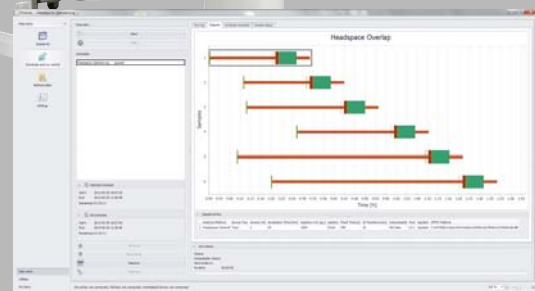


SOFTWARE



AXEL SEMRAU®



CHRONOS Version 4.1

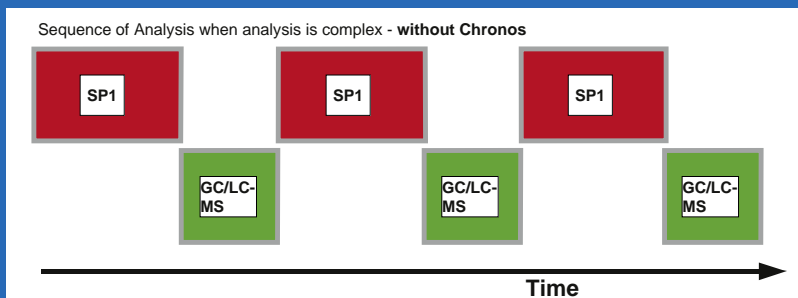
Platform for all CTC Sample Handlers

CHRONOS is an ideal platform for automating complex sample preparation steps on the CTC PAL. Software Integration with data systems such as ChemStation™, Masshunter or Xcalibur™ assures seamless functionality with existing systems. **CHRONOS** not only exchanges information with other systems, but also controls complete processes and optimizes individual work steps with intelligent time-management resulting in significant improvement of system throughput.

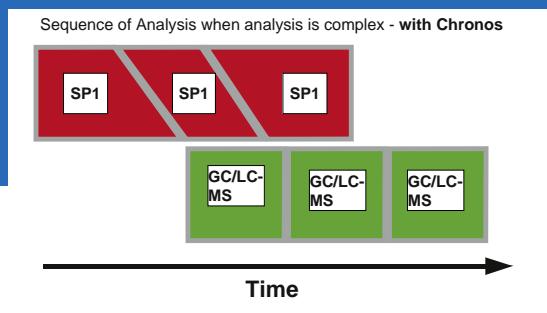


Axel Semrau®

CHRONOS for Sampler and Analytical System



Timing optimization with staggering by CHRONOS



Time is money!

In most analytical labs expensive detectors and analyzers wait for elaborate sample preparations. The consequence is long waiting periods between samples.

CHRONOS provides optimization work that pays off. The software package is compatible with practically all systems using CTC PALs and controls sampler and detection devices.



Automation

New trends in chromatography such as Fast-GC and UHPLC lead to shorter and shorter run times. Simultaneously, more and more sample prep tasks are migrating to the sample handlers. Today simple liquid sample injections or headspace analysis are complemented more often with dilutions, standard additions, derivatizations, SPE process and others.

For this reason many GC-, GC/MS- and LC/MS-systems are inefficient because of standstill and waiting periods. The analytical process traditionally works serially where the run time has to be complete before the next sample can be prepared. The detector system has then to wait for the sample prep steps to be completed.

Exactly in those instances

CHRONOS sets to work.

CHRONOS optimizes the interaction of sampler and detector system by staggering events (see graph above!). The result is a maximal load factor for each component in the system and significant time savings and throughput increase.

CHRONOS

Open Software

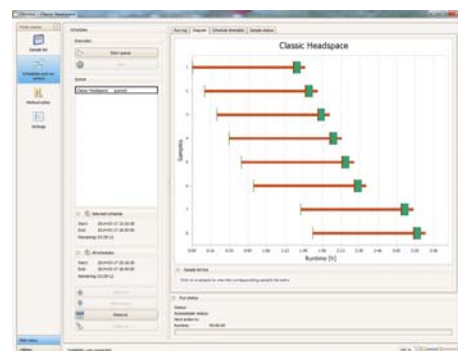
CHRONOS controls the sampler and the MS-Data system as with DANI Master Lab, Agilent ChemStation, Masshunter or Thermo Xcalibur from one sample list. The sample list is freely configurable and it can be saved as Excel compatible xml-database. The sample list can be imported from any LIMS system and can be exported to a sample list for post processing of analytical data.

CHRONOS-Methods provide maximal flexibility. All features of the CTC PAL can be implemented. Complex sample prep steps can be programmed with ease in a simple series of sub-steps. Standardization of all sample lists makes operation simpler for the end-users.

A run time reduction of up to 70 % is not unusual. The time saved depends on acquisition time, sampling time and number of samples in a sequence but **CHRONOS** can calculate accurately the time saved.

Visualization of sample sequence

After submitting the sample list **CHRONOS** will automatically calculate the optimized schedule for the run times. The result of this calculation will be displayed graphically (see fig. below!). The actual status of the series will always be displayed either in form of the graph or in a table. During the run time a log file can be created and saved for later review.



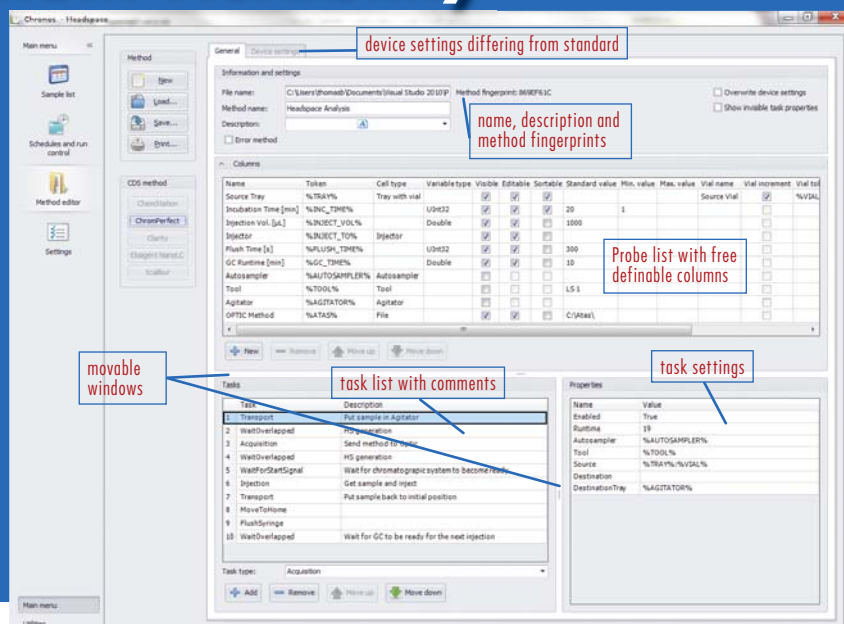
Schedule for seven samples in a headspace GC-MS analysis using PAL

Maximum Flexibility

CHRONOS

Method Editor

With CHRONOS, methods can be prepared in a straightforward simple way by using prepared "Tasks". The sample list can be created with the method editor in a flexible but still simple way. Subsequently it can be passed on to the analytical system.



All encompassing functionality

- import and export of sequences in DANI Masterlab, ChemStation, Masshunter and Xcalibur or cvs-format
- control of multiple PALs
- programmability of Valco valves over a serial interface
- customizable sample list for easy user interface adjustments
- management of multiple sample lists
- management of priority samples
- call up external programs for data interpretation from within the method
- reading of gravimetric data from a Mettler balance
- support for Gilson dilutors for sample dilutions, SPME fiber changer, ITEX-2 functions, 2D barcode reader, Dual PAL systems, liner exchange in a ATAS Linex system
- ability to send SMS messages
- control of peristaltic pumps for liquid handling
- control of SPE cartridge change module for automated SPE
- control of ITSP hardware
- direct incorporation of LIMS systems from ICD

Examples of Applications

GC and GC/MS

- Headspace
- SPME
- ITEX-2
- derivatization e.g. Metabolomics protocols
- support of Preventive Maintenance in Process (PMIP)
- automatic H53-extraction
- on-line SPE
- Dual PAL applications

HPLC and LC/MS

- multi-dimensional chromatography
- matrix separation using SPE
- derivatizing with fluorescence tags
- fast separation of active ingredient in pharma research

Summary Conclusions

CHRONOS optimizes the complex work flows of the sample handler (CTC PAL) and reduces waiting times of all components in GC(-MS) or LC(-MS) systems. This is possible because **CHRONOS** through its intelligent algorithms affects parallel handling of multiple samples without compromising precision and accuracy of the final results. This replaces the usual concept of serially processing of samples. **CHRONOS** introduces an innovative way to enter the world of parallel, staggered sample centric work flow that raises efficiencies significantly.

Specifications

Applicable Chromatography and MS Data Systems

- Xcalibur 1.4 up to 2.2, LC, GC
- GC/LC/MSD ChemStation
- ChromPerfect 6.0.10
- integration of ATAS Evolution Software for the optic injector
- integration of EZChrom Vs. 3.21, Clarity Vs. 3.0 and higher
- integration of Analyst 1.41 and higher
- Masshunter B.06.00 FP2

CTC PAL Samplers:
HTS PAL, HTC PAL, TWIN PAL, CombiPAL, Dual PAL, GC PAL, PAL xt-Serie, RTC PAL, RSI PAL

The simultaneous control of multiple PALs, a Twin PAL or a Dual PAL can be realized with **CHRONOS**.

System requirements:
Recommended processor: 2 GHz, Windows XP, Windows 7, Windows 8.1. For each PAL 1 serial port (RS 232) or over network.



Axel Semrau®

Axel Semrau® is one of the largest Trade and Service Organization in Germany engaged in analytical instrumentation.

For more than 30 Years Axel Semrau® sells and supports specialized solutions for chromatography and mass spectrometry with a steadily growing staff.

Besides analytical systems for LC and GC Axel Semrau® has an expanding line of its own products in software and Odor applicator control for the natural gas industry.

A competent team of analytical chemists, informatics specialist and software engineers develops in close cooperation with end-users new products such as **CHRONOS** to improve efficient processes in the laboratory.

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Axel Semrau is certified by DEKRA in accordance with ISO 9001:2000 since May 2008. The company undergoes regular external monitoring. On CEBIT 2012 **CHRONOS** got the Innovation Award IT.

80 % of our workforce has completed training in science and technology. By continuous further employee training we guarantee a high level of advice and support.

We can adapt our solutions to specific customer requirements if desired.

We sense good chemistry ...



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