



# Case Study

## Co-processing Waste Materials in Cement Production

### AFR Quality Control Laboratory

#### The Example of Resotec in Brazil

##### BACKGROUND

Resotec, a division of Holcim (Brasil) S/A, operates two waste pre-processing facilities close to its Pedro Leopoldo and Cantagalo cement plants. Each facility has an installed capacity of about 120,000 tonnes per year.

In order to qualify candidate waste streams for both pre-processing and co-processing in the cement kilns, Resotec has established detailed quality control plans at each plant. The control plans are based on protocols that include administrative procedures, sampling strategies, and analytical test programs for wastes shipped to the facilities and finally for processed waste streams to be fed to the cement kilns. Specialized **AFR laboratories** are an essential part of Resotec's waste management strategy.

##### PROCESS

At Pedro Leopoldo, a large variety of wastes is co-processed in the kilns, including waste oils, solvents, industrial sludges, and impregnated solids (plastics, textiles etc.).

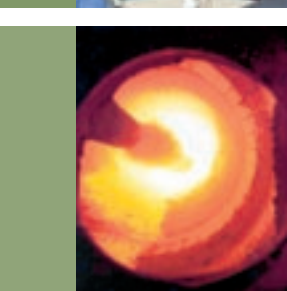
Pedro Leopoldo runs a modern AFR laboratory at its pre-processing site with five trained chemists and laboratory assistants. Between 200 and 300 analyses are carried out every month on average. The **major tasks** of the laboratory include:

- Physical and chemical characterization of incoming wastes and outgoing AFR
- Control of legal aspects and internal technical specifications (i.e. comparison against permit-specifications and internal requirements)
- Environmental monitoring and analysis of waste water, soil or stack emission
- Environmental control (i.e. heavy metals analyses) of products of the cement plant (clinker, cement, filter dust).

The laboratory equipment comprises a comprehensive set of state-of-the-art analytical instruments such as ICP spectrometer (for heavy metals analyses), gas chromatograph (for organics, PCBs), calorimeter (calorific value), sulfur and chlorine analyzers, flash point meter, viscosimeter and others. The total of about USD 500,000 was invested in this analytical equipment.



*Zero Head Space Extractor for the Determination of Volatile Components*





*Service Brochure of Resotec AFR Laboratory Components*

### GOOD PRACTICE

All laboratory assistants receive training in complying with the facility's stringent requirements with regard to analytical performance and health and safety in the workplace.

The pre-processing facility including the AFR laboratory has obtained certification against the international standards ISO 9001 (quality management) and ISO 14001 (environmental management). In the framework of these certifications the laboratory has developed a series of standard operating procedures for all tests applied.

The AFR laboratory participates in various national and international interlaboratory proficiency tests in order to verify and improve its analytical capabilities and in order to increase the confidence of their clients.



*Unidade Pedro Leopoldo*

### FURTHER DEVELOPMENT

The AFR laboratory has started to offer its services to third parties on the market. The revenues from these external services have reduced the operating costs of the laboratory significantly.



*ICP Spectrometer for the Determination of Heavy Metals*

### LESSONS LEARNT

The chemical and physical characterization of highly variable waste streams is an extremely demanding task both with regard to professional skills of laboratory personnel and to selection of analytical equipment and infrastructure.

Standardized test procedures have to be adapted frequently to the specific characteristics of a waste stream. Obtaining representative samples of wastes delivered in different types of packaging, e.g. drums, or out of a load of very heterogeneous materials, requires a sophisticated sampling strategy. A brochure has been published by Resotec describing the services and capabilities of their AFR laboratories.

### REFERENCES

[www.coprochem.com](http://www.coprochem.com)  
[www.resotec.com.br](http://www.resotec.com.br)