

Now, most chemistry is done this way...



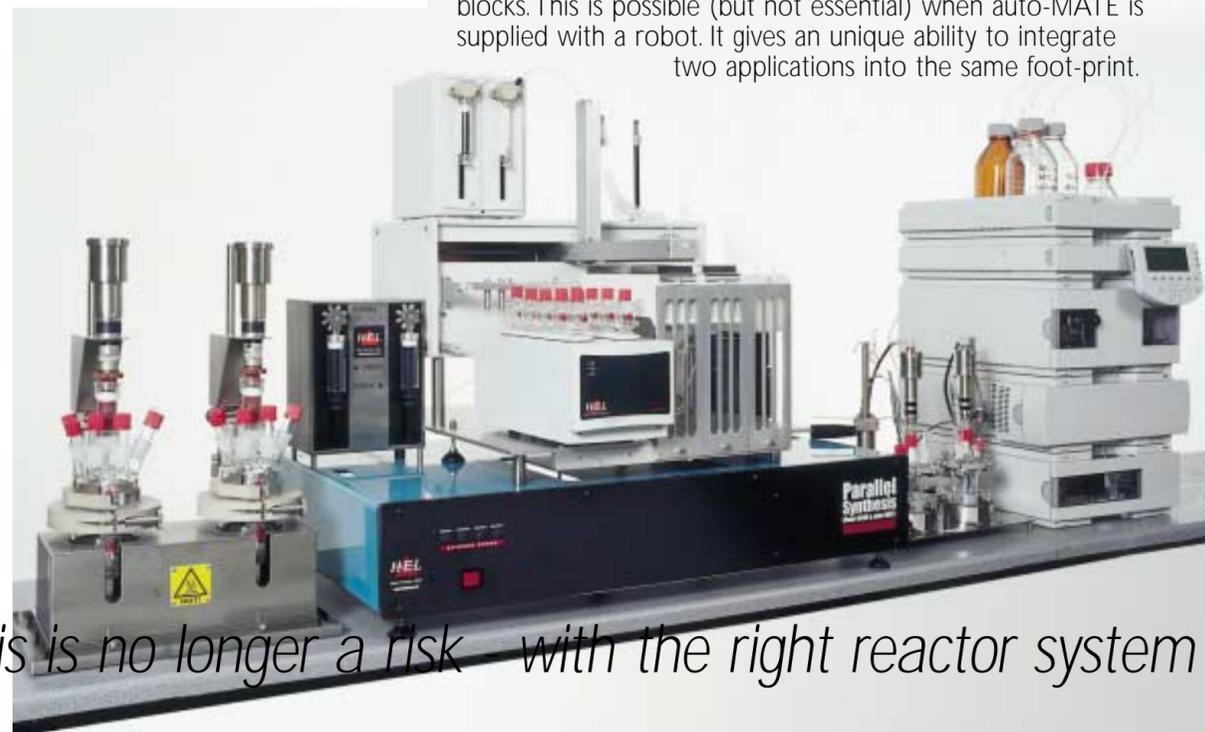
auto-MATE350

The most popular volume for scale-up and optimisation. Custom designs with litre-size reactors (multi reactors) are possible.



Duet

Duet is a *dual* function system: with both auto-MATE reactors *and* ~ 10ml screening function, using multi-reactor blocks. This is possible (but not essential) when auto-MATE is supplied with a robot. It gives an unique ability to integrate two applications into the same foot-print.



Parallel synthesis is no longer a risk with the right reactor system

auto-MATE mini

The original with over 100 systems in use. Clear glass jacket, compact, with or without robotic sampling. Minimum volume 20ml, but fully scaleable data - confirmed by HEL users world-wide.

Important features common to all models

Liquid Feeds

Independent dosing with up to 4 or more liquids to each vessel. Range of pump types - peristaltic, syringe, HPLC, etc. - in any combination to suit your application.

Temperature

Wide range ~ -80°C to 350°C. Independent control of each reactor, using a single chiller with individual heating of each jacket to provide different temperatures. A range of ~

100°C between different reactors can be achieved in most cases.

Agitation

Separate measurements and control of agitation speed, often up to 1500rpm - with a range of impeller types. Viscosity changes can also be tracked where necessary.

Sensors

such as pH and turbidity probes are commonly supplied, but Lasentec (FBRM), FTIR, Raman, etc. can be integrated on all models. Full real-time integration with reactor control software winISO.

HP auto-MATE

Typical volume of 50 or 100ml and pressure 100 bar, this is the world leader in high pressure parallel synthesis. Ease of use, compact design, with a wide range of features including sampling under pressure.



400ml system customised with gas and liquid feeds



400ml system with 6 high pressure independent feeds to all 4 vessels



350°C, 200 bar system with 50ml vessels

Custom HP Systems

Bigger volumes, higher pressures/temperatures, special reactors: *let us know your requirement.*



Liquid Feeds

Any number of feeds, any combination to suit your needs.

Syringe pumps with automatic refill - very precise, ideal for low flow rates, but also good for larger volumes.



Peristaltic pumps - pulse free, with or without balance for feedback, especially for slurries.



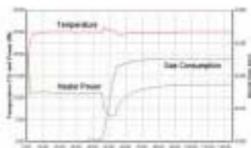
HPLC pump for high pressure applications - rates from below 0.01ml/minute to 50ml/minute.



Diaphragm or piston pumps with balance for feedback control.

High Pressure Systems

We have a wealth of experience in hydrogenation and other pressure applications, especially hetero-geneous catalysis. High pressure sampling - with robots or without, including systems for automatic washing and re-charge, to permit '24/7' operability.



Combined heat output and gas consumption data from auto-MATE



Analytical Probes

Turbidity

Proprietary technology for solubility and MSZW determination, fully automated.



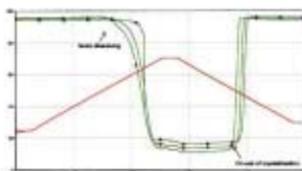
A Lasentec probe within an HEL auto-MATE reactor

Lasentec (FBRM)

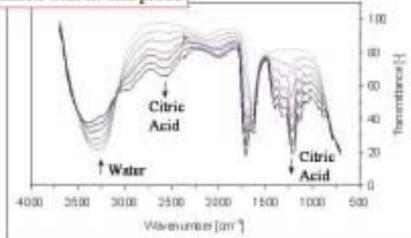
Full integration of these probes, including software interchange to allow detailed tracking of particle characteristics.

Spectroscopy

FTIR and Raman probes, as well as many others, have been incorporated mechanically and in software of many existing users.

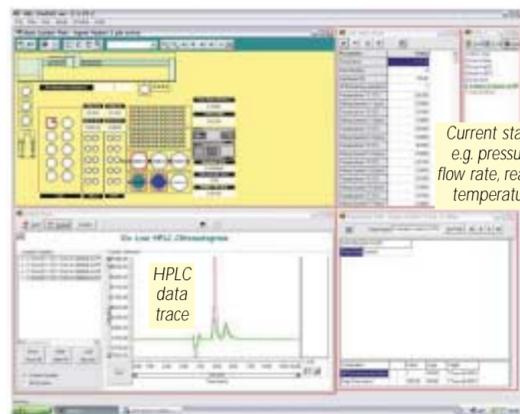


Obtained with in-situ probe

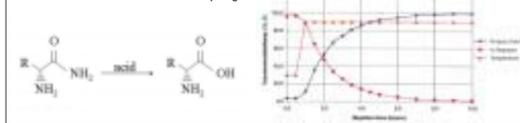


Sampling and HPLC

All reactor modules - even high pressure can be sampled with robots fully integrated into winSO. The samples can be worked-up and if necessary, injected into an HPLC. The HPLC can also be fully controlled from winSO with complete data exchange. Thus, at the end of a test, you can have full data of not only your process parameters, but also from the HPLC.

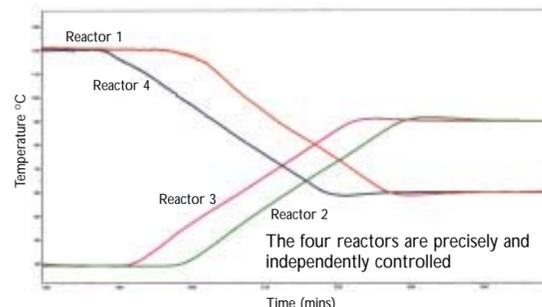


Data obtained from on-line sampling



Temperature Control

Independent and precise, each reactor is totally independent.



The four reactors are precisely and independently controlled

Accessories for 'Completion'

A range of stirrers, condensers, even distillation kits - totally automated on 350ml scale. Full facilities for vacuum control and purge.



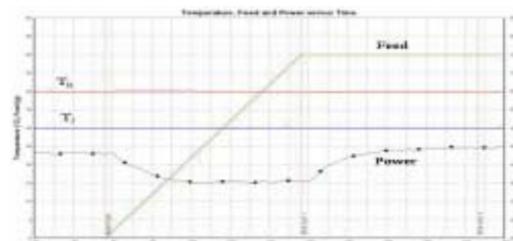
Range of glassware and metal parts



We expect you to make no compromise - auto-MATE supports all features necessary to perform real chemistry.

Thermal Trending and Calorimetry

Quantitative power compensation calorimetry to give additional insight into reaction progress.



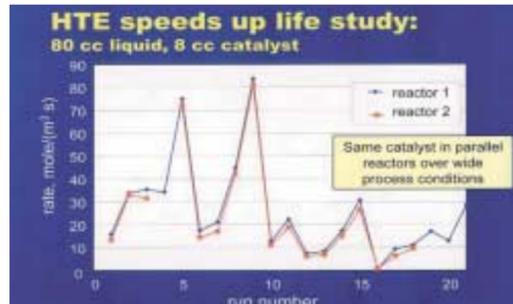
Power compensation is unique to HEL and allows precise thermal calorimetry data to be obtained without the need for expertise in calorimetry and time consuming calibrations.

Designs for '24/7 Operability'

auto-MATE have been adapted for automatic product discharge followed by software controlled washing and repeat of the chemistry - over days and weeks without ever intervening. Examples at high pressure (hydrogenation) and low pressure (enzymatic) processes.



Enzymatic reactor with replaceable sinter and automatic valve in base



Data from high parallel reactors (courtesy Air Products)



better chemistry - faster
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auto-MATE

Parallel process optimisation using mini-reactors



better chemistry - faster