

MagneStretch Process Reduces Stretch Forming Manufacturing Costs

Magnetic Forming Technology Enables Forming of Al7075 Directly from T6 Condition

D. C. Newman, and D. P. Bauer, IAP Research, Inc.

Navy Depot Wanted to Eliminate Heat Treating in Stretch Forming Operations

Through the funding support by the Navy SBIR Program IAP Research, Inc. has developed a process for improving the cost effectiveness of forming aluminum aircraft skin panels by the stretch forming process. IAP has worked closely with engineers at the Naval Aviation Depot, in Cherry Point NC, to use the benefits of electromagnetic forming (EMF) to enhance the efficiency, cost effectiveness and safety of their stretch forming operations. The major goal of the Phase I SBIR effort was to demonstrate the feasibility of eliminating costly and time consuming pre and post forming heat treating steps required to form 7075 and 2024 alloys used in aircraft skins such as the CH53 helicopter.



The Phase I project at IAP focused on using electromagnetic forming technology to form a commonly used aircraft skin material such as 7075 aluminum directly in the T6 heat treat condition.

Current Stretch Forming Process Costs Time and Money

The current process for forming aircraft skin panels from 7075 is summarized below:

1. Solution Heat Treat Annealed or Heat Treated Sheet in Furnace
2. Quench within 10 sec. After removal from furnace (to create the very ductile W Temper)
3. Stretch on press within 6-10 minutes after removal from quench bath
4. Trim Part
5. Final Heat Treatment to T6 condition
6. Part is anodized and painted.

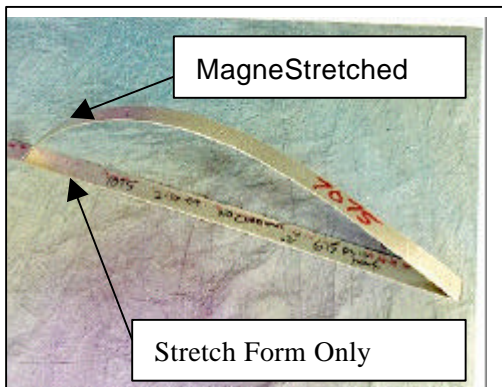
Using the current process can take as long as 7-14 days to produce a replacement panel. The MagneStretch process allows forming directly from the T6 condition eliminating the need for the pre and post heat treating steps. Estimates by NAVDEP Cherry Point have estimated that the MagneStretch process can reduce the time to produce a replacement panel to 2 days. This is critical in today's operational environment.

What Does MagneStretch Do ?

The MagneStretch process integrates completely with your existing stretch press operation. The MagneStretch process will allow you to form skin panels direct from the T4 or T6 condition. Elimination of pre and post processing heat treat steps will increase turn around time and reduce costs.

We have conducted formability trials on 7075 aluminum sheet that was formed directly from the T6 condition. The results are show the dramatic forming that is achieved with the MagneStretch process. The sheet with the least

amount of forming was formed in a standard stretching operation over an 11.00 radius of curvature to about 1-2% plastic strain and released. The drastic amount of spring back is evident. The MagneStretch sheet was pre-stretched to the same conditions and then “magnetically stretched twice. In between stretch cycles the “slack” was taken out of the sheet by tightening it against the die.



Can MagneStretch Improve Your Stretch Forming Operations?

In the Phase I SBIR Project we have shown that the MagneStretch process can :

- Allow stretch forming of 7075 from T6 condition with little or no spring back
- Eliminate costly pre and post forming heat treating steps in current stretch forming process
- Does not alter the microstructure

We are currently preparing the project plan for moving the MagneStretch process into Phase II. Our Phase II goal is to qualify the MagneStretch process to make replacement skins for CH53 helicopters currently supported by the Naval Aviation Depot, Cherry Pont, NC. If you think your companies' stretch forming operation can benefit from the Magnestretch process, and would be interested in participating with IAP in this Navy Funded effort, we would like to include your company as part of our team.

If you would like more information about becoming part of the Phase II program or more information on the Magnepress family of solutions please contact:

Duane Newman
MagneStretch Program Manager
IAP Research Inc.
2763 Culver Ave.
Dayton, OH 45429
Phone: (937) 296-1806

Fax: (937) 296-1114

Email: sales@iap.com

Website: magnepress.com