

Injection Molding in Industry 4.0

Radhya Sahal*

Faculty of Computer Science and Engineering, Hodeidah University, Al Hudaydah, Yemen

*Corresponding Author: Radhya Sahal, Faculty of Computer Science and Engineering, Hodeidah University, Al Hudaydah, Yemen.

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Overview of injection molding industry

Injection molding is a simple and effective manufacturing process that is used to produce single parts and products using various materials. The first injection molding machine was created in 1872 by John Wesley and Isaiah Wyatt, and used a plunger to inject plastic through a heated cylinder into a mold. However, the injection molding industry has progressed slowly since this initial development. Currently, the plastic injection molding is the third largest sector in manufacturing which warrants special consideration in the data Industrial Internet of Things (IIoT) as it impacts manufacturers and their customers. For instance, the plastic injection molding smart factory can efficiently use data for every process to begin preheat only when it has received data that the previous process is nearing completion [1].

Injection molding in industry 4.0

Recently, data-driven manufacturing is becoming more prevalent in the injection molding industry, which is a manufacturing process for producing parts in large volumes. Today, the mold-making industry focuses primarily on producing parts of insufficient quality while limiting costs. In doing so, the injection molding companies use the digitization concept toward smart manufacturing in injection molding (aka Injection 4.0 or Molding 4.0). The injection molding industry involves collecting and analyzing the molding data by implementing Internet of Things technologies to improve data communication, traceability, and visibility in the traditional molding shop-floor [2]. Furthermore, industrial robots can be used to automate the injection molding process by using pick-and-place robots (see Figure 1).

Figure 1: Plastic injection molding industry based on robotic work .

Industry 4.0 can benefit the molding industry in different aspects, including: i) early fault detection by applying predictive analytics techniques to catch problems before they happen, ii) remote monitoring of the machines and their performances, and iii) empowering faster and efficient molding processes.

Substantially, applying Industry 4.0 technologies in the mold industry is effective by using data intelligence. The operational mold data provides people insights to improve quality, reduce costs, and minimize the downtime of molding machines [3].

¹<https://roboticsandautomationnews.com/2020/06/26/how-robotics-work-in-the-plastic-injection-molding-industry/33527/>

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