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# Editorial for a Special Issue on Flow Monitoring and Instrumentation Using Process Tomography

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## Introduction

Defined sequence of operations reaction, separation, crystallisation, solidification, mixing, and drying are examples of such operations. To that end, the modern process industry often employs control systems with local sensors for temperature, pressure, flow, and filling level, among other things [1]. With the advancement of sensor technology, there is an increasing interest in using more complicated sensors in industrial control systems. Process tomography sensors are one such group.

## Description

Process tomography is a well-established imaging technology that is used to collect 2D or 3D information about the distribution and flow of materials in pipes and vessels. Process tomography, in contrast to its equivalents in medical diagnostics and non-destructive testing, often aims for fast scanning speed rather than high spatial resolution. A variety of process tomography techniques have emerged in recent years [2]. Electrical tomography, magnetic tomography, ultrasonic tomography, microwave tomography, and optical tomography are a few examples. However, several traditional tomography modalities, such as X-ray tomography, emission tomography, and magnetic resonance imaging, have been accelerated to examine industrial processes. Tomographic imaging has previously received little attention in industrial process control since real-time reconstruction and feature extraction were difficult to achieve [3].

Recent advances in powerful and intelligent huge parallel computing architectures, on the other hand, have transformed the game. Process tomography is currently a potent sensor element for tomography-based process control. The Special Issue encourages scholars from all disciplines to submit their most recent scientific and technological breakthroughs in the field of process control employing process tomography techniques. The emphasis of this Special Issue is on a comprehensive demonstration of this technology for common industrial processes, ideally in chemical, environmental, and energy engineering [4]. The demonstration can take place in either real-world industrial systems or in a laboratory setting. Technical solutions presented should include tomography sensors, data processing, and control algorithms, as well as at least a proof of concept. Contributions may also address novel hardware and software concepts, such as real-time tomographic sensing and data processing, as well as novel theoretical control concepts for the use of tomography sensors in control loops [5].

Industrial process tomography has two distinct benefits over traditional sensing methods. To begin, process tomography systems give data on the 2D or 3D distributions of variables of interest. Second, tomography looks within processes without physically penetrating them, allowing sensing even in extreme process conditions and without interfering with process activity. These benefits bring up new possibilities in the realm of process control, and the potential for closed-loop control applications is one of the primary driving motivations for the advancement of industrial tomography. Despite these benefits and decades of development, tomography closed-loop control applications are still uncommon.

## Conclusion

A stab at it Tomographic imaging has previously received little attention in industrial process control since real-time reconstruction and feature extraction were difficult to achieve. Recent advances in powerful and intelligent huge parallel computing architectures, on the other hand, have transformed the game. Process tomography is currently a potent sensor element for tomography-based process control. The Special Issue encourages scholars from all disciplines to submit their most recent scientific and technological breakthroughs in the field of process control employing process tomography techniques. The emphasis of this Special Issue is on a comprehensive presentation of this technology for common industrial processes.

## Conflict of Interest

None.

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