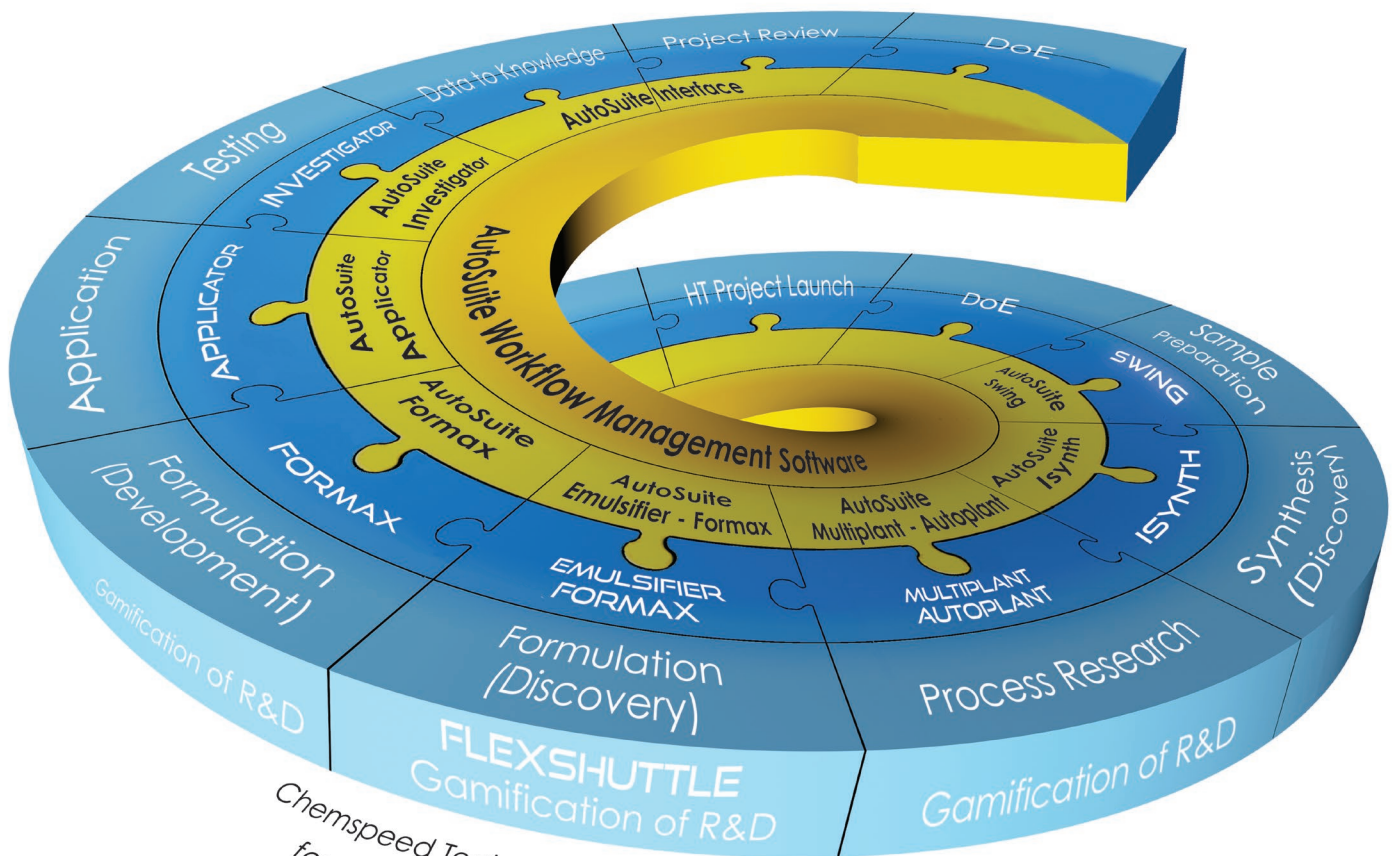


WORKFLOW PORTFOLIO

- Innovative solutions covering every step in the product development cycle -

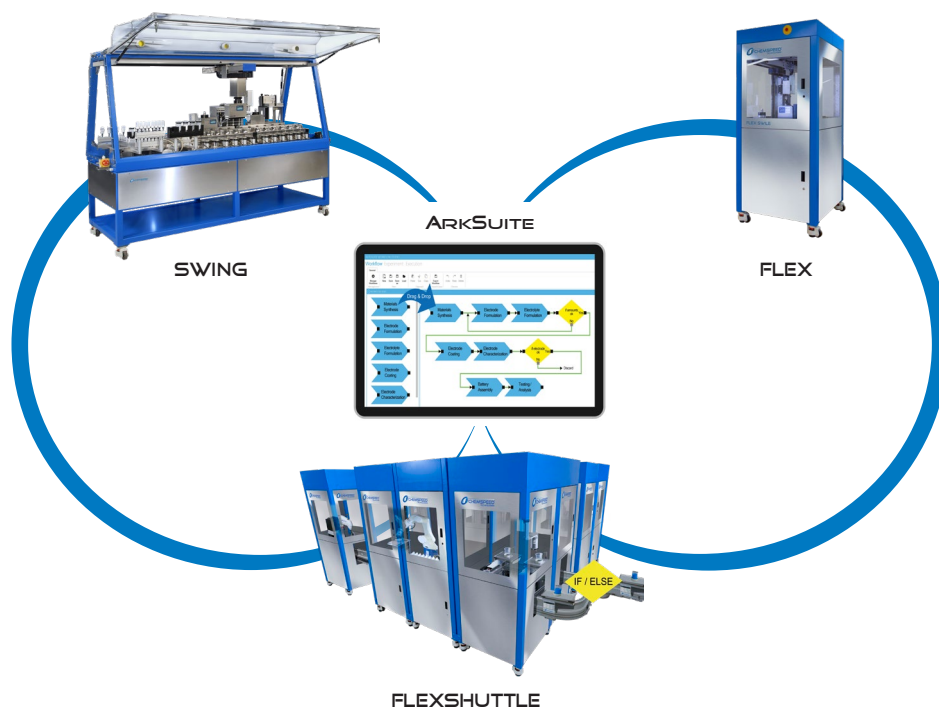


Chemspeed Technologies offers hardware and software for every step in the product development cycle



ROBUSTNESS AND EASE-OF-USE BY DESIGN

Chemspeed's unique solutions, enable a paradigm shift in automated Research & Development of new and better products!



Chemspeed Technologies focuses on creating, developing and delivering full workflow application oriented solutions which enhance R&D productivity.

Chemspeed Technologies is the leading provider of high-throughput and high-output research & development workflow-solutions from single bench-top/standalone automated workstations (powder dispensing – sample preparation – synthesis – process development – formulation – application – testing) up to complete and integrated product development workflows for the entire product development processes in the chemical, material science, renewables & energy, pharmaceutical, agrochemical, specialty chemical, home care, cosmetics and nutrition industries, as well as academia.

Chemspeed's core capabilities:

- Workflow management solutions.
- Workflow task driven user interface.
- Exchangeable robotic tools: Chemspeed can bring more than 60 robotic tool based features to reactors, vessels, etc.
- Unrivalled gravimetric, direct-to-destination dispensing technology.
- High-Performance, flexible synthesis, process research reactors and formulation vessels in disposable or reusable formats.
- Software solutions for module control and workflow management.
- Standardized, ready-to-apply chemical consumables (**SMOLE**).
- Chemistry services.
- Automation of entire R&D labs.

**Precision – Speed – Accuracy
Performance – Versatility –
R&D Cost Savings – High-Throughput**

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Chemspeed's **SWING** product line is the leading high-throughput solution in unattended, automated sample preparation and QC combining unrivalled flexibility and modularity for sustainably increasing R&D efficiency.



SWING
Compound substance handling, sample preparation, reaction preparation
FLEX SWILE (Compound Management / Catalyst Screening / Formulation Screening)
1:1 gravimetric pick and decision dispense of solids
SWILE COMPOUND MANAGEMENT
Solid compound management and distribution / reformatting
FLEX SWIP
1:1 gravimetric pick and decision dispense of liquid, sticky or oily compounds
FLEX POWDERDOSE / FLEX POWDERDOSE XL / SWING POWDERDOSE
Gravimetric solid dispensing / dosing (incl.applications in GMP environment)
POWDERCUBE
Gravimetric dispense of powders / solids from containers
FLEX LIQUIDOSE
Gravimetric and volumetric liquid, viscous liquid, paste, cream dispensing
SWING VISCODOSE
Gravimetric viscous liquid, paste, cream dispensing / dosing
SWING WAXDOSE
Gravimetric highly viscous liquid and wax dispensing / dosing
SWING XDOSE
Gravimetric solid, powder, liquid, viscous liquid, wax dispensing / dosing (for applications in a GMP environment)
SWING SMOLE
Gravimetric filling and sealing of SMOLE PINs (see page 22 - 24)
FLEX VISCO / SWING VISCO
Viscosity measurement (expandable with rheology in case of SWING)
SWING DENSITY
Density measurement: positive displacement and / or on the fly operation while dispensing
SWING PH
Parallel pH measurement
SWING RP
Reaction preparation (for e.g. library synthesis, catalyst screening)
SWING SP
Sample preparation (for e.g. analytics, preformulation)
SWING SPEDEXTRACT
Parallel pressure extraction

^{1a} Hybrid products for unattended Synthesis, Process Research, Formulation, Application and Testing are commonly offered by Chemspeed on one or more platforms, within one product development cycle.

SWING CRYSTAL
Crystallization, polymorph, salt and solubility screening
SWING MIXINGPOSSIBLE
Mixing and grinding of different materials
SWING QUECHERS
Sample preparation and analysis of pesticide residues (in e.g. food samples)
SWING KF
Sample preparation and online Karl Fischer water titration
HERBAL PLANTEX
Actives extraction and purification of plant ingredients at ambient and / or elevated pressure
HERBAL TRACE
Trace extraction and analysis at ambient and / or elevated pressure (of e.g. pesticides, metal trace and other contaminants)
SWING BIOMASS
Biomass pre-treatment & analytics (e.g. organosolve, hydrosolve)
SWING MEDTECH
Dispensing, blending, and microwave assisted baking of powders in regulated environments (e.g. GMP, GLP)
SWING FLEXYWEIGHER PLUS
Vial weighing, filling, capping & crimping
SWING LIQUID GAS RP
Reaction preparation for e.g. polymerization screening of liquefied monomers in disposable glass bottles
FLEX RHEO
Rheology measurement of low viscous to highly viscous materials
SWING DRU-X-TOR
High-quality automated sample preparation and GC-MS analysis for drug analysis (e.g. heroin signature)

^{1a} Hybrid products for unattended Synthesis, Process Research, Formulation, Application and Testing are commonly offered by Chemspeed on one or more platforms, within one product development cycle.

Chemspeed's **ISYNTH** product line is the leading high-throughput and high-output solution in unattended, automated synthesis combining unrivalled flexibility and modularity for sustainably increasing R&D efficiency.



<p>ISYNTH</p> <p>Library synthesis in disposable glass vials / reactors and / or reusable double-jacket reactors and / or microwave reactors</p>
<p>FLEX ISYNTH / ISYNTH AI</p> <p>Active ingredients (AI) library synthesis in disposable glass vials / reactors and / or reusable double-jacket reactors</p>
<p>ISYNTH SPEEDCHEM</p> <p>Library synthesis in disposable vials / reactors under accelerating superheated conditions</p>
<p>ISYNTH PSW</p> <p>Parallel synthesis of peptides and oligosaccharides</p>
<p>ISYNTH SWAVE</p> <p>Microwave assisted synthesis and sample treatment (batch and continuous)</p>
<p>ISYNTH POLYMORPH</p> <p>Pharma science (polymorph screening, salt selection)</p>
<p>FLEX ISYNTH / ISYNTH CATIMPREG</p> <p>Heterogeneous catalyst preparation by automated versatile impregnation</p>
<p>ISYNTH CATSCREEN 96</p> <p>Catalyst preparation and screening at ambient and elevated pressure in 96 well plates</p>
<p>ISYNTH ENERGY</p> <p>Fuel cell catalyst discovery & optimization, organic / inorganic frameworks / cages synthesis, photovoltaics screening</p>
<p>ISYNTH POLY</p> <p>Polymer research (controlled radical polymerization (CRP) techniques)</p>
<p>ISYNTH BIOMAT</p> <p>Biomaterial / biopolymer / drug delivery devices synthesis</p>
<p>ISYNTH POSYCAT POSY</p> <p>Polyolefin catalyst synthesis and screening</p>
<p>ISYNTH REACTSCREEN</p> <p>Automated reaction screening (µl to ml scale)</p>
<p>ISYNTH SMOLE</p> <p>Library synthesis, catalyst screening, reaction screening with standardized, ready-to-apply SMOLE PINs (see page 22 - 24)</p>

^{1b} Hybrid products for unattended Sample Preparation, Process Research, Formulation, Application and Testing are commonly offered by Chemspeed on one or more platforms, within one product development cycle.

Chemspeed's **MULTIPLANT** and **AUTOPLANT** product line are the leading high-output solutions in unattended, automated process R&D, polymer / material and preparative synthesis combining unrivalled flexibility and modularity for sustainably increasing R&D efficiency.



AUTOPLANT
Solutions for process R&D and preparative synthesis
FLEX AUTOPLANT
Solutions for process R&D and preparative synthesis
FLEX MULTIPLANT
Solutions for process R&D and preparative synthesis
MULTIPLANT PRORES / AUTOPLANT PRORES
Optimization and scale-up
MULTIPLANT POLY / AUTOPLANT POLY
Emulsion, suspension, dispersion, solution, mass and pressure polymerization development and scale-up
MULTIPLANT POSYCAT / AUTOPLANT POSYCAT
Polyolefin / rubber catalyst synthesis
MULTIPLANT POSY / AUTOPLANT POSY
Polyolefin and rubber synthesis, optimization and scale-up
MULTIPLANT PREP / AUTOPLANT PREP
Preparative organic and inorganic synthesis
MULTIPLANT CATTEST / AUTOPLANT CATTEST
Catalyst testing (hydrogenation, carbonylation, metathesis, Heck, Suzuki)
MULTIPLANT PRECIP / AUTOPLANT PRECIP
(Mixed) oxides by pH-controlled precipitation, ion exchange and sol-gel process
MULTIPLANT ZEO / AUTOPLANT ZEO
Accelerated and standardized zeolite and metallorganic framework (MOF) synthesis by precisely controlled hydro- and solvothermal synthesis
MULTIPLANT ENERGY / AUTOPLANT ENERGY
Fuel cell catalyst discovery and optimization
MULTIPLANT BIOMASS / AUTOPLANT BIOMASS
Biomass treatment & analysis (e.g. organosolve, hydrosolve, AFEX)
MULTIPLANT AUTOCAL / AUTOPLANT AUTOCAL
Parallel and real time calorimetry in high-precision
MULTIPLANT FLOWCHEM / AUTOPLANT FLOWCHEM
Paradigm shift - combination of batch & flowchemistry

^{1c} Hybrid products for unattended Sample Preparation, Synthesis, Formulation, Application and Testing are commonly offered by Chemspeed on one or more platforms, within one product development cycle.

FORMULATION ²

Chemspeed's **FORMAX** and **EMULSIFIER** product line are the leading high-throughput and high-output solutions in unattended, automated (re-)formulation and characterization combining unrivalled flexibility and modularity for sustainably increasing R&D efficiency.



FORMAX Formulation and characterization
FLEX FORMAX Formulation and characterization
FLEX FORMAX PERSONAL CARE / FORMAX SKIN CARE & SUNSCREEN Formulation and characterization of personal care products (skin care, lotion, soap, sunscreen)
FLEX FORMAX PERSONAL CARE / FORMAX HAIR CARE & COLORANTS Formulation and characterization of colorants and hair care products
FLEX FORMAX HOME CARE / FORMAX HOME CARE Formulation and characterization of home care / household products
FORMAX FOOD & FEED Formulation and characterization of food and feed products (nutrition, functional food, beverages)
FORMAX PAINTS & COATINGS Formulation and characterization of paints and coatings
FLEX FORMAX LUBRICANTS / FORMAX LUBES Formulation and testing of lubricants (oils, greases)
EMULSIFIER Formulation, application and testing of low viscous formulations
EMULSIFIER AGRO Formulation, application and testing of emulsion and suspension concentrates
EMULSIFIER EOR Surfactant and additive screening for enhanced oil recovery

APPLICATION ²

Chemspeed's **APPLICATOR** product line is the leading high-throughput solution in unattended, automated Application of formulated products combining unrivalled flexibility and modularity for sustainably increasing R&D efficiency.



FLEX SPRAY Airborne spray coating of liquid materials (for e.g. paints, coatings)
FLEX DRAW DOWN Wet film applicator (for e.g. paints, coatings, cosmetics, adhesives, battery pastes)

² Hybrid products for unattended Sample Preparation, Synthesis, Process Research, Formulation, Application and Testing are commonly offered by Chemspeed on one or more platforms, within one product development cycle. For complete and fully integrated Formulation, Application, Testing product development workflows, Chemspeed provides a unique solution for virtually unrestricted flexibility in combining sequential and parallel processing (**FLEXSHUTTLE**).

Chemspeed's INVESTIGATOR product line is the leading high-throughput solution in unattended, automated Investigation / Testing of formulated & applied products combining unrivalled flexibility and modularity for sustainably increasing R&D efficiency.



FLEX RHEO

Rheology measurement of low viscous to highly viscous materials

FLEX VISCO

Viscosity measurement expandable with rheology in case of FLEX

SWING VISCO

Viscosity measurement expandable with rheology in case of SWING

SWING PH

Parallel pH measurement

SWING KF

Sample preparation and inline Karl Fischer water titration



Chemspeed's **FLEXSHUTTLE** is the step-changing high-throughput and high-output solution for unrestricted sequential and parallel processing of entire (or partial) product development workflows. The unrivalled design enables dramatic product development efficiency increases combined with highest quality and maximum ease of use.



FLEXSHUTTLE PAINTS & COATINGS

Formulation, application, characterization and testing of paints & coatings

FLEXSHUTTLE COLMATCH

Formulation, application and testing for color blending and color matching

FLEXSHUTTLE ADHESIVES

Formulation, application, characterization and testing of adhesives

FLEXSHUTTLE HOME CARE

Formulation, application, characterization and testing of home care products

FLEXSHUTTLE PERSONAL CARE

Formulation, application, characterization and testing of personal care products

FLEXSHUTTLE BATTERY RESEARCH

Synthesis, electrode / electrolyte preparation, battery assembly and testing

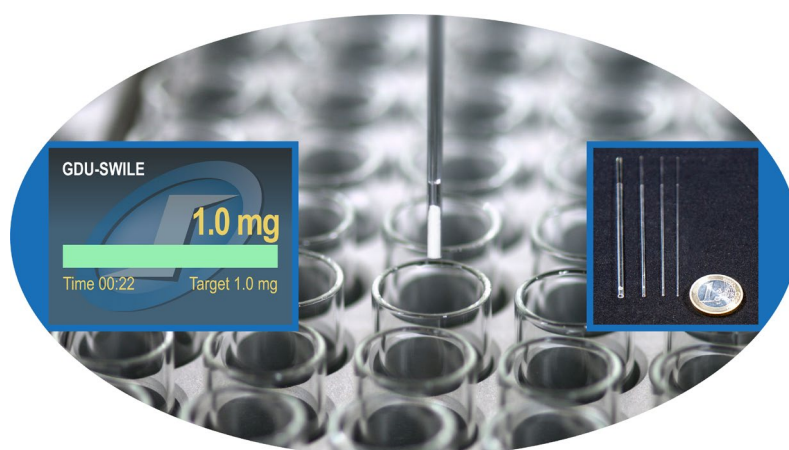
FLEXSHUTTLE PHARMA

Sample preparation, synthesis, work-up, purification and analysis for pharma research

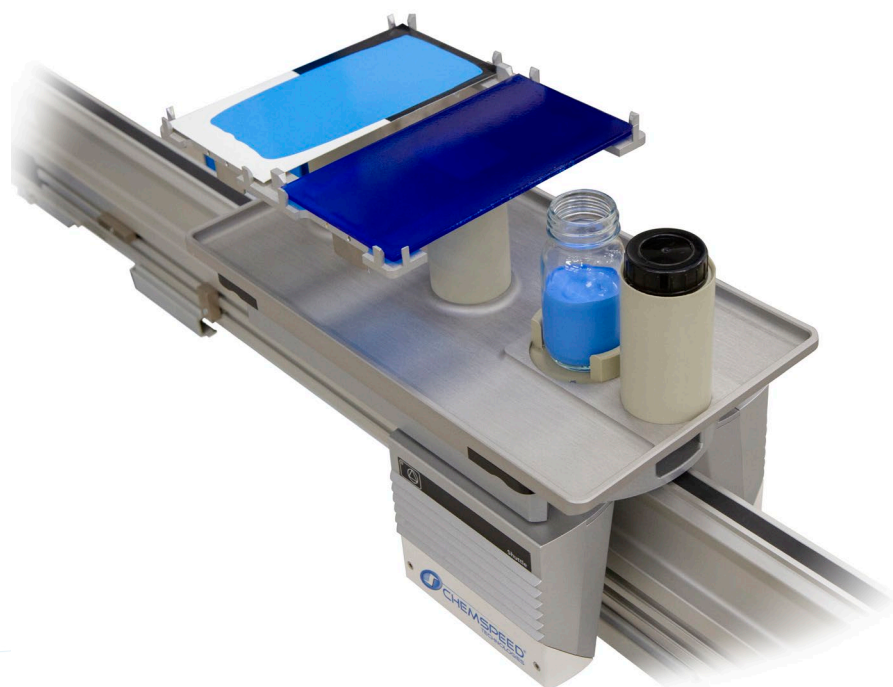


Selection of available FLEX modules:

Formulation and Sample Preparation
FLEX VESSEL STORAGE Automatic storage and handling system for formulation vessels
FLEX STORAGE & CLEANING Automatic storage, handling and cleaning system for functional lids
FLEX SCREWCAPPER Automatic screw capping / decapping system
FLEX LIQUID XL Automatic pressure dispensing system for very large amounts of liquids
FLEX LIQUID L Automatic pressure dispensing system for large amounts of liquids
FLEX LIQUID M Automatic dispensing system for medium amounts of liquids
FLEX LIQUID S Automatic dispensing system for small amounts of liquids
FLEX SWIP Automatic gravimetric pick & place transfer system for very small amounts of (viscous) liquids
FLEX POWDER L Automatic gravimetric dispensing system for large amounts of solids and powders
FLEX POWDER M Automatic overhead gravimetric dispensing system for medium amounts of solids and powders
FLEX POWDER S Automatic overhead gravimetric dispensing system for small amounts of solids and powders
FLEX SWILE Automatic gravimetric pick & place transfer system for very small amounts of solids and powders
FLEX MIX Automatic mixing system for dispersing / mixing a variety of materials - various mixing methods available, e.g. dual asymmetric centrifugation, overhead mixing (dispersing disk, rotor-stator, impeller, etc.), horizontal vibration shaking, vortex shaking
FLEX DISPERSION Fully integrated dispersing system for stirring / dispersing / milling a variety of materials
FLEX BEAD DISPENSING Automatic gravimetric dispensing system for beads (glass, zirconium...)
FLEX FILTRATION Automatic system for highly efficient removal of solids (e.g. glass beads)
FLEX CENTRIFUGATION Fully integrated automatic centrifugation system
FLEX TRANSFER Automatic aspirating, dispensing and transfer system for vessels and/or (medium viscous) liquids



Application
FLEX SUBSTRATE STORAGE & RT CURING Automatic storage, RT curing and handling system for flat substrates
FLEX CLEAN Automatic wet cleaning system for flat substrates
FLEX SPIN COATING Automatic spin coating system for flat substrates
FLEX DRAW DOWN Automatic draw down system for flat substrates
FLEX SPRAY AIRBORNE Automatic airborne spray-coating system for flat substrates
FLEX SPRAY AIRLESS Automatic airless spray-coating system for flat substrates
FLEX SPRAY ELECTROSTATIC Automatic electrostatic rotary spray-coating system for flat substrates
FLEX HEAT CURING Automatic horizontal heat curing and drying system for flat substrates
FLEX UV CURING Automatic horizontal UV curing and drying system for flat substrates
FLEX IR CURING Automatic horizontal IR curing and drying system for flat substrates



Characterization and Testing
FLEX PH Automatic system for pH measurement (and adjustment)
FLEX RHEOLOGY Fully integrated automatic system for rheology measurement of liquid samples
FLEX VISCOSITY Automatic system for viscosity measurement (and adjustment)
FLEX DENSITY Automatic system for density measurement of liquid samples
FLEX TITRATION Fully integrated titration system
FLEX GPC Automatic system for Gel Permeation Chromatography (GPC)
FLEX IMAGING Automatic imaging system, e.g. for color / visual appearance evaluation of liquid sample, analysis of defects in coatings
FLEX RUB-OUT / RUB-UP Automatic rub-out / rub-up system to test the dispersion quality and homogeneity
FLEX COATING CHARACTERIZATION Fully integrated automatic system for dry coating characterization, e.g. color, haze/gloss, contrast ratio, sheen, coating thickness measurement
FLEX ADHESION Automatic system to test adhesion properties of coatings on substrates
FLEX POUR Automatic system for application of (viscous) samples by pour out
FLEX STIPLING
FLEX SOLID CONTENT Automatic system for solid content measurement
FLEX TACK Automatic system for tack cure measurement on flat substrate
FLEX STAIN APPLY Automatic system for stain application, stain drying, rinsing and drying to gain results of contamination (chemical resistance)
FLEX STAIN WASH Automatic system for stain washing to gain results about washability of coatings
FLEX CHEMICAL RESISTANCE Automatic system for chemical resistance measurement against various liquids



Characterization and Testing	
FLEX BURNISH	Automatic system for characterizing burnish resistance of coatings
FLEX SCRUB	Automatic system for evaluating performance of coatings against scrubbing
FLEX FOAM	Automatic measurement of foam building and decomposition in vessel
FLEX TINT STRENGTH	Automatic system for comparing the tint strength of a sample to a standard
FLEX PARTICLE SIZE	Automatic system for particle size measurement
FLEX IR SPECTROSCOPY	Automatic system for mid-infrared and/or near-infrared spectroscopy
FLEX DSC	Automatic system for Differential Scanning Calorimetry (DSC)
FLEX NANO	Fully integrated automatic system for nanomechanical testing and surface topography analysis on flat substrates
FLEX PROFILO	Automatic system for measuring surface profile to quantify roughness on flat substrates
FLEX CONTACT ANGLE	Automatic system for measuring contact angle and surface free energy
FLEX ELECTRODE CHARACTERIZATION & CALENDARING	Automatic system for electrode characterization and high precision calendaring
FLEX UV EXPOSURE	Automatic system for solar exposure stress testing
FLEX CORROSION	Automatic system for testing corrosion on coatings
FLEX CONDUCTIVITY	Fully integrated automatic system for conductivity measurement

Miscellaneous and Logistics	
DASHBOARD	Set-up for data and workflow management, visualization and scheduling
FLEX LABELING	Automatic system for labeling flat or curved surface with self-adhesive label
FLEX DISPOSAL	Automatic system to discard liquid samples and/or formulation vessels
FLEX MANUAL INTERACTION	For any manual interaction during the workflow

ArkSuite workflow management software integrates with:



AUTOSUITE USER INTERFACE + EXECUTOR

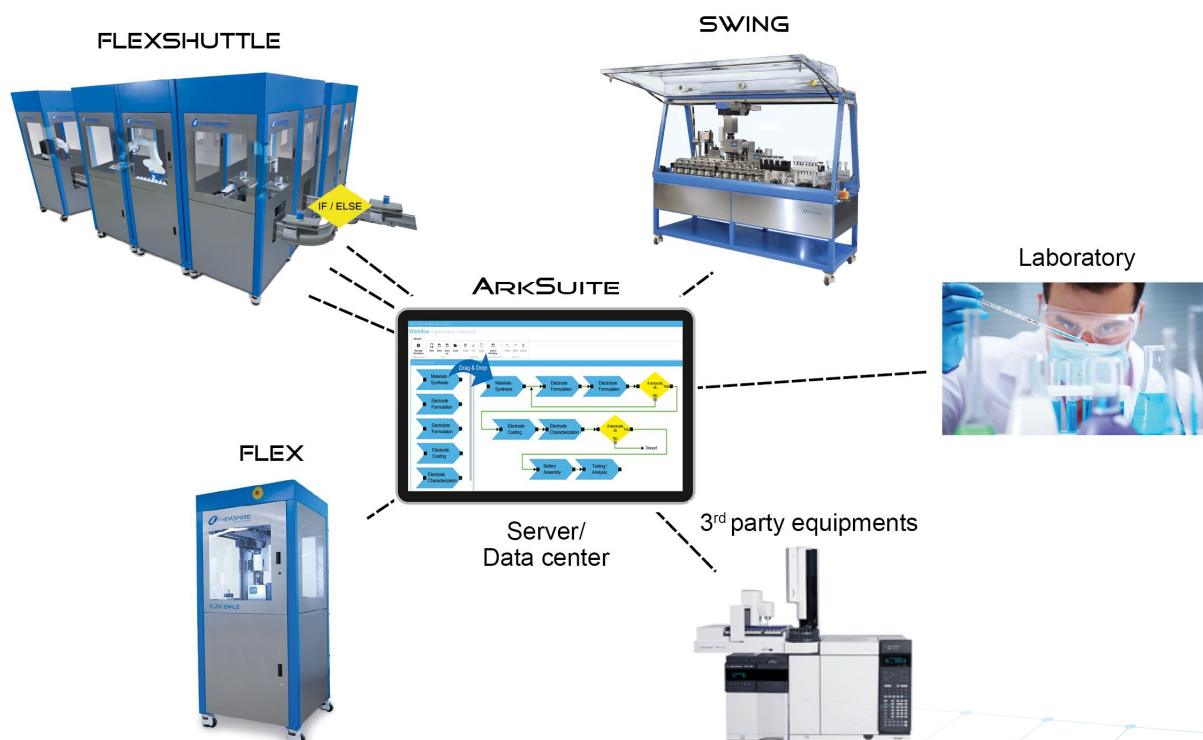
Chemspeed's AutoSuite software enables you to quickly design, execute, analyze and report experiments with your automated Chemspeed workstation. Start with a prebuilt workflow or design your own by dragging and dropping any number of predefined tasks to create your own application

ARKSUITE SOFTWARE & INTERNET OF THE LAB TOOLS

ArkSuite Workflow Software and Internet of the Lab Tools (e.g. DoE/ML/AI, data mgt, substance parameter database, inventory mgt, product mgt, run mgt). It includes a full document management system (electronic labjournal) and is 21 CFR Part 11 compliant. The software scales from a single PC to large network installations with multiple clients.

CUSTOM INTEGRATION PACKAGE

Chemspeed integrates a variety of software products, please contact us for interfaces or integration



Boost output & quality in your R&D



Chemspeed offers robotic platforms and object oriented integrated systems designed to speed up your R&D providing you true high-throughput. Select your system based on your specific needs: dedicated systems for specific tasks such as powder dispensing, sample preparation, synthesis, process development, formulation, application, testing – or combine any of these functionalities to an integrated platform system.

Product Lines

FLEX Line

The **FLEX** platform comprises a series of dedicated automation systems providing leading-edge technology to streamline your lab processes. Our unique concepts such as the patented gravimetric overhead dispensing, our reactor/vessel technology for synthesis or formulation or the revolutionary decision dispensing technology for solid, liquids or honey-like compounds (**SWILE/SWIP**) can all be integrated in these platforms.

The compact footprint (90×90 cm – 3×3 ft.) helps you saving precious lab space all while maximizing your output. The Flex systems target for maximum efficiency in your lab supporting your efforts to save time and costs thus optimizing your return on investment.



SWING Line

The **SWING** platform and the **SWING XL** platform, are designed to automate complex lab workflows. Our unique concepts such as the patented gravimetric overhead dispensing, our reactor/vessel technology for synthesis or formulation or the revolutionary decision dispensing technology for solid, liquids or honey-like compounds (**SWILE/SWIP**) can be combined with virtually no limitations. Numerous options allow you transferring your lab processes in an optimum way thus maximizing your throughput without compromise – designed for scientists by scientists!



FLEXSHUTTLE Line

The **FLEXSHUTTLE** approach comprises a hard- and software concept which allows to automate virtually any combination of R&D workflow steps and functions. Systems adapted to your specific needs may integrate any steps from sample preparation to synthesis, formulation, application, and testing of new products with an unreached flexibility and variability.

Decision guided workflows can be implemented in flexible system using fully automated IF/ELSE-functions: independently programmable shuttles and branches for intelligent, flexible and dynamic workflows are Chemspeed's paradigm shifting answer for The High Output Lab of The Future.



AUTO SUITE User Interface & Executor (module control)

Chemspeed's **AUTO SUITE** software enables you to quickly design, execute, analyze and report experiments with your automated Chemspeed workstation. Start with a prebuilt workflow or design your own by dragging and dropping any number of predefined tasks to create your own application.

Key Features

- Flexible design of experimental workflows via drag and drop
- Encapsulate complex workflows into easily reusable macro tasks
- Utilize extensive built-in programming tools to design complex workflows to meet your needs
- Customize your workflow by tweaking any number of pre-defined parameters
- Print, scan and track barcodes as part of your workflow
- Connect to any ODBC compliant database to store and retrieve experimental data
- Import or export data during execution to CSV format
- Execute scripts or 3rd Party programs during execution for workflow integration
- Integrate with 3rd party systems using AutoSuite API

AutoSuite Editor - [Chemspeed.app]
File Edit Application Tools View Help

Task	Name	Parameter	Description
1	Hybrid Standard Demo	Execute Once	Description
1	Show Dialog	Yes/No/Stop-Dialog: 'you want to run DEMO?'	Description
2	Show Dialog	Yes/No/Stop-Dialog: 'you want to run DEMO?'	Description
3	Macro Task	Execute Once	Description
Macro Task	Macro Task	Execute Once	Description
1	Transfer Gravimetrically	Transfer liquid from valve port 1+3 to Waste 1+3 with Need...	Description
2	Stir	Execute Once	Description
3	Scrape	Transfer liquid from valve port 1+3 to Waste 1+3 with Need...	Description
4	Transfer Gravimetrically	Agitation ON on zone F Reactor 01-02	Description
5	Transfer Gravimetrically	Agitation ON on zone F Reactor 01-02	Description
4	Transfer Gravimetrically	Gravimetric Transfer with GDU-Ps #1 from Ps 01 Na2CO3...	Description
5	Transfer Gravimetrically	Gravimetric Transfer with GDU-P #1 from P04 01...	Description
4	Transfer Gravimetrically	Gravimetric Transfer with GDU-HV #1 from HV01 Sun...	Description
5	Transfer Gravimetrically	Gravimetric Transfer with GDU-V #1 from V01 Water F...	Description
4	Macro Task	Execute Once	Description
Macro Task	Macro Task	Execute Once	Description
1	Transfer Gravimetrically	Transfer liquid from valve port 1+3 to Waste 1+3 with Need...	Description
2	Macro Task	Execute Once	Description
1	Transfer Gravimetrically	Transfer liquid from valve port 1+3 to Waste 1+3 with Need...	Description
2	Stir	Agitation ON on zone F Reactor 01-02	Description
3	Scrape	Agitation ON on zone F Reactor 01-02	Description

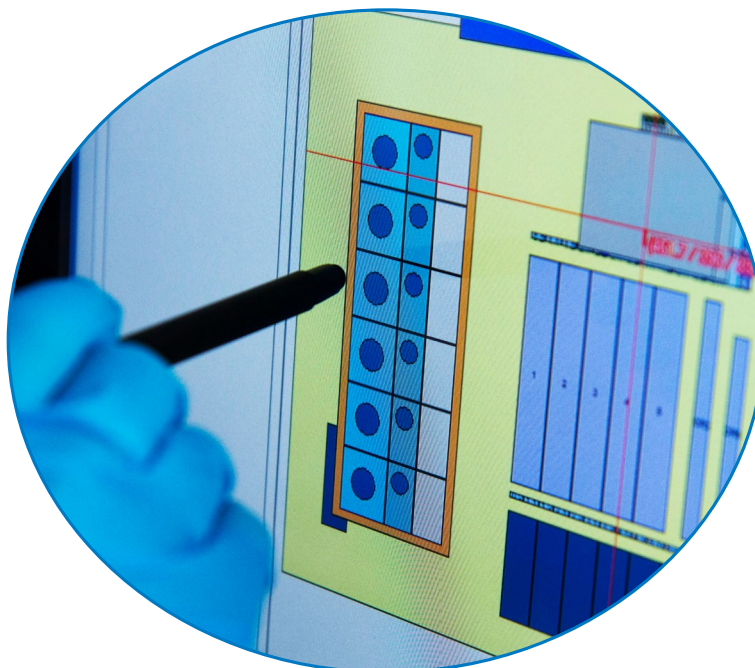
Design

- Design your own experimental workflow using drag and drop functionality
- Develop any number of workflows to support your business needs
- Create advanced workflows using intuitive functions and logic controls
- Easily reconfigure your system and workflow to support future projects

Execute

- Start execution of your workflow with one click operation in a user friendly interface
- Upload external data during execution for maximum experiment flexibility
- Simulate your experiment workflows before running to optimize execution
- Adjust experiments on the fly by calculating new parameters based on in-line values

AUTOsuite User Interface & Executor (module control)



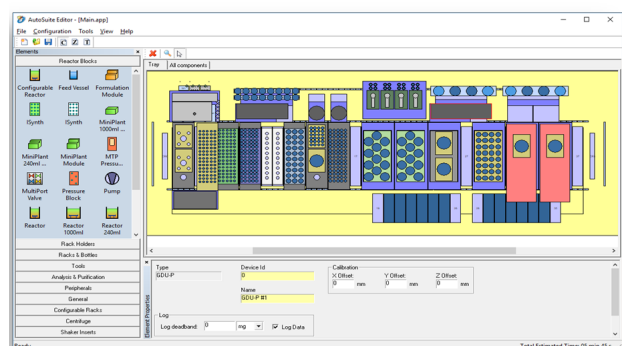
Analyze

- Track experimental conditions in real-time to ensure optimal execution
- Review experimental trends (temperature, pressure, etc.) for in-depth analysis
- Export data during execution and analyze with 3rd party tools

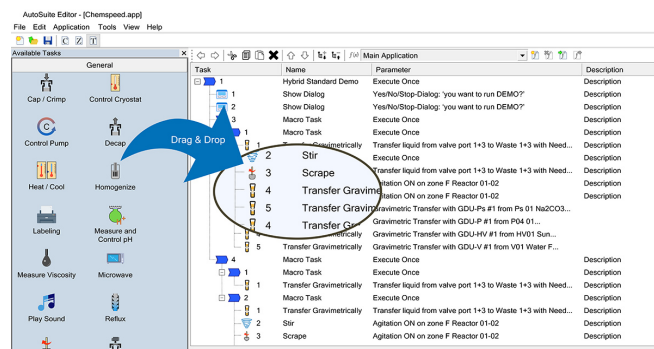
Report

- View resulting data in Excel to quickly analyze experimental results
- Export data to CSV format or push into an ODBC database for increased accessibility
- Utilize 3rd party tools such as Spotfire for reporting results
- Integrate with 3rd party tools such as LIMS or ELN to enhance reporting

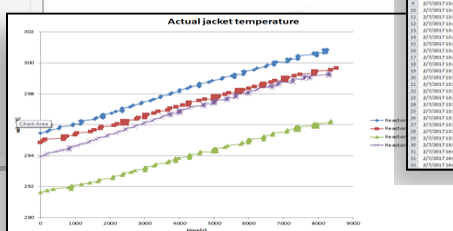
Configuration



Application



Data



Run	Start	Type	From Weigh	To Weigh	Signified Amount	Adjusted Amount	Actual Amount	Dispense Time
1	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #1 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
2	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #2 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
3	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #3 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
4	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #4 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
5	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #5 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
6	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #6 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
7	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #7 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
8	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #8 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
9	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #9 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
10	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #10 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
11	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #11 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
12	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #12 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
13	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #13 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
14	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #14 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
15	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #15 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
16	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #16 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
17	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #17 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
18	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #18 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
19	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #19 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM
20	2/7/2017 12:42:12	Dispense	Well #1 of Dispensing Container Rack #1	Well #20 of 0.08 Wellplate #1	0.000001 Kg	0.000001 Kg	0.000001 Kg	0:00:00 AM

ARKSUITE Workflow Management Software

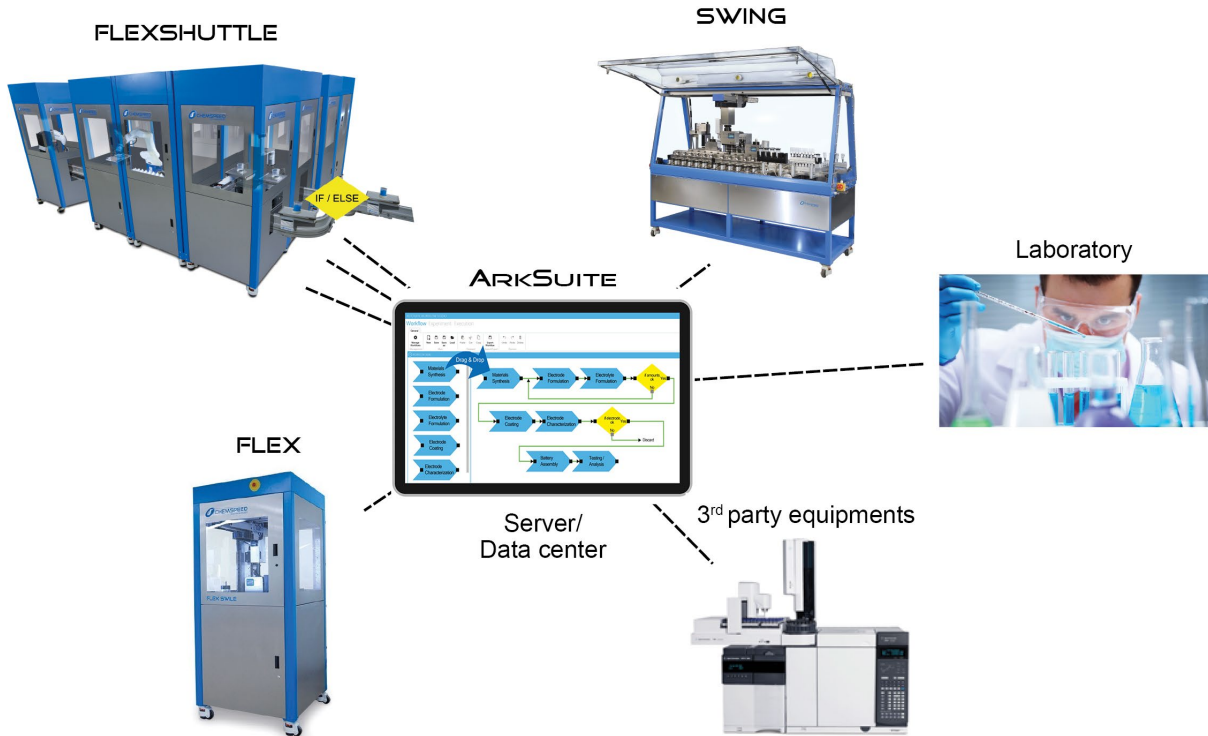
Federalistic Concept

Chemspeed's ArkSuite Workflow Management Software is Chemspeed's solution to coordinating and orchestrating overall laboratory workflows across multiple client systems.

Users can design workflows to include any number of clients including Chemspeed Workstations (**FLEX/SWING**) **FLEXSHUTTLE** modules or even manual lab processes.

Workflows, experiments, messaging, status and inventory management are all centralized within AutoSuite Workflow Management Software. The federated architecture of ArkSuite Workflow Management Software acting as a central authority to multiple clients, enhances usability by presenting a single UI for overall system management, while maximizing flexibility and configurability of user workflows.

Internet of the Lab Tools



Workflow Experiment Execution

Workflow Experiment Execution

Workflow (NAME: MARKETING WF, FROZEN: FALSE)

Drag & Drop

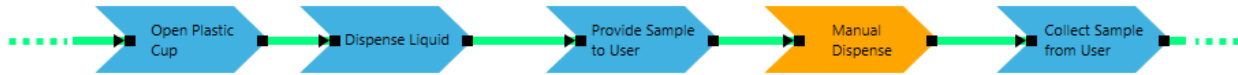
- Workflow Steps representing the different FLEXSHUTTLE functionalities.
- Easy programming with drag & drop.
- Pre-defined templates for a quick setup of recurring workflows.
- Conditional workflow design through structural elements ("IF / ELSE").

LABEL	VALUE
Label	Marketing WF
Comment	
TRIAL	COLOR
0	
1	
2	

ARKSUITE Workflow Management Software

Manual Interaction

- Ability to mix automated workflow steps on a **FLEXSHUTTLE** with manual steps on a lab bench ...
- ... while keeping data centralized ...
- ... by direct connection from manual instruments to ArkSuite Workflow Management Software or by interactive web sites shown on the operator's tablet



Setup of Experiments

- Intuitive definition and design of batch runs for designed workflows
- Possibility to import from and export data to third-party applications (e.g. Excel) including meta information
- Experiment multiplication through varying parameters (e.g. dispense amount)

AUTOSUITE WORKFLOW STUDIO [VERSION 2.2.30.0]

Workflow Experiment Execution

General

Management: Manage Runs, New Run, Load Run, Save Run, Delete Run, Duplicate Run, Run Info, Refresh; Design: Add Experiment, Add Experiments; Advanced: Import Run, Export Run, Queue Run

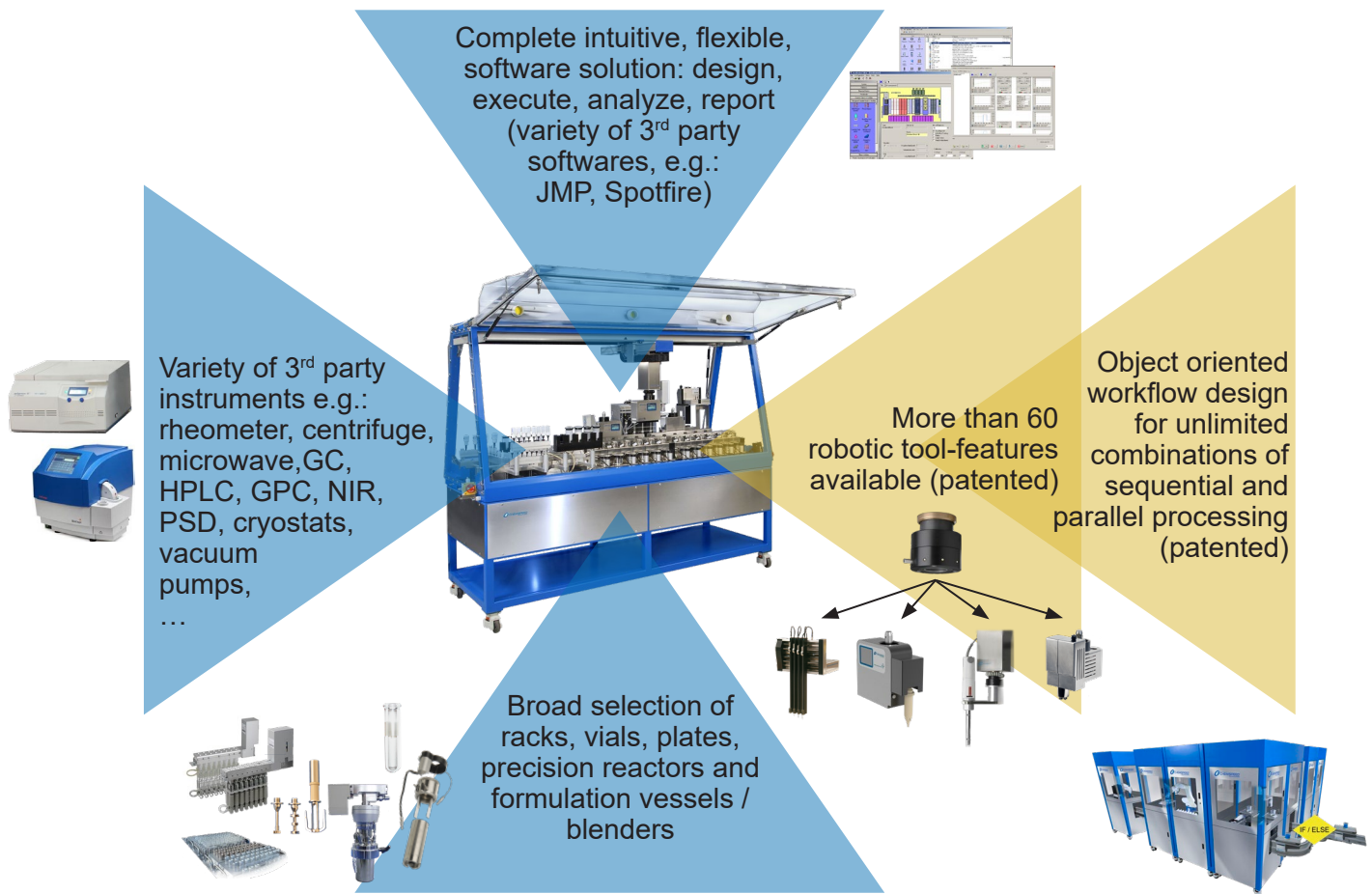
RUN (ED: 60, NAME: RELIANCECH 747 MET 3920 ASAP 6.8(10%, STAT): PROCESSING)

Module: Design Results

Drag a column header here to group by that column

ROW ID	TRIAL	WORKFLOW STEP	STEP ID	PARAMETER	PARAMETER ID	MIN VALUE	MAX VALUE	UNITS	RUN DEFAULT	Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 5	Experiment 6	Experiment 7
1	0	Dispense Liquid	946	Ignore Order	319				True							
2	0	Dispense Liquid	946	Substance1	320					1607.146.large	1607.146.large	1607.146.large	1607.146.large	1607.146.large	1607.146.large	1607.146.large
3	0	Dispense Liquid	946	TargetAmount1	321			Gram		20.7	20.7	20.7	20.7	20.7	20.7	20.7
4	0	Dispense Liquid	946	Substance2	324					1704.349.large	1704.349.large	1704.349.large	1704.349.large	1704.349.large	1704.349.large	1704.349.large
5	0	Dispense Liquid	946	TargetAmount2	325			Gram		5.64	5.64	5.64	2.82	2.82	2.82	0
6	0	Dispense Liquid	946	Substance3	328					1551.326.large	1551.326.large	1551.326.large	1551.326.large	1551.326.large	1551.326.large	1551.326.large
7	0	Dispense Liquid	946	TargetAmount3	329			Gram		0	0	0	2.82	2.82	2.82	5.64
8	0	Dispense Liquid	946	Substance4	332					1558.348.small	1558.348.small	1558.348.small	1558.348.small	1558.348.small	1558.348.small	1558.348.small
9	0	Dispense Liquid	946	TargetAmount4	333			Gram		0.06	0.06	0.06	0.06	0.06	0.06	0.06
10	0	Dispense Liquid	946	Substance5	336					1705.311.small	1705.311.small	1705.311.small	1705.311.small	1705.311.small	1705.311.small	1705.311.small
11	0	Dispense Liquid	946	TargetAmount5	337			Gram		0.6	0.6	0.6	0.6	0.6	0.6	0.6
12	0	Dispense Liquid	946	Substance6	340											
13	0	Dispense Liquid	946	TargetAmount6	341			Gram								
14	0	Dispense Liquid	946	Substance7	344											
15	0	Dispense Liquid	946	TargetAmount7	345			Gram								
16	0	Dispense Liquid	946	Substance8	348											
17	0	Dispense Liquid	946	TargetAmount8	349			Gram								
18	0	Dispense Liquid	946	Substance9	352											
19	0	Dispense Liquid	946	TargetAmount9	353			Gram								
20	0	Dispense Liquid	946	Substance10	356											
21	0	Dispense Liquid	946	TargetAmount10	357			Gram								
22	0	Dispense Liquid	946	Substance11	360											
23	0	Dispense Liquid	946	TargetAmount11	361			Gram								
24	0	Dispense Liquid	946	Substance12	364											
25	0	Dispense Liquid	946	TargetAmount12	365			Gram								
26	0	Dispense Liquid	946	Substance13	368											
27	0	Dispense Liquid	946	TargetAmount13	369			Gram								
28	0	Dispense Liquid	946	Substance14	372											
29	0	Dispense Liquid	946	TargetAmount14	373			Gram								
30	0	Dispense Liquid	946	Substance15	376											
31	0	Dispense Liquid	946	TargetAmount15	377			Gram								
32	0	Mix Plastic Cup	948	MixCount	425	1	3			1	1	1				
33	0	Mix Plastic Cup	948	Speed1	427	799.999999	2750	RPM	800							
34	0	Mix Plastic Cup	948	Duration1	428	10	1200	Second	60							
35	0	Mix Plastic Cup	948	Speed2	429	799.999999	2750	RPM								
36	0	Mix Plastic Cup	948	Duration2	430	10	1200	Second								
37	0	Mix Plastic Cup	948	Speed3	431	799.999999	2750	RPM								
38	0	Mix Plastic Cup	948	Duration3	432	10	1200	Second								
39	0	Ignore Order	319													

5 Dimensions of Scalable Modularity and Flexibility



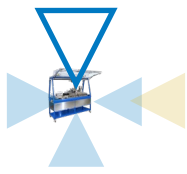
Off-the-Shelf-Design

Individual platform configuration tailored to your workflow with market-proven off-the-shelf components.

Robotic platforms which can easily be integrated with one another to enable multi-workflow processes (e.g. Formulation, Application and Testing procedures all integrated in a single platform).

Chemspeed evolves in a very diversified and very fragmented market. Every industry has different needs, which makes modularity and flexibility a must. Therefore, every Chemspeed solution has a 5-dimension orientation, which allows us to offer targeted and tailored products to our customer:

The automated chemistry systems of Chemspeed Technologies 'condense' many instrument capabilities (such as reaction preparation, liquid handling, solid weighing and dispensing, reaction & work-up, output to analytics, etc.) into one platform, thereby simplifying the operations required.



Software

ARKSUITE Workflow Management Software

- Designed for today's laboratories which increasingly rely on technology and automation
- Aids scientists who need to execute related tasks/workflows across many different systems
- Orchestrates laboratory tasks/workflows across these systems, putting an unparalleled amount of flexibility and utility in the hands of the scientist

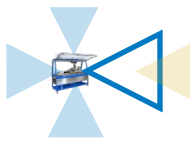
Workflow Experiment Execution

LABEL	VALUE
Color	Hybrid Standard Demo
Comment	
TRIAL	COLOR
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1	
2	

AutoSuite Editor - [Chemspeed.app]

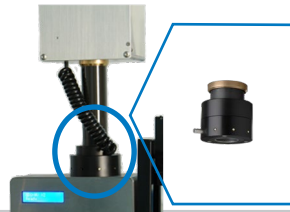
File Edit Application Tools View Help

Task	Name	Parameter	Description
1	Hybrid Standard Demo	Execute Once	Description
1	Show Dialog	Yes/No/Stop-Dialog: 'you want to run DEMO?'	Description
2	Show Dialog	Yes/No/Stop-Dialog: 'you want to run DEMO?'	Description
3	Macro Task	Execute Once	Description
1	Macro Task	Execute Once	Description
1	Stir	Transfer liquid from valve port 1+3 to Waste 1+3 with Need...	Description
2	Stir	Execute Once	Description
3	Scrape	Transfer liquid from valve port 1+3 to Waste 1+3 with Need...	Description
4	Transfer Gravimetrically	Agitation ON on zone F Reactor 01-02	Description
5	Transfer Gravimetrically	Agitation ON on zone F Reactor 01-02	Description
4	Transfer Gravimetrically	Gravimetric Transfer with GDU-Ps #1 from P04 01...	Description
4	Transfer Gravimetrically	Gravimetric Transfer with GDU-HV #1 from HV01 Sun...	Description
5	Transfer Gravimetrically	Gravimetric Transfer with GDU-V #1 from V01 Water F...	Description
4	Macro Task	Execute Once	Description
1	Macro Task	Execute Once	Description
1	Transfer Gravimetrically	Transfer liquid from valve port 1+3 to Waste 1+3 with Need...	Description
2	Macro Task	Execute Once	Description
1	Transfer Gravimetrically	Transfer liquid from valve port 1+3 to Waste 1+3 with Need...	Description
2	Stir	Agitation ON on zone F Reactor 01-02	Description
3	Scrape	Agitation ON on zone F Reactor 01-02	Description

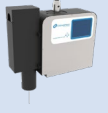











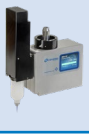







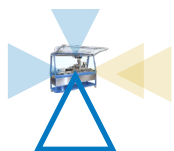
Robotic Tool-Features

More than 60 robotic tool-features can be integrated with **Chemspeed's** unique robotic tool exchange technology, including unrivaled overhead gravimetric dispensing, which can operate while mixing, heating and cooling. Virtually any combination of these robotic tools is possible.



Robotic tool exchange interface (proprietary)

Precision balance Overhead gravimetric dispensing robotic tools (proprietary)	Volumetric dispensing robotic tools	Action robotic tools	Analytic robotic tools
<p>Overhead gravimetric 1:1 "pick & dispense" of solids & powders DIRECTLY from virtually any source to any destination (<100 µg to 100 mg).</p> <p>Disposable pick & dispense tips (no dead volume).</p> <p>Resolution: 100 µg (or 10 µg with an on-deck balance).</p> 	<p>Liquid handling powered by 4 syringe pumps (syringe volumes: 1, 10 or 25 ml) for viscosities from 1 mPa·s to 100 mPa·s.</p> <p>Special options:</p> <ul style="list-style-type: none"> - Disposable tips (1'200 µL). - Disposable syringes. - Heated needles (up to 100 °C). - Spray needles - pH and temperature measurement and control - Coated needles, PEEK needles... 	<p>Multigripper for vial, MTP transport and much more.</p> <p>Automated barcode scanner.</p> 	<p>Online density measurement (aspiration technology), on the fly.</p> <p>Resolution: 1 mg (or 10 µg with an on-deck balance).</p> 
<p>Overhead gravimetric 1:1 "pick & dispense" of liquid to sticky compounds DIRECTLY from virtually any source to any destination (<100 µg to 100 mg).</p> <p>Disposable pick & dispense tips (no dead volume).</p> <p>Resolution: 100 µg (or 10 µg with an on-deck balance).</p> 	<p>Liquid gas dispensing with gravimetric control.</p> <p>Resolution: down to 100 µg.</p>	<p>Screw capper.</p> <p>Vial diameter range: from 10 mm to 50 mm. Larger ranges available.</p>  <p>Torque range: from 0.1 Nm to 1 Nm.</p>	<p>Brookfield Viscometer (RVDV-II+ Pro BK).</p> 
<p>Overhead gravimetric fine dispensing of solids & powders (100 µg to 20 g).</p> <p>Dispensing container volume of 30 ml.</p> <p>Resolution: 100 µg (or 10 µg with an on-deck balance).</p> 		<p>Capping, crimping and decapping (N8 / N11 / N13 / N20).</p> 	<p>Tri gloss measurement. Thickness measurement. Color measurement. Precision tack-cure.</p> 
<p>Overhead gravimetric dispensing of solids & powders (1 mg to 100 g, larger volumes are available).</p> <p>Dispensing container volume of 200 ml.</p> <p>Resolution: 1 mg (or 10 µg with an on-deck balance).</p> 		<p>High shear homogenization (11'000 rpm to 30'000 rpm).</p> 	<p>Camera. Observation of dissolution.</p> <p>Particle size distribution and dynamic light scattering.</p> <p>Precision tack-cure.</p>
<p>Overhead gravimetric dispensing of highly viscous liquids, pastes and creams (1 mg to 100 g) with viscosities from 1 mPa·s to 500'000 mPa·s (based on Newtonian substances).</p> <p>Dispensing container volume of 65 ml.</p> <p>Resolution: 1 mg (or 10 µg with an on-deck balance).</p> <ul style="list-style-type: none"> - Optional aspiration feature. - Optional transfer of hot (up to 90 °C) substrates via heatable cartridges (e.g. for waxes). 		<p>Overhead stirrer (20 rpm to 200 rpm). Different stirrer types available.</p> <p>Ultrasonic dispersion (100 W).</p> 	
<p>Overhead gravimetric aspiration and dispensing of viscous liquids with viscosities from 1 mPa·s to 15'000 mPa·s via disposable positive displacement syringes (0.1 to 12.5 ml).</p> <p>Resolution: 1 mg (or 10 µg with an on-deck balance).</p> 	<p>Overhead volumetric aspiration and dispensing of viscous liquids with viscosities from 1 mPa·s to 15'000 mPa·s via disposable positive displacement syringes (0.1 to 12.5 ml).</p> 	<p>Vacuum / Degassing. Reflux condenser. Evaporation. Filtration.</p>	
		<p>High speed injection molding. Foam formation.</p>	
		<p>Draw Down with disposable or reusable precision spiral and / or gap bars. Free film generation. Dip coating. Spray coating. Wet-on-wet coating.</p> 	
		<p>Robotic transfer arm to serve 3rd party instruments e.g. centrifuge.</p> 	



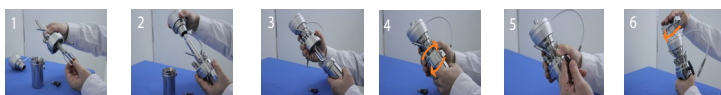
Selection of Racks, Vials, Plates, Precision Reactors, Formulation Vessels / Blenders

High-Throughput and High-Output Synthesis (Discovery) & Library Synthesis



- High-speed vortexing glass reactors including all features for high-performance synthesis
- ISYNTH disposable glass reactors for a variety of applications such as synthesis, emulsions, crystallization
- ISYNTH SPEEDCHEM Library Synthesis in disposable glass vials / reactors at elevated pressure (Flexible MTP format: 24, 48, 96; MTP pressure block: 100 bar)
- Arrays of double-jacketed glass or stainless steel reactors for a broad temperature (-70 to +180 °C) and pressure (up to 100 bar) range
- Quartz vials for temperatures up to 650 °C
- Reaction volume: µl to ml
- Reactor volume: 1 to 100 mL
- Closure of reactors by a multi-functional & multi-position valve system allowing operation under high quality vacuum (for online evaporation), inert atmosphere (no need for septa, filtration etc.)
- Efficient yet gentle vortex mixing (up to 1,400 rpm), even while accessing the reactor
- Inert atmosphere for sensitive reagents or inert reaction conditions:
 - Inertization of the reactors (vacuum inert gas cycles)
 - Inertization of the entire workstations (enclosed hood)
- Optional pseudomechanical stirring for viscous liquids

High-Output Process Research



- Up to 36 process reactors with proven scalability to the multiliter scale!
- Individually controlled process reactors with unique screwless and selfsealing design
- Reactor volumes: 100 mL, 250 mL, 1000 mL.
- Exchangeable stirrer design
- Individually controlled continuous feeds (gas, liquefied gas, liquid).
- Individual control of jacket and internal reactor temperature
- Individual control of agitation (torque & speed)
- Individual measurement, control, adjustment of viscosity

- PAT such as pH, Pt100, IR, UV / VIS, Raman, laser scattering, viscosity
- Vacuum and filtration capabilities
- Different modes of operation (batch, semi-batch, continuous Cascade, FLOWCHEM)
- Pressure range (standard: 100 bar)
- Temperature range (standard: -20 to +250 °C, upgrade: -50 to 350 °C)

High-Performance Formulation

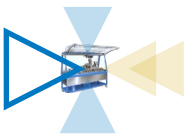


- Up to 36 formulation vessels with proven scalability to the multiliter scale!
- Individually controlled blenders
- Reactor volumes: 100 mL, 1000 mL
- Vessels for preparation, application and analysis of emulsion & suspension concentrates
- Exchangeable stirrer design
- Exchangeable scraper
- 6'000++ rpm
- 500+ Pa.s / 1'000 rpm
- Gravimetric dispensing of solids, viscous liquids, waxes, WHILE mixing & scrapping, heating, refluxing, cooling, Measurement
- A variety of integrated characterizations such as pH, viscosity, rheology, imaging, laser scattering, IR
- Degassing
- Individually controlled feeds

Disposable Formats for Sample Preparation



- Variety of racks for vials, tubes plates for a broad range of e.g. sample preparation, synthesis, formulation
- Capping, de-capping, screw capping
- Electrical heating racks and simultaneous cooling
- Evaporation plates
- Reflux plates
- Filtration plates
- Vortex mixing
- Speedmixing



Selection of 3rd Party Integrations

Action Tools

- Centrifuge
- Dual Asymmetric Centrifuge
- Compaction Press
- Crushing Mill
- Sieving System
- Pigment Grinding Mill
- Drying / Curing Oven
- Calcination Oven
- Desiccation / Drying Oven
- Vortex Evaporator (Combidancer)
- Microwave
- Balance (Weighing)



SWING with centrifuge

Application Tools

- UV Curing System
- Spin Coater

Special Tools

- Fraction Collector (e.g. for process reactors)
- Barcode Printing / Vial Labelling
- Plate Storage System



Plate Storage System

Testing Tools / Analytical

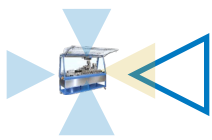
- Karl Fischer Titrator
- Parallel Precision Calorimeter
- Tribometer (Coefficient of Friction)
- Spectrophotometer for
 - Color
 - Sheen / Sheen Uniformity
 - C/R, Hide
 - Color Acceptance / Rub Out
 - Scattering / Absorption Coefficient (Kubelka-Munk)
 - Reflectance
 - Stain Wash / Washability
 - Tint Strength
- Tensiometer / Drop Shape Analyzer for
 - Contact Angle
 - Surface Tension
 - Surface Energy
- Density Meter
- Dynamic Mechanical Analyzer
- Thickness Gauge (Film / Coating Thickness)
 - GC
 - GC-MS
 - HPLC
 - HPLC-MS
 - GPC
- IC
- NMR
- Parallel FTIR (MIR, NIR)
- UV-VIS
- XRD
- Parallel pH Measurement System (pH Measurement / Control / Adjustment)
- Parallel Conductivity Measurement System (Conductivity Measurement)
- Camera for
 - Image Analysis
 - Dissolution Control
 - Phase-state Analysis
- Haze Meter / Gloss Meter
- Nano-/Micro-Hardness Tester
- Nanoindenter (Hardness/ Mechanical Properties)
- Turbidity Meter, Nephelometer (Turbidity, Nephelometry)
- Particle Size Measurement System
- Profilometer
- Rheometer (Rheology)
- Viscosimeter (Viscosity Measurement / Control / Adjustment)



Rheometer



Haze Meter / Gloss Meter



Object Oriented Workflow Design for Unlimited Combinations of Sequential and Parallel Processing (Patent pending)



Formulation and Sample Preparation

- Liquid dispensing capabilities
 - From 100 µg to several hundred grams of liquid with varying viscosities
 - Optional stirring and heating of raw materials
 - Solvent-proof solutions
 - Possible use of disposables to avoid cross-contamination and cleaning
- Solid dispensing capabilities
 - From 500 µg to several hundred grams of solid with varying properties (powders, beads, extrudates, flakes, waxes, etc.)
- Mixing / dispersing by overhead stirring, high shear dispersion, dual asymmetric centrifugation, shaking, etc.
- Bead dispensing (glass, zirconium, etc.)
- Filtration using vacuum, gravity or centrifugal force together with disposable filters
- Centrifugation
- (Viscous) liquid transfer - from vessel to vessel
 - Mother/daughter transfer
 - Transferring sample into new vessel
 - Running sub-workflows
- Full vessel transfer
- Waste stations including drain – optional vessel cleaning

Application

- Draw down, spin coating, spray airborne, spray airless, spray electrostatic
- Flexibility to vary parameters such as wet layer thickness, sample volume, application speed, dispensing pattern, etc.
- Optional cleaning of substrate before application
- Curing capabilities under various conditions e.g. room temperature, heat curing (oven, IR), UV curing

Characterization and Testing

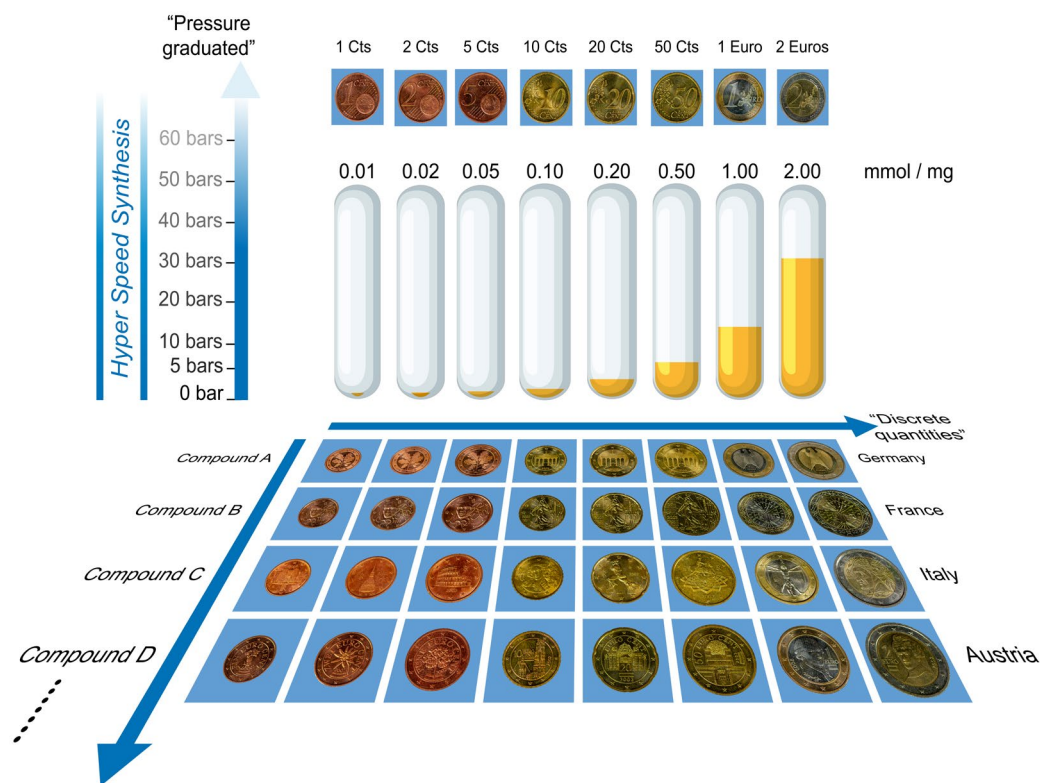
- Measurement of physicochemical properties
 - Liquid sample: pH, viscosity, rheology, density, solid content, particle size, conductivity, moisture content, etc - adjustment capabilities for pH and viscosity
 - (Half) dry surface: color, haze/gloss, thickness, hardness, surface profile and topography, contact angle, tack, IR spectroscopy, conductivity, etc.
- Foam analysis
- Titration
- Gel permeation chromatography (GPC), Ion chromatography (IC), Inductively coupled plasma mass spectrometry (ICP-MS), Differential scanning calorimetry (DSC)
- Tint strength
- Imaging
- Evaluation of coating behavior through rub-up/rub-out, adhesion, stain and chemical resistance, burnish resistance, scrub resistance, surface quality, etc.

Miscellaneous and Logistics

- Vessel storage capabilities - different sizes and materials available
- Opening / closing vessel - sealing option at the end of the run when using e.g. plastic bags or microplates
- Substrate storage capabilities – different formats and materials available (paper, glass, metal, plastic, wood, etc.)
- Labelling capabilities for various surfaces (vessel, substrate, etc.)
- Openings for manual interaction - possible at any moment



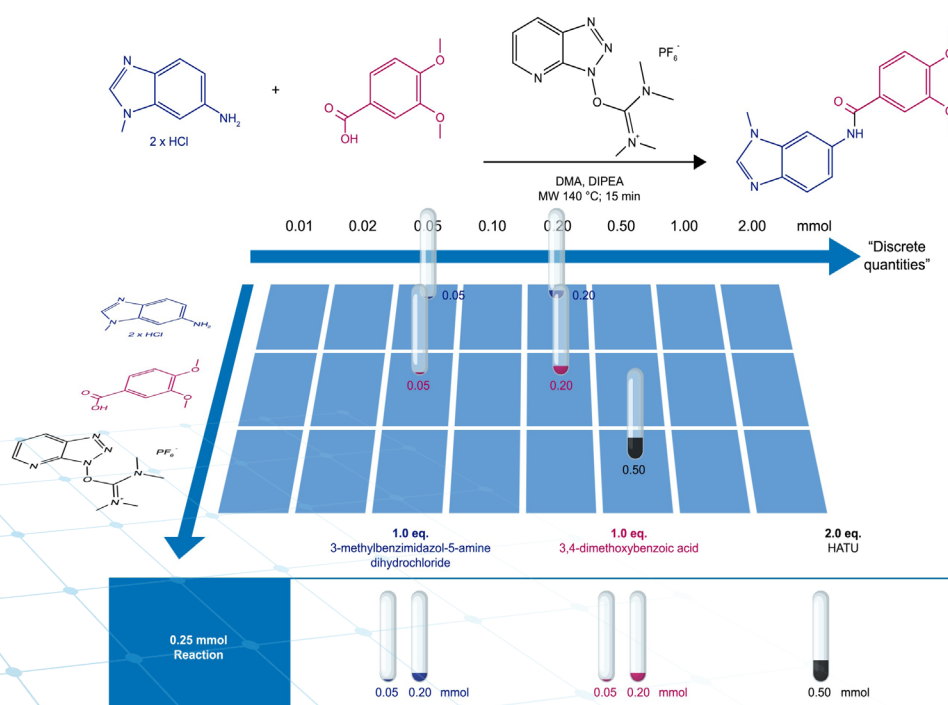
SMOLE Concept

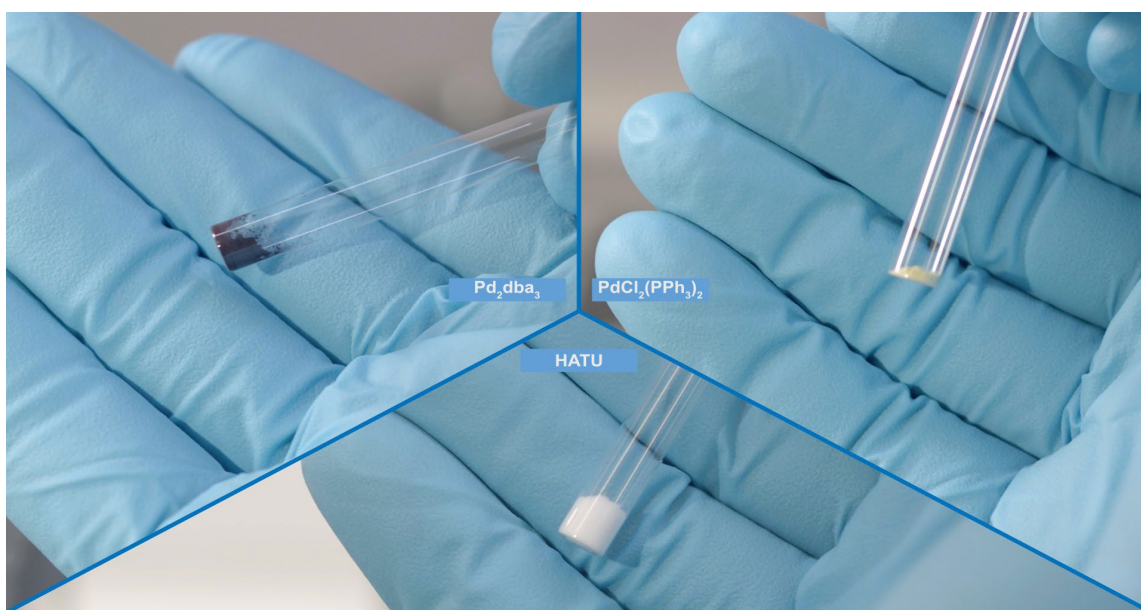


SMOLE is a disruptive, easy-to-use, standardized and ready-to-apply chemicals consumables technology - Gamification of Medicinal Chemistry.

It is a unique and revolutionary concept for compound handling and reaction preparation by providing prefilled chemicals in various fixed molarities in sealed and crushable ampoules (e.g. 5.00, 2.00, 1.00, 0.50, 0.20, 0.10, 0.05, 0.02, 0.01 mmol).

Gamification of R&D Synthesis





Testimonials

- “The greenest I have ever seen.”
- “You do not worry about the chemicals. You simply order a reaction.”
- “I heard the gospel of chemistry.”
- “...the iPhone in chemistry.”

Chemspeed Technologies offers a comprehensive package of synthesis and formulation services for researchers in e.g. Life Science, Materials Science or Consumer Goods.

If you are looking for the advice and back-up of an experienced parallel synthesis, a process development specialist, formulation expert or if you simply lack resources: our highly qualified scientists are happy to support you, wherever you need it.

In lead finding and lead optimization we can help you with the design of exclusive, tailor-made libraries, building blocks, or active compounds. We are able to perform highly demanding chemistry with high throughput using our state-of-the-art synthesis equipment (**ISYNTH** product line).

As soon as you have found your targets, we can support you in finding the fastest and most cost-effective synthesis route or we can optimise a single step, taking advantage of the unique capabilities of our **AUTOPLANT** product line.

Mapping out raw materials or formulation parameters is supported by an experienced chemist team combined with our **FORMAX** and **EMULSIFIER** product line.

Combining sophisticated know-how with state of the art technology

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- Literature / Patent review
- Lead finding / Lead optimization
- Focused libraries of 100's of compounds
- Building block synthesis on gram scale
- Parallel multi step synthesis
- Microwave synthesis
- Integration of the entire workflow: synthesis / work-up / purification / output
- Process research / Process screening
- Optimizations, scale-up
- Route finding
- Method development
- Reproduction of libraries
- Formulation discovery
- Formulation development
- Consulting

Covering a wide Range of Chemistry

- Transfer of classical chemistry without compromise
- Solution, solid, gas phase processes
- Handling of sensitive materials
- Ambient and elevated pressure
- Sample work-up and purification
- Samples in customized formats

Experience in all Fields of the Chemical Industry

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- Crop Protection
- Catalyst Research
- Material Sciences
- Paints & Coatings
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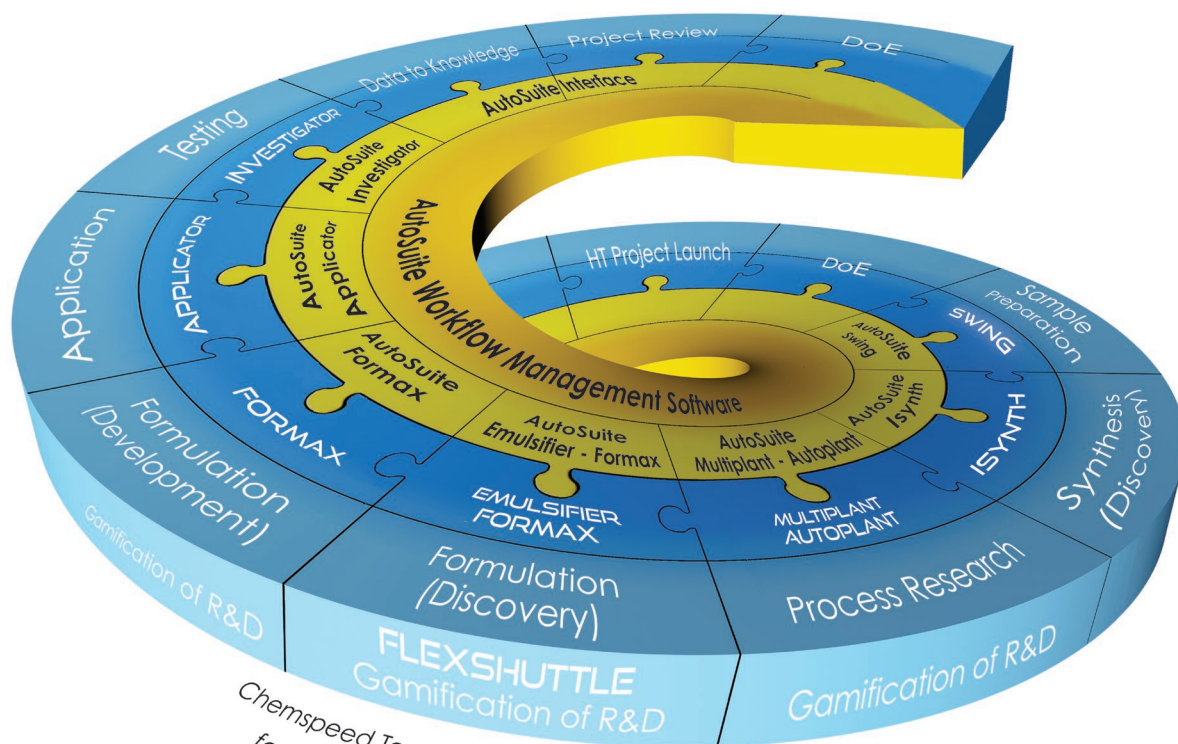
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