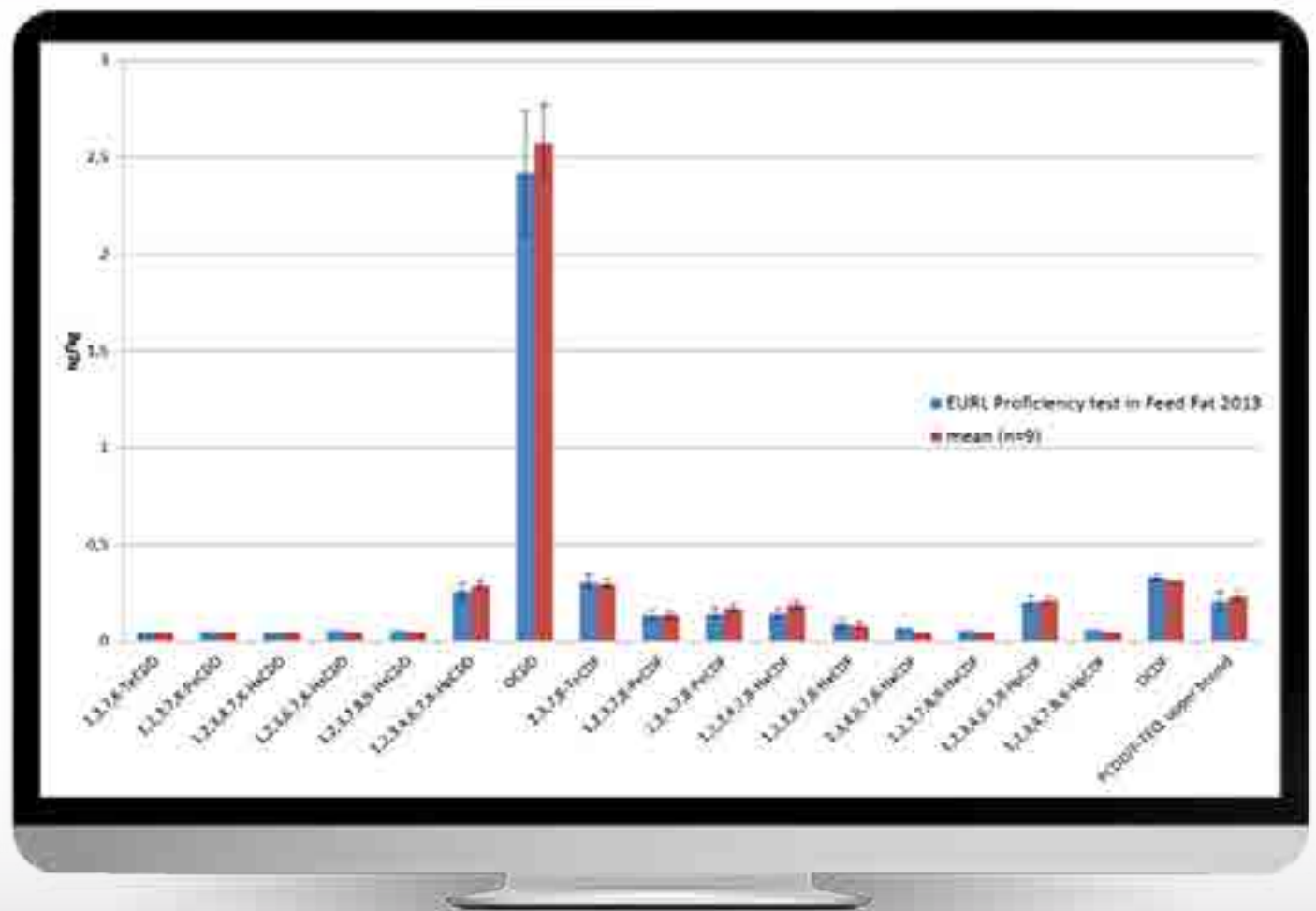


# Proficiency test Feed Fat 2013

Figures 2 and 3 show the results calculated by the proficiency test organiser (consensus values, Huber robust mean) for the individual congeners together with the respective robust standard deviation. These data were compared with the results of the 9-times processed proficiency test-sample using the DECS system. The result was that all values are very close to the consensus values, which have been determined by the EURL from data of all laboratories participating in proficiency test. A sample weight of 1-5 g, as used in the 9-fold processing, seems to have no effect on the quality of the results.

**Figure 2:**

Comparison of the robust dioxin mean values of the EURL proficiency test "Feed Fat 2013" and the 9-fold processing with the DECS system.



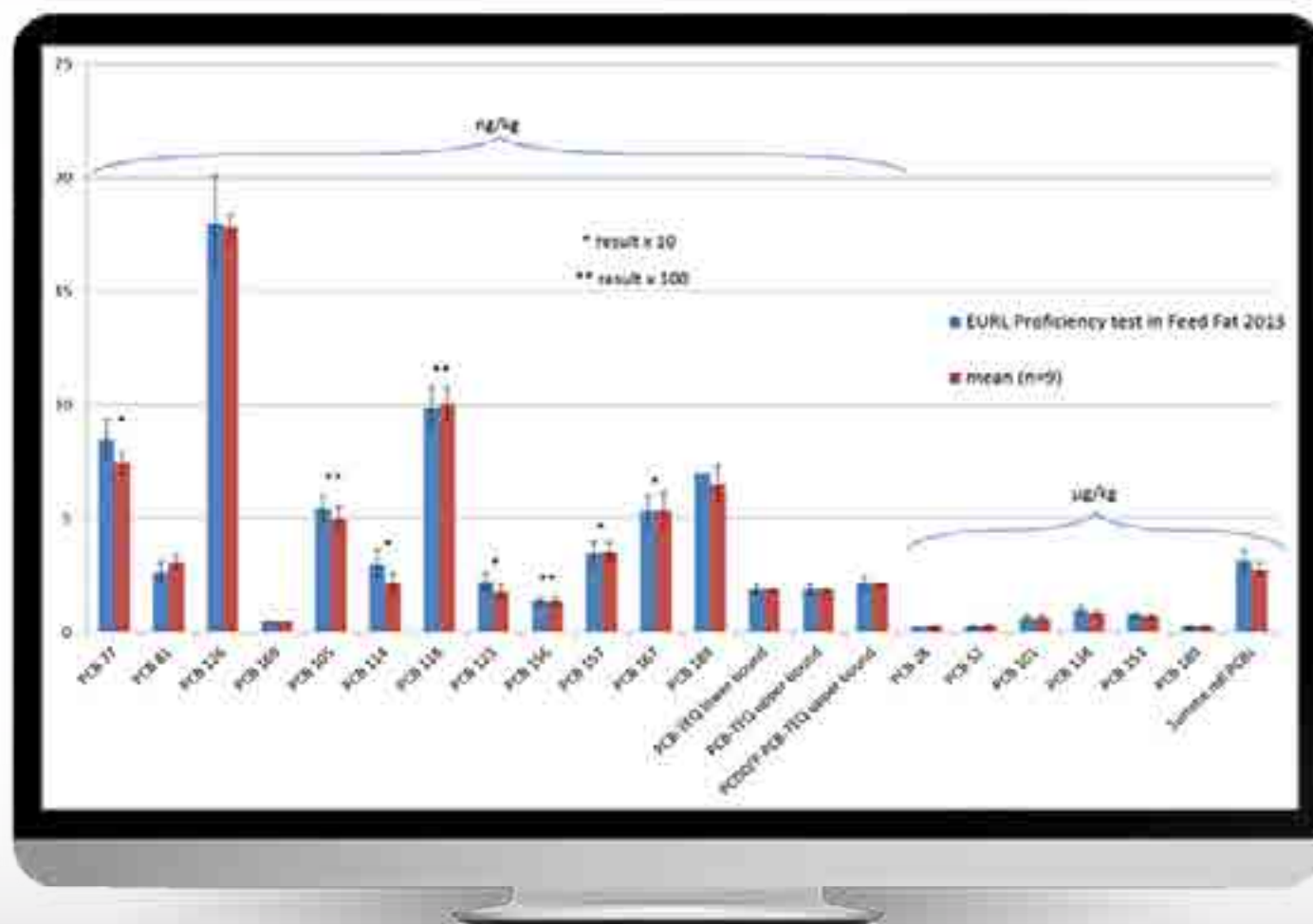
# Proficiency test Feed Fat 2013

**Figure 3:**

Comparison of the robust PCB mean values of the EURL proficiency test “Feed Fat 2013” and the 9-fold processing with the DECS system.

## Conclusion:

A comparison of analytical results obtained from the proficiency test “Feed Fat 2013” demonstrated that the DECS offered by LCTech is excellently suited to conduct fast and reliable analyses of PCDD/PCDF and PCB congeners in food and animal feed within the range of the relevant concentrations that comply with the criteria of the European legislation.



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*Service is one of our  
easiest tasks.*



DECS has been constructed in such a high quality and practice orientated way that servicing is reduced to a simple task. We are certain that you rarely need to ask for help, since the few mechanical elements are almost free of wear. The high quality valves with dead volume free passages and the tubes do not clog. The high-precision solvent pump (preparative double piston pump), tested in hard laboratory routine work, has proven itself for more than 10 years in many LCTech devices and rarely needs maintenance.

Just in case, our trained service staff are available to help at any time.



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LCTech





# *Safety is when a machine thinks about people.*

## **Safe work and letting work with DECS.**

In particular when handling harmful substances, equipment safety is most important. This is a fundamental design principle. Our safety consciousness is supported by mechanical measures, preventing exposure to the user.

## **A high safety standard can be expected from DECS:**

- Start only possible after the front door is closed.
- Liquid components are kept separate from the electrics. Leakages are immediately identified and indicated.
- Leaking solvents are collected in a drip tray. The integrated solvent sensor shuts off the system. Better safe than sorry: A programmable pressure limit prevents the leakage of larger amounts of flammable and dangerous solvents in the laboratory.
- Columns can be dried by blowing off with nitrogen. Hence, no emission during their removal or in the waste.
- The waste filling level sensor prevents overflowing waste bottles. When a defined filling level is reached, the device shuts off (optional).
- No emission of solvent fumes as long as the recommended accessories are used.
- DECS is a nearly closed system.



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# Thinking outside the box leads to clever solutions.

We do our best effort to look at solutions from every angle. Sometimes, the unconventional approach results in clever solutions.

## Small but mighty.

DECS systems require little space and can be easily placed in a fume cupboard. However, owing to the closed design this is not mandatory.

## Ideally suited for first-time users.

- This LCTech concept offers for all currently working manually an ideal entry opportunity.
- Tested and optimised standard method from a renowned laboratory is already integrated into this device.
- Simple capacity expansion through procurement of further systems; method transfer between devices easily achieved.
- No tedious handling with PCs or laptops; the control is integrated within the device and can be operated easily via touchscreen for routine work as well as for method development.

## Knowledge transfer through collaboration with a competent laboratory.

Through close collaboration with a leading laboratory for dioxin analysis in Germany, the CVUA Münster (Prof. Fürst/Dr. Bernsmann), during the development of DECS, the users benefit in their daily work from the laboratory's knowledge and experience. This goes far beyond the capabilities of DECS. We gladly help establish contact and answer your questions.



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# Specifications DECS



The DECS System is delivered completely and consists of four positions for columns that are arranged axially one below the other.

- (1) 10 mL sample loop (standard; other volumes on request)
- (2) Injection valve
- (3) 4 dummy columns (e.g. for fast cleaning process)
- (4) Connection tubing for three solvents (supply), with a solvent filter each
- Preparative double piston low pressure LC pump (flow rate is adjustable from 0.1 to 40 mL in steps of 0.1 mL)
- Tubings for the collection of up to four fractions; fifth tubing for fraction “back-flush“
- Waste disposal tubings for separate collection of halogenated and non-halogenated solvents
- Safety features: drop pan with sensor, overpressure sensor as well as front door sensor, fraction vials are closed with special caps (option)
- Touch-screen display with integrated methods for Dioxin/PCB clean-up and separation as well as a fast method (in total only 30 seconds) for cleaning of the system, system is delivered with default method
- Parameterisation of all method parameters is possible (time in steps of 0.1 mL, flow rate in steps of 0.1 min/mL)
- System is operated with 24 and 36 V; external wide range power supply 95 –240 VAC, 50 / 60 Hz
- Low space requirements of only 300x725x570 mm (WxHxD, system without rack) options 425x725x570 mm (WxHxD, system with fraction rack)
- Three solvent filters
- 5 mL injection syringe with injection needle



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# Specifications

## Specifications of the process:

- Partial loop filling (samples in Hexane, standard in Toluol)
- Self-cleaning: sample loop is washed approx. 15 min in-line with unused solvent; all intern tubings are cleaned at the end of the process
- Included default method with solvent usage < 700 mL (incl. conditioning columns)
- Total running time < 90 min (incl. conditioning)

## Specifications of the columns:

### (1) Acid silica column (multi layer)

With high fat loading capacity (up to 5 g) designed as multi-layer column.  
Sorbents are separated with glass fibre filters.

### (2) Florisil column

For binding PCDD/F, designed as multi-layer column.

### (3) Carbon column (large)

For clean-up of eluates with Florisil column to avoid overlays and misinterpretation in analysis.

### (4) Carbon column (small)

For binding and separation of PCB.



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# *The process flow for the user is that simple.*

1. Insert column

2. Choose method

3. Inject sample



4. Close door



5. Start process



## Ready after only 1 hour and 40 minutes!

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## Acknowledgment:

The company LCTech GmbH wants to say "Thank you" to Prof. Dr. Peter Fürst and to Dr. Thorsten Bernsmann at CVUA Münster for the pleasant cooperation during the development of the DECS.



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