Thermo Haake FOCUS

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All of us at Thermo Haake appreciate your support during the past year and extend Seasons Greetings and best wishes for a prosperous New Year

News from around the globe

K-Show 2001 Report

The K-Show in Düsseldorf, Germany is the industry's uncontested premier event - a truly global marketplace for plastics and rubber technology. For Thermo Haake, this fair is traditionally "a must" with the polymer sector being an important market for our products.
This year the show was of course overshadowed by recent events and a general decrease in the number of visitors as was originally forecast.
However during the 8 days of the show this year, around 230,000 trade visitors attended K 2001. Says Karlheinz Wismer, president and CEO of Messe Düsseldorf: "While visitor numbers were about 12 percent lower than at K '98, no one that I have spoken to was disappointed by this decrease. In light of the current worldwide political and economic situation, we are very pleased with the results. Exhibitors were impressed with trade visitors' professional calibre, the large number of guests and an unexpectedly high eagerness to invest."

Matthias Jaehrling discussing the PolyLab with customers

This trend was echoed on the Thermo Haake booth. Whilst there was an overall drop in the number of foreign visitors, a very buoyant domestic market meant we saw an increase in the number of German visitors to our booth. This kept us very busy during the show and translated into a large number of promising prospects, across all the products on display.

To view full screen photos from the K Show 2001 visit www.haake.de/info/k2001.htm

1 st Australian – Korean Rheology Conference, 2001. REVIEW

The first Australian-Korean Rheology Conference was held in Melbourne, Australia on 20th and 21st of September 2001 at the Melbourne Business School (MBS) at the University of Melbourne.
The conference was organised by the Australian Society of Rheology (ASR) in consultation with the Korean Society of Rheology (KSR). It provided an international forum to showcase the rheological research in Australia, Korea, Japan and the Pacific region. All scientists and engineers interested in rheology were invited to participate in this conference. A total of 36 members of the Korean Society of Rheology (KSR) attended and they contributed 15 oral presentations and 10 postgraduate students presented posters. The Australian-Korean Conference provided a valuable and useful opportunity to meet, to listen and to exchange the latest research findings and industrial applications in rheology for researchers in Australia, Korea, Japan and the Pacific region.

The next Australian-Korean Rheology Conference will be held in Seoul, Korea in August 2003.

South American Sales Meeting for Thermo Haake Distributors

July 24 to 27 this year a team of 18 participants from Brazil, Argentina, Chile, and Venezuela attended the first Thermo Haake sales meeting. The meeting was held in Sao Paulo, Brazil and all reports confirm that the meeting was a great success.
This inaugural sales meeting was organised to further support the excellent work of our partners in this region over the many years. The results from our distributors and representatives have achieved sales results greater than the economical situation. This sales meeting provided the opportunity to present the latest new product innovations including the Phoenix circulator range, the entire rheometer range including the Series 1 Rheometers, the New Modular RheoStress and the exciting RheoScope 1. Also the Carbon Black testing systems and the new CAHN Thermal Analytical and surface science products were shown. Everyone was able to have access to the instruments and carry out some individual 'hands-on" training. It seems that the sales meeting was a great success and the prospects for sales is still climbing with some three sales for the RheoScope 1 already confirmed.
Special thanks to our Brazilian representative Polimate for organising the meeting, your efforts were greatly appreciated.
Thermo Haake have been active in South America for more than 30 years and look forward to seeing you at the next sales meeting for South America.

The view over Sao Paulo from the sales meeting room

In This ISSUE

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Inside Thermo Haake

New Product Specialists

... Within the Analytical Laboratory Instruments Team

Fritz Soergel joined the team of product specials at Thermo Haake in October 2001.
Fritz received his degree in Physics from the University of Ulm (Germany) and his PhD at the department of Production Pechhold. In his research projects Fritz focussed on the rheological and thermoanalytical characterisation of human eye tissues and implant materials.
Fritz also has spent three years gaining valuable experience as an application specialist for rheology and Dynamic Mechanical Analysis (DMA).

We welcome Fritz to the team.

RheoFuture 2001

Leading German rheologists came together at RheoFuture® 2001, which was held on September 4th and 5th at Thermo Haake in Karlsruhe. The name of this event reflects the topics, trends and future developments in material characterisation, such as:

- New technologies
- The rheometer of the future
- Optics and visualisation

New ideas and concepts were presented in several plenary lectures and were followed by open discussions. Young scientists from university research institutes were one major group at RheoFuture. In the "young & wild" session they provided very interesting presentations of their research work.
The second day ended with the official presentation of the RheoScope® instrument with a press conference. We received very positive feedback about this event.
"It was very beneficial to look into the future – apart from the day-to-day business", said one of the participants.
We are presently planning RheoFuture 2002 for October 2002 and would like to mention one highlight, the "The Young Scientist Award from Thermo Haake".
More Info?
Quote No: 60
A report on RheoFurture 2001 can be obtained from
www.thermohaake.com>events

Thermo Haake is now Structured for Greater Customer Benefits

In August 2001 we introduced a new organisation with 2 specialised businesses:

- the Temperature Control group (TC) which manufactures the well known range of circulators and
- the Material Characterisation group (MC) which combines the former Rheology, Polymer Technology and Thermal Analysis teams.

This new business – **Material Characterisation (MC)** is headed by Dr. Hartmut Braun, who is now responsible for 30 Million USD in sales worldwide.

"This change allows us to better focus on our customers & their needs", Dr. Hartmut Braun when appointed to his new role.

To further support this a **C**ustomer **R**elationship **M**anagement (CRM) team has been introduced. The heads of two the departments are Veit Zschuppe – Analytical Laboratory Instruments, and Bernd Staehr – Process Instruments.

These two CRM teams combine all the people and services which are relevant to the product and service needs of our customers. This includes product and application specialists, sales staff and service engineers.

All the team members believe this facilitates a shorter communication line and with the added benefit of know how in one team results ultimately in added customer benefits.

We look forward to working with you and providing even quicker response, deliveries and support.

OPP & Thermo Haake Jointly Produced a Poster on the Rheology of PVC Plastisols

In March this year OPP, one of the biggest Brazilian polymer producers opened their new Customer Support and Service Laboratory for PVC applications. The opening of the new laboratory also included the running of a rheology seminar. The seminar provided the opportunity to test samples and discuss the results obtained from their Thermo Haake RheoStress 1. The newest result of the relationship between OPP and Thermo Haake was the presentation at the Brazilian Polymer Congress in Gramado (11 – 15 November 2001) of the poster on the rheology of PVC Plastisols that they produced.

Dr. Petri discusses the features of the new rheometer

Whats on and When – Diary Dates

Thermo Haake Local Seminars 2002 in German Language.

In 2002 Thermo Haake will again offer seminars for beginners and specialists in Rheology – Thermal Analysis and Polymer characterisation. These meetings have been designed to have an educational element using practical examples and real applications.

Basic Rheology Seminars

Darmstadt: 20 – 21 March 2002
Dortmund: 4 - 5 June 2002
Dresden: 11 – 12 June 2002
Karlsruhe: 17 – 18 September 2002
Hamburg: 1 – 2 October 2002
München: 8 – 9 October 2002

Polymer Testing Seminars

Polymer Days in Karlsruhe
Karlsruhe: 16 - 17. April 2002
Melt flow indexing
Karlsruhe: 18 April 2002
Polymer Day in Leipzig
Leipzig: 18 June 2002
Melt flow indexing
Dortmund: 09 October 2002

TGA / DCA Seminars 2002

Dynamic Contact Angle
Karlsruhe: 18 March & 19 Sept. 2002
Thermo-gravimetric Analysis
Karlsruhe: 19 March & 20 Sept. 2002

More information can be obtained at www.thermohaake.com at Events or info@thermohaake.com .

Web Conference – Beginning in January 2002

Thermo Haake will again be running Internet conferences for selected subjects within the Material Characterisation product and application areas. These web conferences are open to everybody that has an Internet connection (it will work even with modem) and a phone to follow the lecture and discussions.
To join a session go to www.thermohaake.com and select "SUPPORT" then go to "On-line Meeting Centre" or go directly http://thermohaake.webex.com/webex

As a new user follow the new user instructions and join the meeting using your personal code.

The next meetings are in January beginning with:

"RheoScope 1, the rheometer that can see" followed by " The new scientific RheoStress 600 Rheometer".
If you want to know more about these web meetings, please contact Peter.Kilinc@thermohaake.com .

More Info? Send and Email to info@rheologysolutions.com and Quote No: 61 for RheoScope 1 and Quote No: 62 for RheoStress 600

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Temperature Control Update & News

Facts behind the Phoenix-Line:

FuzzyStar® Control with Neural Adaptation for temperature stabilisation of external systems

A standard circulator with conventional internal temperature control maintains the preset temperature (temperature set value) in its own bath vessel with a high degree of stability. However, in the case of external temperature control (Fig. 1), this means a temperature has to be set at the circulator which differs from the temperature required in the external object. This is attributable primarily to heat losses of the external bath in the case of poor insulation and to losses during heat transfer. The further away the external object is located from the circulator, the greater the heat losses. This means working with a temperature gradient which must already be included when defining the set value.

If this gradient changes, the temperature set value must be manually readjusted in each case. How often this is required depends on the frequency and intensity of the disturbance variables acting externally. Consequently, if exothermic reactions are anticipated, the user must constantly remain next to the apparatus so that he can correct the set value. In such cases, the obvious solution is to implement a genuine external control of the temperature control process.

Looking for Application Information?

Thermo Haake provides application support worldwide. If you would like to discuss your particular application and find out where Thermo Haake can offer technical product support contact your local distributor or Email info@rheologysolutions.com

Electronic control systems with external temperature control (ETC), as described below, compensate for an extremely wide variety of influences on the temperature behaviour of external systems.

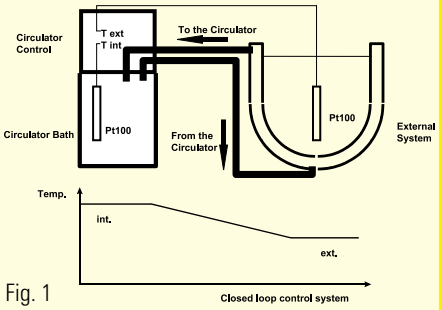

Fig. 1

Schematic representation of the temperatures of external systems: Energy losses must be anticipated throughout the entire closed loop control system. These energy losses must be compensated for by a corresponding temperature increase in the internal bath.

External control with genuine fuzzy logic and a neural network for the Phoenix-circulators

Since the applications in the laboratory or pilot plant frequently differ from the standard applications, the controller must be adapted to the application either by the user or by an automatic system.

The FuzzyStar® control with neural adaptation, which works with genuine fuzzy logic and a neural network, has been developed in order to be able to cope with complex control problems.

It makes it possible to describe interrelationships "fuzzily". The description method is adapted to that of the human brain and could be formulated as follows:

"If the temperature difference with respect to the pre-set value is small and the risk of overshoot is very high, then heat only a little".

From a technical-control point of view, fuzzy logic is a method which allows controller characteristics (eg. control gain) to be set dependent on state with linguistic fuzziness (see rule, no explicit numeric specifications). The combination with a neural network which identifies the optimal parameters for the external system results in a robustness (insensitivity to changes in process parameters) of the adapted fuzzy controller which is far higher than that of a conventional controller. It is only the robustness, which allows the user to achieve a good result even if there are variations in the temperature control process.

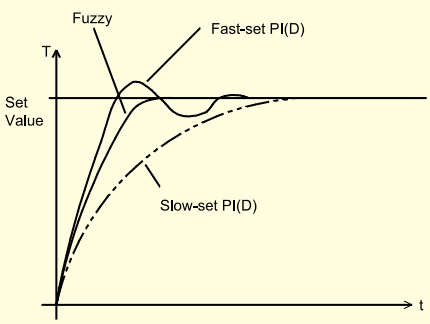

Fig. 2

Response of various controllers to a set value step-change. The fuzzy logic control allows the set value to be reached quickly without overshooting.

Fuzzy logic control has made it possible to elegantly dispense with one disadvantage of conventional PID controllers (Fig. 2). If a fast control response is programmed for a PID controller, it will ensure a high temperature rise when a new set value is defined but also an overshoot.

The fuzzy temperature controller behaves in an entirely different way. By creating an appropriate algorithm, the temperature will rise steeply if there is a large difference with respect to the set value. When the measured temperature reaches the set value, this is then another state for which adapted control parameters have been created. The desired response of steep temperature rise and overshoot-free control has thus been made possible by the use of fuzzy logic with neural identification and allowing for this accordingly in the control algorithm.

More Info? Send and Email to
info@rheologysolutions.com and
Quote No: 63 for Phoenix Heating Circulators and
Quote No: 64 for Phoenix Refrigerated Circulators

In the next issue: Facts about the new water recirculators from the TC-line

Distribution Network.

All Thermo Haake distributors are listed on our website. Visit www.thermohaake.com>AboutUs>OurRepresentatives

You can Email direct or call your local supplier to discuss your application needs.

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Laboratory Instruments Update & News

RheoScope and polarised light microscopy

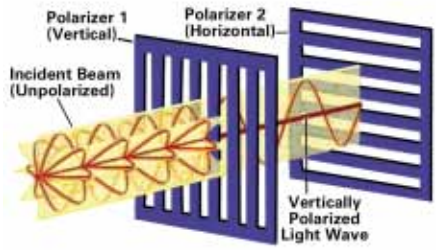
Pierre Reinheimer

Manager New Technologies
Business Development Team
Thermo Haake

Modern microscopy has developed a wide spectrum of useful techniques designed to aid in **contrast enhancement** and provide better observation of specimens.

Polarised light is one of these techniques that improves the quality of the image obtained with **anisotropic** or **birefringent** materials. The technique exploits optical properties of anisotropy to reveal detailed information about the structure and composition of materials. In order to accomplish this task, the microscope in the RheoScope is equipped with both a **polariser**, positioned in the light path before the specimen, and an **analyser** (a second polariser), placed in the optical pathway between the objective and the camera. The concept of using two polarisers oriented at right angles with respect to each other is commonly termed **crossed polarisation** and is fundamental to the practice of polarised light microscopy. With the RheoScope, this can be achieved easily though the software.

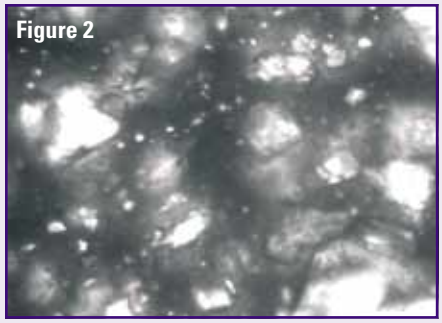
Figure 1



Light Passing through crossed polarisers

Image contrast arises from the interaction of plane-polarised light with a birefringent (or doubly refracting) specimen placed in the optical path between the two polarisers. Without sample the light polarised by the polariser is blocked by the analyser and no light is visible (Fig.1). When samples that are birefringent are viewed between crossed polarisers, the microscopist can visualise aspects of the samples through light rotated by the sample and then able to pass through the analyser. As of today, polarised light microscopy can be done under shear using the new RheoScope (Fig.2).

Figure 2



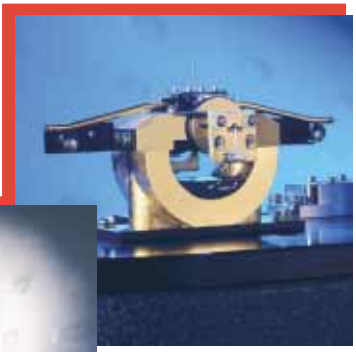
Observation of a suspension containing birefringent particles using polarised light in the RheoScope

More Info? Send and Email to
info@rheologysolutions.com
and Quote No: 65 for RheoScope 1

NEW Thermo Cahn VersaTherm TGA System

During the K Show 2001 Thermo Haake launched the new TGA series VersaTherm. The complete new design combines new technologies, the best specifications with easy handling.

VersaTherm TGA System



Thermo Cahn balance technology

High temperatures, high masses and high volumes are the key features of this instrument. The new recording balance used in the system can handle up to 100 g at a sensitivity of 1 µg. The sample volume of up to 35 cc makes the instrument unique in comparison to other Thermogravimetric Analysers. Others can handle up to 20 g too, but have you ever tried to put 20 g in a 100 µl sample container? On the world market only the VersaTherm can handle the high masses and the high volumes. The Thermo Cahn equipment provides special synergies such as coupling with other analysis methods (eg. FTIR, GC, MS). For example, the Nicolet FTIR OMNIC software permits not only simultaneous start of TG and FTIR but also the real time observation and evaluation of TG and FTIR-signals.

More Info? Send and Email to
info@rheologysolutions.com and
Quote No: 66 for VersaTherm

New Technologies for the Investigation of Low-Viscous Structural Fluids

Dr. Seungrok Kim
Asia Pacific Regional Manager

Abstract

Fluids of higher viscosity dampen inertial effects more than samples of lower viscosity. Additionally, inertial effects become greater as frequency increases. This leads to the fact that, for low-viscous structural fluids such as polymer solutions, emulsions, foams or colloidal dispersions, there is some maximum frequency at which inertial effects can no longer be corrected. Many so-called universal controlled stress (CS) rheometers with conventional set-ups turned out to have this inertial limit during dynamic testing for such samples. An innovative solution for the measurements of low-viscous structural fluids in high frequency regime is presented. The performance of the new technology is demonstrated and several test results are presented. Besides the new technology for high frequency dynamic oscillatory measurements of low viscous viscoelastic fluids, another new technology enabling *in-situ* dynamic optical analysis of sheared structural fluids is also presented together with several examples.

This paper was presented at the Australian and Korean Rheology Conference, Melbourne Australia, September 2001.

More Info? Send and Email to
info@rheologysolutions.com and
Quote No: 67 for RheoWave and
Quote No: 68 for a copy of this paper

Reader Comments

Contributions to this newsletter are welcomed. Please send an Email to
info@rheologysolutions.com

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Process Instruments Update & News

Thermo Haake MC goes On-Line

Thermo Haake´s unique Controlled Bypass Rheometer ***ProFlow*** offers continuous MFR, MVR and viscosity supervision. ***ProFlow*** is designed to provide production quality control as a turnkey solution. *"We have found some key features of high importance, like separate temperature setting and an unbeatable reproduceability to our Lab Data"* said one of our Customers who just commissioned our ***ProFlow*** system.

ProFlow – on-line melt rheometer for process flow characterisation

"Besides the fact that we are now able to prove our quality continuously, also we learn a lot about our production. We can see a direct result on parameter changes" was statement made from a production manager.

Thermo Haake´s expertise comes from decades of experience in handling rheological data, so why not make use of it.

More Info? Send and Email to
info@rheologysolutions.com
and Quote No: 69 for ProFlow

The Impact of PE based Adhesive Resins and Other Thermoplastic Matrix on Mechanical Properties of Ground Rubber Tyres-Thermoplastics Composites

S.J. Kim, C. Han and S.R. Kim*

Dept. of Chemical Engineering, Kwangwoon University, Seoul Korea, *Thermo Haake Regional Office / Asia-Pacific

There is increasing interest in developing methods of reducing the plastic and tyres in municipal trash. Among several possibilities for the recycling of whole scrap tyres and plastic is their use as low cost fillers, once they have been ground

up to a fine powder. This is of special interest since it potentially recovers the usefulness of the materials. Mechanically ground rubber tyre (GRT) crumbs were introduced as a filler in polyolefin blends. It was hoped that a significant impact on the environmental problems related to incineration as fuel or simple utilisation of discarded tyres to hand-made recycling products by converting them into a family of commodity thermoplastic polymer blends.

This paper was presented at the China Polymer Conference, October 2001.

More Info? Send and Email to
info@rheologysolutions.com
and Quote No: 70 for a copy of the paper

What's New in Bench-top Twin Screw Compounders

Thermo PRISM continue to combine their mixing experience with the measurement technology from Thermo Haake … and all customers benefit as was shown at the K Show 2001 recently. The newest products from the Thermo PRISM product range on show included:

16 mm EUROLAB Digital twin-screw extruder.

The 40:1 L/D compounder features data logging and processes samples as small as 200 g up to rates of 10 kg/hr. A segmented screw and barrel design, with easy opening, make product changes quick and simple. Both barrel and screws can be re-configured for different processes. A touch-screen control with recipe storage gives reliable and repeatable process conditions. Data logging to an Excel spreadsheet allows archiving and easy analysis of process data.

Eurolab 16mm twin-screw compounder

The EUROLAB System of co-ordinated ancillary equipment extends the application of the extruder from basic strand pelletising of the product to a face-cut pelletiser with air quench, blown film or cast and extruded sheet.

Designed to plug into the EUROLAB extruder, each of these Thermo PRISM ancillaries are manufactured to be interchangeable. Customers can source their entire polymer processing needs from one supplier.

More Info? Send and Email to
info@rheologysolutions.com
and Quote No: 71 for EUROLAB

TSE 36 HC – segmented compounder

This twin screw converts lab scale development into customer samples or pilot scale production quantities. Alongside the compounder is shown the matching *VARICUT* strand pelletiser, which allows the operator to select alternative pellet lengths from 1mm to 3mm.

Thermo PRISM 36 mm compounder with strand line

More Info? Send and Email to
info@rheologysolutions.com
and Quote No: 72 for TSE 36 HC

Pilot 5 Mixer

The current range of bench-top change bowl mixers has been extended to include a new 5-litre Pilot 5 mixer. With variable speed impellor, process timer and temperature measurement, this high-speed mixer is already working worldwide preparing polymer/pigment blends and powder coating premixes.

A complete service of compounding and analysis in small scale and pilot production up to 200 kg/hr is available.

More Info? Send and Email to
info@rheologysolutions.com
and Quote No: 73 for Pilot Mixer 5

Further Information on Thermo PRISM is available on www.twinscrew.com

PolyDrive Extruder / Filter Test

The PolyDrive extruder technology is dedicated to provide solutions for extrusion applications. The system with specific feeders, dies and screws to optimise extrusion procedures. As a stand alone unit with control panel the PolyDrive doesn't require a computer. A data dump to the PolyDrive monitor software is integrated.

This integrated pressure control loop guarantees constant feeding conditions with an attached melt pump and filter die. This powerful and cost effective filter test set up is unique for analysing the performance of polymer master batch mixtures.

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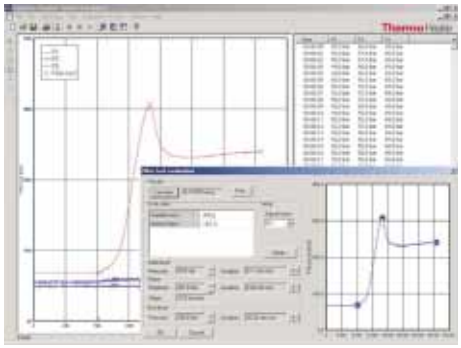
Process Instruments Update & News



PolyDrive Filter Test Results

The PolyDrive monitor software designed to monitor the test and store the data from the PolyDrive system. Stored data can be compared to superimposed reference curves. A push button operation converts the data to MS-Excel for further analyses. The PolyDrive filter test software is easy to use tool for the analyses filter tests. The formula generator allows to customise the evaluation mathematics of filter test to the individual requirements. Those settings are later used for QC-tests to print a test reports by pushing a button. Beside this QC-routine data can be evaluated to individual needs and superimposed.

The PolyDrive has a large screen display with key pad operation.

More Info? Send and Email to info@rheologysolutions.com and Quote No: 74 for PolyDrive and Quote No: 75 for PolyDrive Filter Test

Automatic Determination of MVR with the Roboflixer

The Roboflixer is designed for around the clock production control of polymers. It is a fully automatic measuring system for the determination of MVR. The operator has only to fill the sample container and place it in the magazine. The robot runs the sequence of tests, supervised and controlled by the computer eliminating operator-influenced variation. A full automatic procedure – sample loading, pre-compression, temperature equilibration, measurement and cleaning – ensures precision and accuracy of each measurement. The test protocol shows the status, statistics and flags outliers, allowing the operator to react early when the quality is affected.

The key features of the Roboflixer are:

- Magazine for 30 sample containers – empty containers can be refilled and reloaded in the magazine while running
- Fully automatic cleaning of the piston, barrel and replacement of the die after each test
- Fully enclosed machine for tough environments
- Computer controlled measurements and statistical data evaluation
- Weight magazine up to 21.6 kg – this allows tests with different weights
- Auto sampling from the production
- Full process control and data transfer to the control room

More Info?
Send and Email to info@rheologysolutions.com and Quote No: 76 for Roboflixer

Determine Flow Behaviour of Polymers with the Rheoflixer

The Rheoflixer is a high pressure capillary rheometer for the determination of flow behaviour of polymers as a function of shear rate and temperature. The computer controlled instrument covers a wide range of shear rate with a variety of measurement dies. The user friendly software for data acquisition and evaluation provides Bagley, Rabinowitsch and Weißenberg correction as well as studies of thermal stability. Slit dies, a die swell sensor and a special sensor for PVC gelation tests complete the measuring capabilities of the Rheoflixer.

More Info? Send and Email to info@rheologysolutions.com and Quote No: 77 for Rheoflixer

Modular Twin Screw Extruder for the PolyLab System Rheomex PTW24p … the specialist for research and production

The PolyLab System consists of the Rheocord torque rheometer, which, includes all functionality for driving and controlling the measuring sensors.
The Rheomex PTW24p is a modular parallel, co-rotating twin screw extruder with a process length of 28:1 L/D. It is suitable for thermoplastic compounds up to rates of 20 kg/hr. A hinged barrel design allows for easy access and cleaning. The Basic Unit and software detect the connected measuring sensor automatically. Measuring range and alarm values are set automatically. The software provides visualisation and control of the instrument set up. The extruder is mounted onto a moveable stand for easy handling and changing to other PolyLab system components.

Rheomex PTW24p Barrel Opened

Key features include:

- Auto detection of the system and all connected sensors
- Modular hinged barrel with (7) 4:1 L/D sections for easy access
- Multiple electric heat/water cool
- 4:1 L/D temperature controlled zones up to 400°C, with self contained barrel cooling unit, barrel layout to suit, including 1 off side feed and 3 off top port blocks for split feeding and venting
- Set of shafts with a suitable screw configuration

Rheomex PTW24p Barrel & Screws

More Info?
Send an Email to info@rheologysolutions.com and Quote No: 78 for PolyLab & Rheomex