



## Review

## RTO: An overview and assessment of current practice

Mark L. Darby<sup>a,\*</sup>, Michael Nikolaou<sup>b</sup>, James Jones<sup>c</sup>, Doug Nicholson<sup>d</sup><sup>a</sup> CMiD Solutions, 13106 Dogwood Blossom Trail, Houston, TX 77065, USA<sup>b</sup> Department of Chemical Engineering, University of Houston, Houston, TX 77204-4004, USA<sup>c</sup> Chevron Products Company, 1400 Smith Street, Houston, TX 77002, USA<sup>d</sup> IPCOS (UK) Ltd., Copley Hill Business Park, Babraham Road, Cambridge, CB22 3GN, UK

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## ABSTRACT

The practice of implementing real-time optimization (RTO) using a rigorous steady-state model, in conjunction with model predictive control (MPC), dates back to the late 1980s. Since then, numerous projects have been implemented in refinery and chemical plants, and RTO has received significant attention in the industrial and academic literature. This history affords us the opportunity to assess the impact and success of RTO technology in the process industries. We begin with a discussion of the role RTO serves in the hierarchy of control and optimization decision making in the plant, and outline the key steps of the RTO layer and the coordination with MPC. Where appropriate, we point out the different approaches that have been used in practice and discuss the success factors that directly relate to the success of RTO within an organization. We also discuss alternative approaches that have been used to alleviate some of the challenges associated with implementing RTO and which may be appropriate for those unwilling to commit to the traditional RTO approach. Lastly, we provide suggestions for improvement to motivate further research.

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## 1. Introduction

In the mid to late 1980s, the confluence of several developments allowed for the first time, real-time optimization utilizing a rigorous steady-state model of the process:

- Model predictive control technology.
- Open equation modeling.

\* Corresponding author. Tel.: +1 281 477 7791.

E-mail address: [darbymark@sbcglobal.net](mailto:darbymark@sbcglobal.net) (M.L. Darby).