実施報告

金型変形状態可視化とマハラノビスの距離による状態監視システムの検討

Visualization of mold deformation, and monitoring system based on Mahalanobis distance

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Techniques for visualizing and managing the state of equipment have become important in recent years, and they are widely used in industry both to save labor and to transmit technology. In plastic molding, for example, they are used for quality control by attaching sensors to molds. Managing the manufacture of plastic products, which are used in a wide variety of places, has become complicated due to stringent quality requirements and larger and more complex shapes. So-called DX manufacturing, which employs digital technologies such as artificial intelligence（AI）and the Internet of Things（IoT）, can make mold manufacture more efficient by monitoring mold conditions and identifying defects. In this study, with the aim of constructing a low-cost system, we attached strain gauges to molds, acquired data during operation, and visualized the data using general-purpose software（Microsoft Excel VBA）. We also used the Mahalanobis distance（MD）to construct a display system with the normal state as the unit space, and presented several examples. As a result, we were able to visualize mold status during the molding process and display MD values under both normal and abnormal conditions, and found that we had a tool that could be usefully employed to monitor the operation of a mold.

Key words : Mahalanobis distance, monitoring system, DX manufacturing, Mahalanobis-Taguchi system, quality engineering, Taguchi methods

1. 緒　　言

深刻な少子高齢化により国内における多くの産業では技術の衰退が懸念されている。さらに，熟練技術者が有する経験や勘も含めた優れた知見の次世代への技能伝承が難しいことも問題視されていること

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