



# Clextrusion

## Summary

INTERNATIONAL  
DEVELOPMENT

DEVELOPMENT  
AND PROCESS

REALIZATIONS

SERVICE AND  
MAINTENANCE

IN BRIEF

During the Scientific Seminar organized in Clextral to celebrate our 40 years manufacturing twin-screw extrusion systems, we agreed to create a periodic newsletter about CLEXTRAL innovations.

In 1997 we sent you a questionnaire, in order to better identify the subjects of interest to you. About 2 000 questionnaires were sent to CLEXTRAL customers and prospects.

Analysis of the responses enabled us to decide what to include, especially regarding technological developments and new methods. Special emphasis will therefore be placed in the now six-monthly issue of the CLEXTRAL NEWSLETTER; we will give you specific details of evolution of our know-how, our products and associated applications. We are pleased to send you the first issue, which describes in particular the new CLEXTRAL achievements in terms of complete installations.

We hope that this first issue will live up to your expectations: remember that we are always ready to receive your inputs to improve the newsletter. We reiterate our desire to serve you and help you make the best choice.

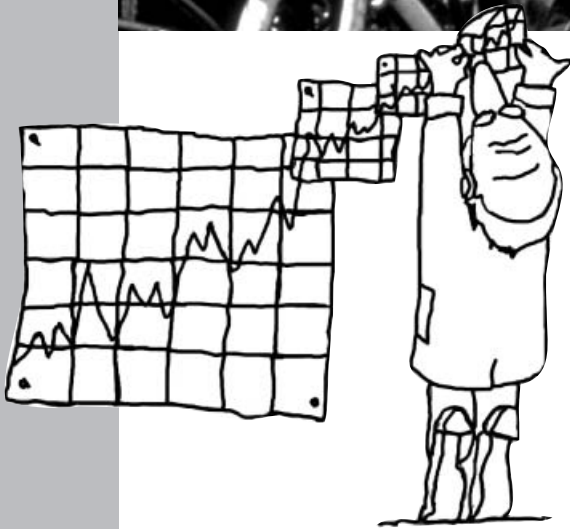
Georges JOBARD  
Director

**SPECIAL  
ASIA**

Number 1  
MARCH 1998

CLEXTRAL

# International development



Already present on the American continent (Cletral, Incorporated, at Tampa in Florida-10 people) and in China at its Shanghai office, in 1997 Cletral made two new major steps in its international development..

To provide coverage of the Asia-Pacific area, Cletral opened a sales office in Singapore last July.

The objective was to give daily presence to customers in this vast region extending from the Indian peninsula in the west to New Zealand in the east, and from Japan in the north to Australia in the south.



Based in the premises of Framatome, this office is led by two Sales Engineers, Emmanuel Bole and Emmanuel Allibe, who had already covered this region from France.



Apart from their experience in this part of the world, they are backed up by the network of agents present in the various countries in this region.



Also, considering the continued growth in the C.I.S. countries, and most especially in Russia, last September Clextal decided to appoint a Russian sales engineer, Dimitri Romanov, in the Framatome office in Moscow. This structure will enable technical and commercial follow-up of existing customers and new projects.

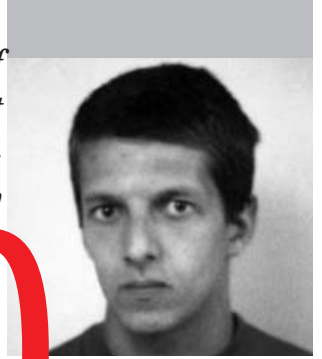
With these two new sites, Clextal now has the means for increased proximity to our existing and new customers, both in terms of support, technical and process service taking into consideration the characteristics inherent to these regions, whether concerning the available raw materials or financial realities. Clextal is now closer than ever to its customers.



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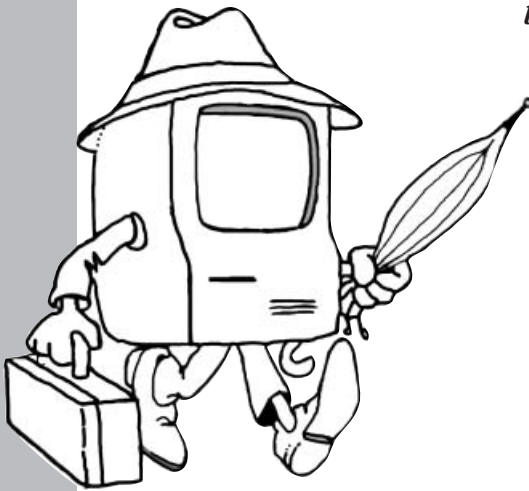
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*JEROME MOTTAZ, heat engineer at the IUSTI of Marseille (University Institute of Industrial Heat Systems). He obtained a DEA (post-graduate diploma) in Energy Mechanics in 1994 and a PhD from the University of Provence in Energy Mechanics in 1997.*



# D

## Developper



The extrusion of heat sensitive products involves control of the product temperature during its transformation in the extruder and in the die during shaping.

Clextal and the IUSTI (University Institute of Industrial Heat Systems, UMR, CNRS 6595) have collaborated in the field of research and development of heat transfers in twin screw extruders for several years seeking greater understanding of the machine-material transfer mechanisms in order to optimise the transformation of the extruded products.

The work group included two Clextal research engineers, three IUSTI scientists and a postgraduate student writing a PhD thesis on heat transfers in twin screw extruders. This research concerned the energy analysis of the whole extruder and thermomechanical analysis at each barrel.

Suitable instrumentation including over one hundred temperature sensors and several pressure sensors were used to monitor the temperature field inside the barrel and the material under transformation. This analysis methodology was applied to the study of the transformation of organic products and plastic chemistry. This research

work resulted in improved knowledge of heat exchanges between the barrel and the product, heat and mechanical power generated at the various parts of the screw, and better understanding of the different stages in product transformation.

Through this experimental work, developed in the Clextal test station at Chazeau and the IUSTI laboratory, models have been developed to predict the temperatures of the barrel and the product during its transformation.

A first model using the finite elements

technique is based on a local description of temperatures in the barrel.

Figure 1: Meshing of a barrel in a straight section.

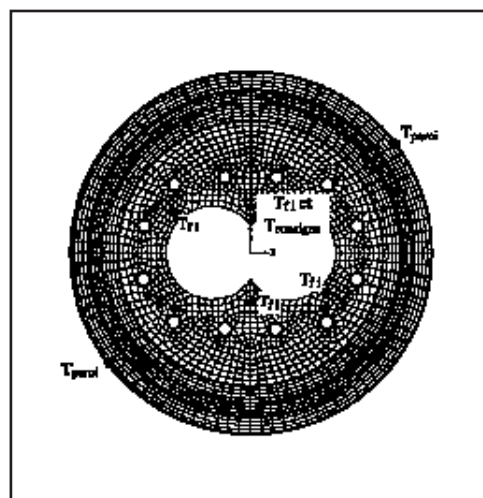


Figure 1

# Heat transfers in the TWIN-SCREW extruder

## ment & Process

Using this approach, areas of temperature heterogeneity can be located and the temperature gradients can be evaluated in each part of the barrel.

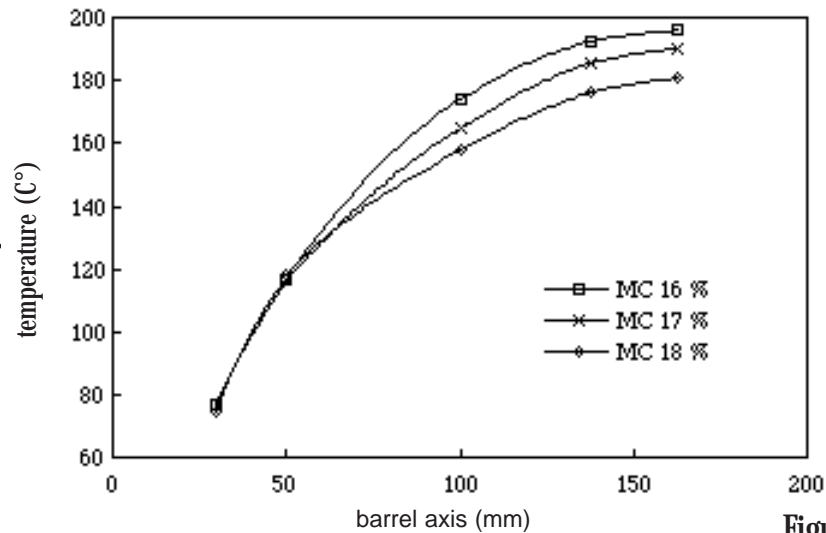


Figure 2

A second specific model was developed to predict the thermomechanical behaviour of the material in the work area. At this point, the material undergoes major transformations and therefore significant temperature variations along the screw. This model has been validated from the experimental results obtained during various

Figure 2: Example of temperature profile of the material in evolution inside a barrel.

These two detailed model of heat and weight transfers were integrated and simplified in a third type of simulation which uses the model reduction method. This work resulted in a reduced model which is a regulation support tool with very short response times. The advantage of this tool is that it takes into account the heat characteristics of the materials and phenomena in the product and in the machine.

Developments in the field of thermomechanics are currently continuing between the two partners. The objectives are improvement in product temperature control techniques, in order to obtain optimum machine performance, and greater control over the quality of the products transformed.



Interview with Didier Thevenet  
(Project Manager) by Mariel Badel

1997 has been an especially significant year for Clextal, since two complete paper pulp production lines have been put into operation: one in China, at Tianjin, and the other in Russia, at Saint Petersburg, and the Clextal teams have been busy with a third line, again in China, this time at Kunshan.

## New missions.

*Mariel Badel : Could we say that the Cellulose Pulp activity has started Clextal off in a new role as turnkey house ?*

**Didier Thevenet :** The Tianjin contract actually represents the first complete cellulose pulp line supplied by Clextal. Remember that it is a printing-writing paper pulp production line, with a raw material of cotton linters.

When building projects like this, there are many significant moments... the negotiations were initiated at the end of 1992, and due to the importance and complexity of this project in China, they were long.. The contract came into force at the end of May 1993.

Chinese personnel under Clextal supervision carried out the installation during 1997. Clextal delegated a site manager, joined successively by process control electrical engineers, process engineers specialised in paper pulp; and a laboratory technician, to direct the plant construction until start-up. The old paperwork buildings were completely demolished and rebuilt, to take the new paper and pulp production equipment.

An excellent relationship, marked with frequent contacts and co-ordination meetings, was grown between Clextal and the various companies involved (Design Institute, Paper Mill, and local suppliers).

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# A profession,



turnkey system supplier.

realizations...



and dry purifying through to refining.

## Where next ?

### Tianjin, St Petersburg, Kunshan,...

*MB : The performance tests for the delivery of this production line, producing 700 kg/h of pulp from cotton combers, were held in December 97. The Goznak line is now operational. What project are you now working on ?*

DT : We are working on the next site at Kunshan in China, a paper pulp line using raw cotton fibers to produce bank notes. The process is similar to those used by the Bank of France and Goznak at Saint Petersburg. The supply is equivalent in volume to that of Tianjin. The engineering experience gained at Tianjin and Goznak, the process control system knowledge and the control we have acquired of our three dimension CAD system have considerably reduced the time spent designing this project. We will start this production line this spring.

## A vocation, working together.

*MB : Could you define what the Tianjin contract has meant to Clextral ?*

DT : As with every new project we have improved our knowledge and experience as supplier of turnkey project. The Tianjin contract confirmed to us how important it is for the project manager to participate in the final contract negotiations. Also that project management requires the involvement of an entire team, creating close links and constant information exchanges with the customer. Finally great care must be taken with planning, information and cost follow-up.

*MB : Was it sufficient to apply these major principles methodically to implement the Goznak contract with a peaceful mind ?...*

DT : This contract, in fact, allowed us to demonstrate the experience acquired and our ability to design alone a complete line. The Goznak Paperworks, at Saint Petersburg, has produced the Russian rouble for almost two centuries.

The decision was taken to modernise its production unit. We supplied and commissioned an installation from transporting the cotton



# S

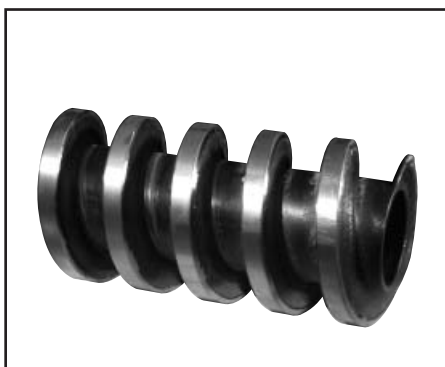
# ervice & Maintenance

A Clextral solution to reduce wear cost:

## Refurbishing of screw parts.

Clextral has developed a new resurfacing service aiming to reduce wear costs by increasing the lifetime of screw parts.

The repair is carried out in our Firminy (France) workshops by depositing



a hard alloy on the thread tips using an automated welding process. This state-of-the-art technology, carried out under perfectly controlled conditions, results in high-quality resurfacing with perfect adhesion to the base metal. This resulting surface's coating offers high corrosion and abrasion resistance.

At 30% of the price of a pair of new elements, this solution represents considerable savings for the user. The calculation is based on 3 successive resurface treatments of the part.

Screw repairs can be carried out on screw parts from BC72 and greater diameter.

The procedure is as follows:

When the screws are received in our workshops, their diameter is checked: it must not be below a certain nominal value. Similarly, the thread tips must not show signs of abnormal wear or fractures. The screws are ground after resurfacing to restore the original profile.

All repaired parts are inspected by the Quality Department before reshipment.

This new service marks a new step in the constant effort made by Clextral regarding wear.

It is supplied with Clextral quality guarantee, covering not only adequate control of screw dimensions, but also of the various metals used.



## In brief...

**A NEW ADDRESS FOR CLEXTRAL, INC.**

Following the improvement work carried out on our premises, the address of Clextral, Inc. is now:

14450 Carlson Circle -  
Tampa 33626 FL - USA

The telephone number, fax number and e-mail address are unchanged:

(1-813 854 4434 - 4 1 813 855 2269

e-mail: clextralus@aol.com

### TRANSFER

Gilles Maller, who up until now was Sales Engineer in charge of the United Kingdom, Eastern European countries and the Middle East, has joined the Clextral, Inc. sales team at Tampa. He will add sales support to the North American territory.

### GROWTH OF THE CUSTOMER SUPPORT ACTIVITY

In 1997 Clextral recorded a very high increase of its Process Support, Maintenance Inspections and Operator Training activities.

These results bear witness to the increasing interest by users in optimum use of their Clextral extruders and refresher courses for their personnel. To meet these expectations, over the last few years Clextral has developed various training and support modules.

### 1998 EXHIBITIONS

**VICTAM** 12-15/05/98 Utrecht  
NETHERLANDS animal feed.

**ASIAN-PAPER** 6-8/05/98 Singapore  
SINGAPORE paper pulp.

**K'98** 22-29/10/98 Düsseldorf  
GERMANY plastic and rubber.

**IPA** 19-23/10/98 Paris  
FRANCE agri-business.



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