

## Role of IDS in Global Drying R&D

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### **Abstract**

*The first conference in the IDS was held in 1978 at McGill University, Montreal, Canada, with the express purpose of international exchange of technical and scientific knowledge and promotion of drying R&D on a global scale via networking and collaboration. Another goal clearly noted in the Preface of the proceedings volume of the first symposium was to encourage tangible academic-industry exchange, knowledge transfer and exchange of knowhow across diverse industrial sectors with significant drying operations. Initially the impetus for drying R&D was provided by the rapidly escalating cost of energy; later the stimulus for drying research was the need to produce high quality products safely at lower cost and higher productivity using innovative dryers and optimal control as well as operation. The success of the IDS series led to the establishment of Drying Technology-an international journal (LDRT), several international and national conference series devoted to drying and many academic drying research centres around the world. This presentation will give a historical perspective on the establishment and subsequent development of IDS with statistical data and summarize results of a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis. Prospects for the future of drying R&D and need for both basic and applied research, will be identified. Role of IDS in promoting networking, international collaboration, innovation, and industry-academia interaction will be discussed.*

**Keywords:** IDS, Drying Technology Journal, networking

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## **Extended Abstract**

A unique feature of the technical and scientific literature on drying is the manner in which it was reviewed and disseminated in the absence of a journal dedicated to inter- and multidisciplinary field of thermal drying. Additionally, drying is encountered in several industrial sectors and much of the early literature has appeared in industry-specific trade and technical journals not commonly accessed by researchers in other industries. The IDS series, established in 1978 (including other sister conferences) and Drying Technology journal, established in 1982 provided a global unified forum to encourage inter-industry transfer of knowledge and experience along with knowledge on Drying Science and technology.

The important feature of this effort is that, for the first time, countries behind the so-called iron curtain contributed to and also accessed technical knowledge in drying technology. The research of a number of senior researchers from the former USSR, East European countries as well as Japan, Germany, France, Sweden etc became known internationally, which was singularly significant factor in expansion of drying R&D around the world. Indeed, the word “globalization” was applicable to IDS well before it became a buzz word about two decades ago. Without true globalization we believe that the IDS series would not have succeeded as well as it actually did. There was inadequate critical mass of drying researchers in most countries to sustain a major conference series.

The first two IDS meeting were organized by Prof. Mujumdar essentially on his own with very limited financial and Human resources to hold an international conference. It is important to note that these meetings were held when no computer search of literature was possible and all communications were made manually using mechanical typewriters and snail mail. Furthermore, the first conference was held on McGill University campus in Montreal just 15 months after the decision to host it. Much to his amazement the first event attracted participation from 19 countries. Interestingly, about half of the participants were from industry which met one of the key objectives Prof Mujumdar had to develop closer academia-industry links. Academics do not build or operate dryers. So, designers and users of dryers, who are the principal beneficiaries of the academic effort, need to participate and even tangibly fund such research. This has been one of the key goals of IDS series although in time academic participation dominated the series. Since industry - for understandable reasons- is unwilling to divulge proprietary information, their contribution and participation levels have declined over the years. More recently, however, there is a detectable rise in industrial attendance thanks to special effort by the Program committees of various IDSs.

One of the most important benefits of the IDS series has been the opportunity for academics to share their results and ideas with practitioners from diverse industries as well as vendors



Authors: Mujumdar, A.S., Xiao, H.W., Jangam, S.V.

of drying equipment. Often a single simple idea incorporated in the design and/or operation of industrial dryers can lead to major economic benefits in terms of energy savings, better product quality, higher productivity as well as safety. We are confident that numerous ideas first proposed at IDSs have been transferred effectively in many industries around the world. For obvious reasons, it is hard to obtain data about such developments from industry. One of the most important benefits of the IDS series has been the opportunity for academics to share their results and ideas with practitioners from diverse industries as well as vendors of drying equipment.

One important aspect of IDS is the fact that the series allowed researchers from the former USSR, East European countries, Japan, Australia, New Zealand as well as Western European countries including The U.K., Germany, France, Sweden, Denmark, the Netherlands etc to participate with North American researchers in the first two meetings held in Montreal in 1978 and 1980. China participated at IDS92 in Montreal for the first time. Participation from India was weak until early 2000. Technical literature available only in Russian, Polish, Hungarian, German, French, Japanese, etc became accessible to the global readership. Until about the 1990's, much of the drying research appeared in other than the English language. I believe this has been one of the most significant outcomes of the initial IDS meetings.

Hundreds of journals in English published papers on drying and allied areas. Additionally, numerous trade journals serving industrial sectors such as, polymer processing, wood, ceramics, pulp and paper, biomass, coal, etc also publish technical papers in the field. In last two decades numerous monographs, edited volumes, handbooks etc have appeared that include chapters on drying and dehydration. It is therefore impossible to make an accurate and definite analysis of literature on drying. Nevertheless, it is instructive and illuminating to consider some major thematic areas where drying makes a notable contribution and compare the statistics on papers published in LDRT versus the number appearing in 12 key archival journals. Table 1 provides some key statistics about Drying Technology journal. (\* until March 2018)

*Table 1. Key statistics about Drying Technology Journal (LDRT), last assessed on March 8, 2018*

Papers published in LDRT (since 1980)	~4500
Current impact factor (2016)	1.96
Highest impact factor	2.08 (in 2011)
Latest 5-year impact factor (2016)	2.06
Highest 5-year impact factor	2.15 (in 2011)



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Average number of authors per volume	~250
Number of countries/territories contributed to LDRT	~85
Project impact factor for 2017	2.1+
Majors contributing countries (Since start): China, Canada, United States, France, Australia	
Major contributing authors (Since start): A.S. Mujumdar, M. Zhang, T.A.G. Langrish, S. Soponronnarit, X.D. Chen	
Editor-in-Chief, Senior Associate Editor, 5 Associate Editors and 7 Assistant Editors	
21 EAB members from 15 countries	
A few authors made massive contribution of papers, reviews – Pereto principle – 20% contributed 80%	
LDRT has published 30% of all the papers on drying published in 12 key journals between 2000 – present	

Based on a look at general Drying Technology and IDS statistical data, it is fair to conclude that drying R&D activity around the world was stimulated by IDS and The journal. As a multi-disciplinary discipline drawing on progress made in transport phenomena and material science, drying received recognition as a challenging and strategic area worthy of serious research in academia and a key industrial operation in need of innovation. IDS brought researchers and practitioners from multiple industries together to learn from experiences and expertise which is dispersed widely around the world. IDS also spawned a number of sister symposia in Asia as well as Africa. In recent years, ease of networking has led to collaborative effort and enhanced interaction between industry and academia. Both technology-push and market-pull type innovation has led to more efficient drying systems with better efficiency, productivity, control and safety. In future we can expect miniaturization and intelligent control. There is scope for more reliable mathematical models for better designs, scale-up as well as control of dryers. We expect the next two decades of Drying Research will keep IDS as well as a number of sister conferences around the globe and the journal fertile with high quality archival research which will benefit industry and eventually the consumer. We hope that in the coming decade much of the thermal energy needs will be met using renewable resources as the cost of solar and wind energy keeps dropping. As a highly energy-intensive operation consuming 10-20 per cent of national industrial energy in developing nations, improved efficiency and use of renewable energy will make a definitive impact on global greenhouse gas emission as well.

