



ΙΔΡΥΜΑ ΤΕΧΝΟΛΟΓΙΑΣ ΚΑΙ ΕΡΕΥΝΑΣ

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ΣΕΜΙΝΑΡΙΟ

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- ΘΕΜΑ:** **The Challenge of Process Operability**
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ΠΕΡΙΛΗΨΗ

It is well known that the effectiveness of a chemical process is dependent both on its steady state and its dynamic characteristics. Traditional approaches address the issue in a sequential manner, by first designing the plant from the steady state point of view and addressing the dynamic characteristics and the controller design tasks after the plant is built. This often resulted in a substantially over-designed and sub-optimal plant with dynamic and control characteristics that are not difficult to handle with simple single-input-single-output controllers. Efforts to build more optimal and less polluting processes have resulted in the introduction of a substantial number of heat integration schemes and a large number of recycle streams, making the process several orders of magnitude more complex than before. Such processes are very difficult to operate or are totally inoperable, unless their dynamic and control characteristics are examined very early in the design phase. Such need to examine the interaction between process design and control has recently started to be recognized in the literature.

The seminar presents a new and systematic approach that examines the operability of a plant design prior to its physical construction. This enables the examination of the operability characteristics of several alternative designs and suggests design changes that improve process operability. The proposed operability measure is a multivariable and nonlinear one based on such concepts as the Available Input or the Expected Disturbance Spaces and their transformations by either the steady state or dynamic model of the process. After the initial definition of the new concepts, the proposed approach is applied to several example unit operations such reactors as well multiunit processes, concluding with the examination of plant-wide problem. The exposition of these examples reveals that the substantial computational challenge in the effective characterization of the operability of complex processes can be addressed by the use of optimization tools.