

PLANT DESIGN AND ECONOMICS FOR WASTEWATER TREATMENT PLANTS VIA THE CAD/CAE SYSTEM "SIMTAR"

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Mathematical models, wastewater treatment, computer software, computer aided engineering, computer aided design.

SUMMARY

The work presented in this paper is concerned with an application of a CAD/CAE system called "SIMTAR" for the design and economic evaluation of wastewater treatment plants (WTP's).

The improvement in the performance and capabilities of the computers -calculation speed, graphical capacity, user friendliness and moderate cost- have made useful software tools to solve engineering problems, that otherwise would be difficult to approach because of their complexity (Busch and Pillsbury, 1984). However, in order to take advantage of the possibilities offered by the computers, it is necessary to create the suitable software adjusted to the specific requirements of their application area (Getty *et al.*, 1987).

Within the technological field of wastewater treatment, development of mathematical models for the simulation of Wastewater Treatment Plants has been limited because physico-chemical and biological processes involved are complex, and the estimated values for the parameters included in this models cannot usually be applied in a general way (Bush and Silveston, 1978). These obstacles have delayed and restricted the development and application of CAD/CAE systems in the wastewater treatment field with regards to other engineering branches, in spite of the initial efforts to improve and generalize the available models (Smith and Eilers, 1968; Keinath and Wanielista, 1975; Tyteca *et al.*, 1977). In the last few years, however, this situation has improved due to the works carried out by Ramalho (1983), James (1984) and the IAWPRC (1986).

"SIMTAR", the CAD/CAE system presented in this paper, is a handy tool for the design and evaluation of WTP's. It allows the study of numerous design alternatives, including both technical and economic issues. In this system all the stages involved in the design of WTP's - calculation of equipment dimensions, cost estimation, and planning drawing up- can be accomplished. The data input is done interactively by means of a graphical interface, which permits generation of the simulation diagram and the treatment process flowsheet (Gassó, 1989).

To accomplish these tasks, "SIMTAR" is composed of three basic modules -Design Module, Economic Module and Graphic Module- which, each of them, can be run independently. There is, in addition, a fourth module -the Management Module- which is in charge of transferring information between the basic modules and managing the communication with the user.

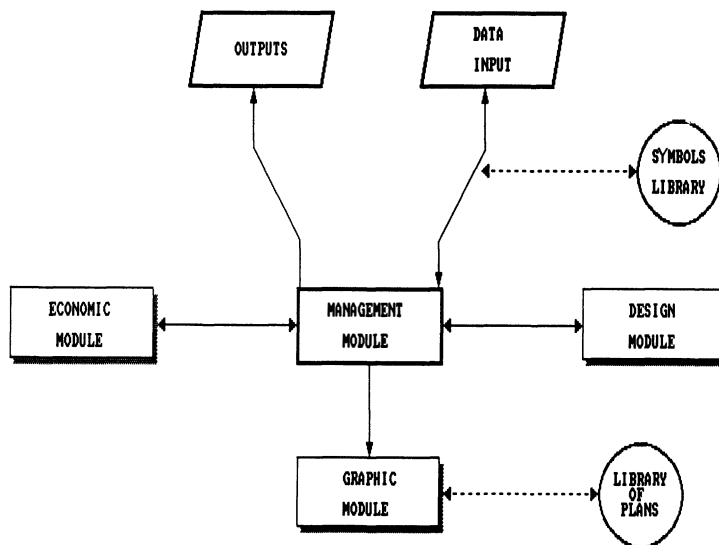


Fig. 1. Flowsheet with the basic structure of "SIMTAR"

To test the performance of this CAD/CAE system, design of some WTP's performed with it have been compared with those proposed by several engineering companies. It can be stated that the equipment sizes and the costs computed by "SIMTAR" fit quite well with those calculated by the engineering firms (Gassó et al., 1989).

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