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## **The Mechanism in Ultrasonic Welding of PS Injection Molding**

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Ultrasonic welding is used largely in the industrial field because of the high speed welding, good adhesion, easy automation and the safety without solvents. There are many studies about the technique of the welding. But the mechanism in ultrasonic welding has not been cleared sufficiently.

In this study, the process of the ultrasonic welding of PS injection molding was discussed by means of the observation of the joint, image data processing, measurement of the surface roughness of the test pieces and the temperature of the welded surfaces. It was known that initial welded spots of the piled test pieces were originated in the convex parts of the surfaces and the marks of the ejector pins. From the image data processing of the joints, it became clear that total areas of the welded spots increased rapidly after the number of the spots reached maximum value because of the union of the spots. It was thought that the union of the spots was resulted from the melt and the flow of PS.

It was found that the temperature of the welded surfaces increased initially and converged in around the flow temperature of PS with the passage of welding time. It was explained that ultrasonic wave was difficult to be transmitted to the boundary of the test pieces when PS became molten state, then rise in heat at the welded parts was suppressed any more.

Therefore, it was presumed that the ultrasonic welding was predominant at the first stage of the welding process, but the heat plate welding which was accompanied with the molten flow took the place after some welding time.