

HEAT EXCHANGER FOULING AND CLEANING **- OPPORTUNITIES AND CHALLENGES -**

PREFACE

The formation of process-related deposits on the heat transfer surfaces is probably the least understood phenomenon in heat exchangers, causing severe problems in design and operation of the equipment. In recent years, the importance of this phenomenon has received further attention due to the increasing cost of energy, climate changes as a result of energy conversion processes, technical advancement requiring more efficient thermal management, and changes in the nature of feed materials, such as:

- thermal desalination and water treatment processes to produce more potable water for the growing world population,
- oil refineries are processing heavier and denser crude oils, to utilize reservoirs which have so far not been economical,
- fuel processing from a variety of sources with a high content of impurities, such as biomass, coal-gasification etc,
- miniature thermal devices, such as laboratory/analytical equipment, micro reactors and ultra-compact heat exchangers, may experience fouling problem,
- highly integrated thermal management processes to save on energy, cost, weight and volume.

Nevertheless, present design procedures still involve massive uncertainties. The predictions of fine-tuned correlations and computer models for clean heat transfer coefficients need to be corrected by crudely estimated fouling resistances. Models for the prediction of fouling rates can only be applied to a very limited number of idealised deposition processes.

In contrast, efficient mechanical and chemical fouling mitigation and cleaning techniques have found their way into regular plant operation through a mainly empirical trial and error approach. These anti-fouling strategies have few or even no links to academic research findings, since industry and academic research institutions have traditionally approached the problem of fouling from different aspects, and there has not been enough interaction and exchange of information.

Bi-yearly conferences on heat exchanger fouling have been organised by Engineering Conferences International (previously United Engineering Foundation) since 1995, with the aim to bridge the gap between the two communities. These meetings provide an opportunity for experts from industry, academia and government research centres from around the world to present their latest research and technological developments in the areas of fouling mitigation and cleaning technologies. They involve overview presentations, technical papers, poster sessions, and panel discussions. Following the highly successful meetings in San Luis Obispo (1995), Lucca (1997), Banff (1999), Davos (2001) and Santa Fé (2003), the 6th conference in this series was held in Kloster Irsee, Germany, in June 2005. The aim of this conference was to facilitate innovative thinking and to explore new theoretical and practical approaches to address the tremendous challenges due to fouling of heat exchangers. The conference attracted

representatives from a wide range of universities, research institutes and companies and hence was able to provide participants with excellent technical presentations and a very conducive environment for personal discussions. In total, 65 participants attended the conference, presenting 57 papers/posters, which was the highest numbers in this series. The next Engineering Conferences International meeting on heat exchanger fouling will be held in Canada in May 2007. More information will soon be available at:

<http://www.engconfintl.org/>

The following papers have been presented and recommended for publication in the final conference proceedings, after a careful refereeing and revising process. The proceedings cover various aspects of heat exchanger fouling along with updated state-of-art fouling mitigation and cleaning strategies. The present e-proceedings as well as those from the previous conference in 2003 can be obtained free of charge from the following homepage of Engineering Conferences International Symposium Series:

<http://services.bepress.com/eci/>

A limited number of hardcopies of the 2001 fouling conference proceedings (Davos, Switzerland) can still be purchased from Dr Malayeri, see below.

The conference chairs and scientific secretary wish to thank everybody who contributed towards the conference and the conference proceedings, i.e.

- all the authors and participants who invested substantial efforts to produce high-quality papers and to attend the conference
- the technical referees who helped to improve the quality of these papers even more, by providing valuable and helpful comments
- the Conference Advisory Committee and the Session Chairmen
- Barbara Hickernell and Frank Schmidt, and their team from Engineering Conferences International, for an effective organization.

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