

# HAND-HELD WOOD MOISTURE METER & RECORDER

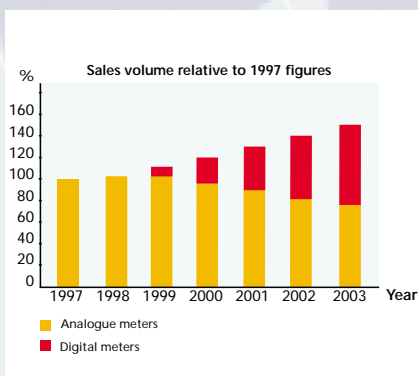
accuracy and versatility made possible with microcontroller system

*Tramex has successfully utilised microcontroller technology to develop a versatile moisture meter and recorder for wood and other building materials. The new system overcomes the limitations of its existing analogue meters and simplifies the measurement process by eliminating the need for manual data conversion using specialists charts. The adoption of microcontroller technology will enable the company to increase its sales volume of moisture meters by 150% during 5 years of production.*

Tramex designs, manufactures and markets a range of instruments for the measurement and detection of moisture in wood, plaster, concrete and other building materials. Most of the instruments are battery powered and portable. The company sells its product world-wide and has approximately 15% of the moisture measurement market.

TRAMEX LTD	
Employees	7
Turnover	2 M€/year
Industrial Sector	Measurement instruments NACE code: 33
Technical expertise before the project	PCB and discrete components
Technical expertise at the end of the project	Microcontroller

## SIGNIFICANT ECONOMIC BENEFITS



Although Tramex has the edge over its competitors in non-intrusive moisture instruments, it expects the sales of its analogue meters to decline gradually due to innovations and improvements in its competitors' instruments. The introduction of the new microcontroller-based instrument with its advanced features, versatility and modern user interface consisting of a keypad and LCD display will enable Tramex to enhance its sales as shown in the chart. It will also open new markets for Tramex outside the building industry. The development work, up to the prototype stage, was funded under the FUSE programme at a total cost of 50 K€. The product industrialisation required a further 68 K€. As a result of increased sales, these costs will be recovered in 2.2 years. The return on investment is estimated at 250% over a period of 5 years.

## PRODUCT IMPROVEMENTS

The company's existing moisture meter utilised discrete analogue electronics and suffered from several limitations including the need for the user to convert each reading using charts relating to wood species to determine the moisture content of the wood. The new microcontroller-based instrument overcomes these limitations and provides significant feature improvements including:

- Accurate and direct measurement of the percentage moisture in wood with automatic correction for wood species specific gravity and temperature.
- Moisture detection and measurement for other wall and roofing materials.
- Non-volatile storage of measurements and materials libraries.
- PC interface to download stored readings and edit materials libraries.



# How to go about it

## CHOOSING THE RIGHT TECHNOLOGY

Tramex considered several technology choices to implement the improved moisture meter. Microcontroller technology was selected because it offered several advantages including:

- Suitability for implementing the user interface and moisture measurement algorithms.
- The on-chip peripherals enabled the overall number of components to be reduced to a minimum.
- Cost effective for the envisaged sales volume.
- Availability of development tools, design assistance and training at moderate costs.
- A suitable technology step for Tramex's staff.
- Potential for applying the technology to develop other instruments relating to the building trade.

### PROJECT OVERVIEW

PROJECT OVERVIEW	
Main Activity	Microcontroller development
Duration	14 months
Effort	326 person days
Overall prototype development costs	50 K€

## A PARTNERSHIP FOR SUCCESS

The project was conducted as a FUSE application experiment. The staff of Tramex took the lead in conducting all the tasks of the project. They were assisted by suitable subcontractors who provided:

- Training on hardware and software microcontroller design.
- Firmware design assistance.
- Advice on design for electromagnetic compatibility.
- Manufacturing of printed circuit boards.

The main project tasks, effort and costs are listed in the adjacent table.

### EFFORT & COST

Task	Company's effort (days)	Subcontractors' costs (K€)
Management	15	
Training	10	1.73
Specifications	27	
Design	179	
Manufacture and test	93	1.15
Total	306	2.88

## YOU CAN ALSO BENEFIT FROM MICROELECTRONICS

Microcontroller technology provided Tramex with the means of improving its moisture measurement products and enhancing its market position. You can also achieve significant benefits by acquiring the right microelectronics technology and utilising it in your product or manufacturing process. You can get help from FUSE to realise this.

*FUSE is a technology transfer programme, funded by the European Commission to stimulate the wider use of microelectronics technologies by European enterprises to increase their competitiveness and enhance their economic growth. The demonstrator described here is one of many examples in the public FUSE portfolio covering the whole spectrum of microelectronics technologies and spanning a wide range of applications and industry sectors.*

**FUSE provides you with:**

- **Best practice in acquiring specific microelectronics technologies and conducting full development projects through the FUSE portfolio of real life demonstrator documents.**
- **Local training and expert support to plan your innovation realistically and help you conduct your project successfully.**

*Further information and support relating to this and other demonstrators can be obtained from the addresses below.*

#### The Technology Transfer Node

The University of Paisley,  
Paisley, Scotland, PA1 2BE, United Kingdom  
Tel: (44) 141 848 3419  
Fax: (44) 141 848 3413  
Email: [ttn@paisley.ac.uk](mailto:ttn@paisley.ac.uk)



#### The Company

Tramex Ltd, Shankhill Business Centre  
Shankhill, Co. Dublin, Ireland



#### The FUSE Secretariat

European Commission  
DGIII/F/3 – N105 2/36  
200, rue de la Loi  
B-1049 Brussels  
Belgium

