

Ultrasonic Sealing in MRE Pouch Production

PROBLEM / OBJECTIVE

Traditionally, the entrees included in Meal, Ready-to-Eat (MRE) are either pumped or placed into multi-laminate foil pouches that are then hermetically sealed and exposed to heating (retorting) to extend the shelf life and prevent contamination during storage and handling. Preformed pouches in MRE's have traditionally been filled and sealed by heated tools in a process that often results in splashing of the food product and contamination of the sealed area. A steady reject-rate range from 1.5 to 4.5% with an average of 3% cross the industry is related to seal defects. The need was identified by the industry to improve seal quality.

Ultrasonic sealing technology appeared to hold promise for solving this problem in MRE production. The objective was to demonstrate the proof of concept of ultrasonic sealing of MRE pouches in production by retrofitting a preformed pouch package machine.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

Ultrasonic sealing delivers heat to the seal interface by mechanical vibration. Earlier research showed that the internal heat generation combined with mechanical vibration makes this seal technique tolerable to seal area contaminations. The Ohio State University worked with SOPAKCO Packaging and Edison Welding Institute to retrofit a Bartelt single lane preformed pouch packaging machine. The 20-kHz 2-kW ultrasonic welding system including a 9-in balanced amplitude and smooth face horn, and stainless steel female-knurled anvil was designed, fabricated and installed in the Bartelt machine.

Implementation and Technology Transfer:

After three iterations of optimization, the produced pouches passed manufacturer evaluations, passed the USDA on-site evaluation and were accepted by DSCP. The technology is currently being transitioned to industry. Ultrasonic sealing resulted in significant decrease of number of rejects due to seal area contamination from 5.6% to 1.2%. The producer also found that throughput could be increased from 32 pouches per minute to 45 pouches per minute, compared to conventional heat sealing.



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Expected Benefits and Warfighter Impact:

Compared to conventional heat sealing, ultrasonic sealing has the potential to increase line speed by approximately 50%. This increase in line speed can translate into a 50% increase in production throughput. This coupled with the decrease in rejects results in a significant potential for savings.

The business case analysis demonstrates that there is a potential industry wide savings of \$474,000 per year due to fewer product rejects and increased throughput. Over the period 2007-2015, this would realize savings of \$4.3M

TIME LINE / MILESTONE

Start Date: April 2002

End Date: June 2004

FUNDING

DLA ManTech: \$336,144

PARTICIPANTS

- The Ohio State University
- SOPAKCO
- Edison Welding Institute
- US Army Natick Center
- USDA Agricultural Marketing Services
- Defense Supply Center Philadelphia