“A DECISION SUPPORT TOOL FOR THE SELECTION OF CLEAN TECHNOLOGIES IN INDUSTRY”

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Scope :

This paper aims to present the methodological approach and the results related to the development and the implementation of a tool for the introduction of clean technologies to SME's. The innovative and user-friendly software package Decision Support Tool (DST) using an integrated techno-economical full-scale application was developed within the framework of LIFE/ENV/GR000384 project.

Introduction of Clean technologies to Textile Industry

Application of environmental advanced techniques in SMEs such as the Textile industry is currently mainly characterized by a simple diagnosis of environmental problems and end - of - pipe techniques for confronting environmental requirements. In large industrial units advanced-engineered systems are the most common approach for improving environmental performance.

The Textile industry is characterized by a vast differentiation of the production process and consequently by difficulties in the standardization of applied techniques. The evolution of the sector in Europe is important in many aspects considering that including clothing (and excluding chemical fibers), the sector accounts for 4.4% of the manufacturing production.

According to the European Council Directive 96/61/EC (Integrated Pollution Prevention and Control), EU Member States have to undertake measures in order to ensure the advanced environmental operation of industrial installations.

Methodology

The methodological scheme adopted for the design of the DST was based on the formulation of a Best Available Techniques database, which was developed by a survey of the "clean" textile processes, as well as, on the elaboration of mass/energy balances of the textile processes. In more details the main characteristics of the DST are as follows:

- Formulation of typical production process flow-charts of typical textile industries.
- Identification/Registration of all major input - output parameters as elaborated in the mass/energy balances per unit operation.
- Standardisation of input - output parameters according to reference parameter units.
- Best Available Technology database formulation.
- Standardisation of BAT according to input - output quantified parameters.

Application of the Innovative Decision Support Tool

DST comprises a useful tool for SME, providing with reduced requirement on resources for detailed and costly computerised systems, the capability to adjust their production line and to investigate different technical solutions towards the examination of improved environmental operation.

The methodology, and the Software program containing the database of existing Clean Technologies (candidate BAT) delivers mass/energy and cost flow charts that support the Decision Making for the selection of BAT. The methodology not only takes into consideration environmental and economical aspects as well as technological feasibility but mainly designates a user-friendly tool based on quantitative beyond qualitative evaluation for the extrapolation of conclusions on the whole production process and for all kinds of environmental technologies. It is characterised by flexibility in the replacement of techniques in parts of the production process as well as by the possibility for combination of techniques in the order of specific "recipes". Contrary to the common approach of producing long documented results, which are difficult to read and evaluate, or of focusing on the application of a clean technology in a short-sighted manner and a specific part of the process, this is an innovative tool. It not only provides end-users with practical and immediate results upon the selection of a BAT but also highlights the appropriate BAT for each case by the means of "filtering".

The information provided by the DST can be transformed to easily adapted standard data, which enable managers to determine the environmentally "weak" points and quickly select the appropriate "clean" solution (process optimisation, recycling, clean technology) adaptable to the actual situation.

The ultimate result of the DST is the achievement and presentation on flow charts, of the maximum achievable reduction and its respective costs.

The DST was simulated successfully in industrial environment and test cases concerning typical Greek and Portuguese textile processes were examined. The DST, which is accompanied by a demonstration software program, gives the opportunity to the user instead of viewing at a disorder locally (on one unit operation), to view the whole production process. The user can compare between the old method and the application of the new technique and to decide whether the new technique benefits the whole production process in economical and environmental terms.

Technical information

The database tables of DST were designed with Microsoft Access® and the programming environment was developed using Microsoft Visual Basic®. The application is easily installed in any Windows standalone PC through an installation procedure run from the CD. No license or password is needed to run the DST software application. DST elaborates the results of calculations in two different kinds of electronic files: text format files (reports) and graphical format files (charts). The reports produced, are Microsoft Excel® worksheets, which can be further elaborated or modified by the user of the application.

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