

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

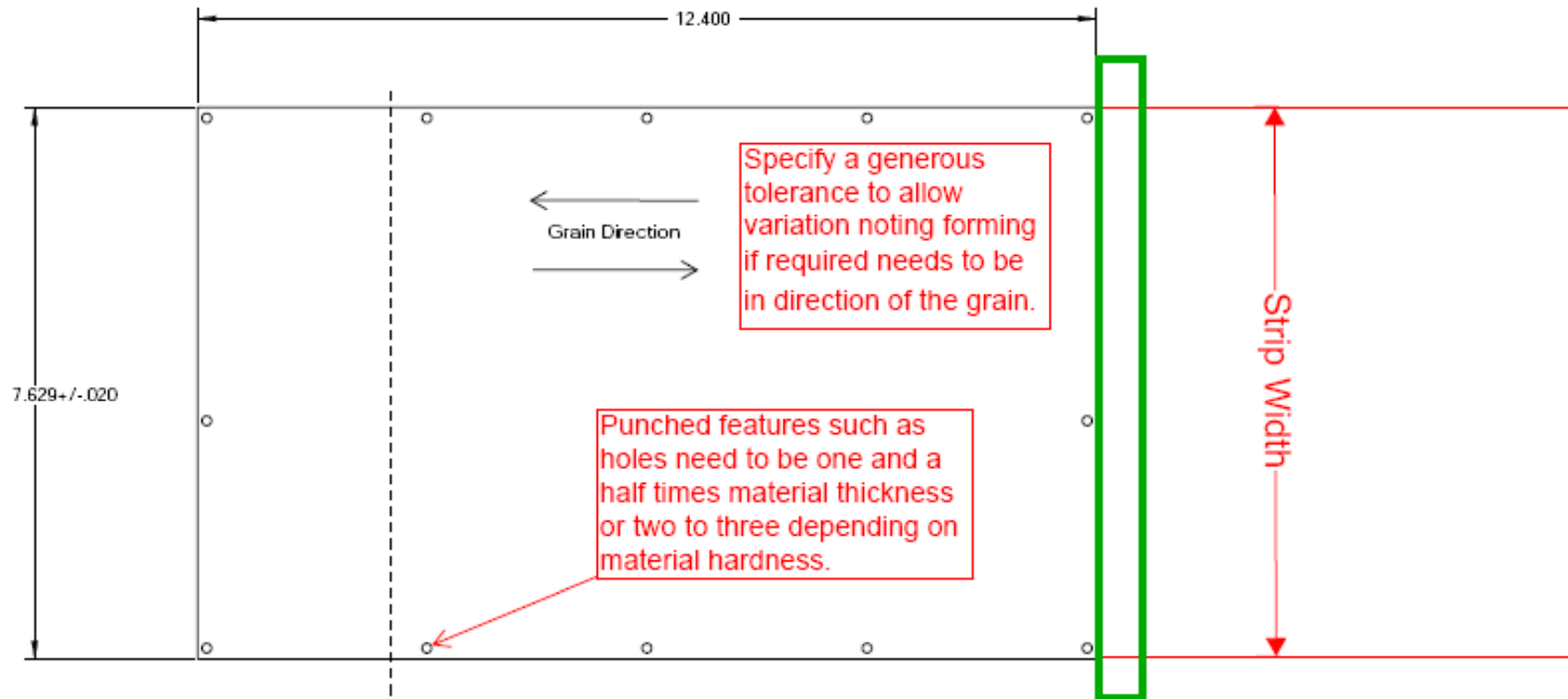
<b>1. REPORT DATE (DD-MM-YYYY)</b> 7/1/2011		<b>2. REPORT TYPE</b> Final Report		<b>3. DATES COVERED (From - To)</b> Jan 01,2011 thru July 30th 2011	
<b>4. TITLE AND SUBTITLE</b> Reactive Tile Fabrication Support				<b>5a. CONTRACT NUMBER</b> W15QKN-09-9-1001	
				<b>5b. GRANT NUMBER</b>	
				<b>5c. PROGRAM ELEMENT NUMBER</b>	
<b>6. AUTHOR(S)</b> David Gerke				<b>5d. PROJECT NUMBER</b>	
				<b>5e. TASK NUMBER</b>	
				<b>5f. WORK UNIT NUMBER</b>	
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Nu-Way Industries, Inc.				<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> ATI, NVEC Consortium Management Firm 5300 International Blvd., Charleston, SC 29418				<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>	
				<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b>	
<b>12. DISTRIBUTION / AVAILABILITY STATEMENT</b> Public					
<b>13. SUPPLEMENTARY NOTES</b>					
<b>14. ABSTRACT</b> Improved dimensional stability for laser welding with interlocking cutouts on the edges rather than internal return flanges.  Forming heavy gage 17-4 can be achieved by annealing to red hot 1900 F then air cool down to manageable 800 F rather than 800 F as suggest in the material data sheet. While plates were formed consideration for bulging, tolerance capabilities and slow throughput resulting in higher component costs. issue are inconsistent forms angles and variation of the material thickness through the bend and metal fatigue on over bends past 90 degrees.					
<b>15. SUBJECT TERMS</b> Laser welding, 17-4					
<b>16. SECURITY CLASSIFICATION OF:</b> "U" unclassified			<b>17. LIMITATION OF ABSTRACT</b> UU	<b>18. NUMBER OF PAGES</b> 1	<b>19a. NAME OF RESPONSIBLE PERSON</b> David Gerke
<b>a. REPORT</b> UU	<b>b. ABSTRACT</b> UU	<b>c. THIS PAGE</b> UU			<b>19b. TELEPHONE NUMBER (include area code)</b> (847) 298-7710

Nu-Way Industries, Inc.

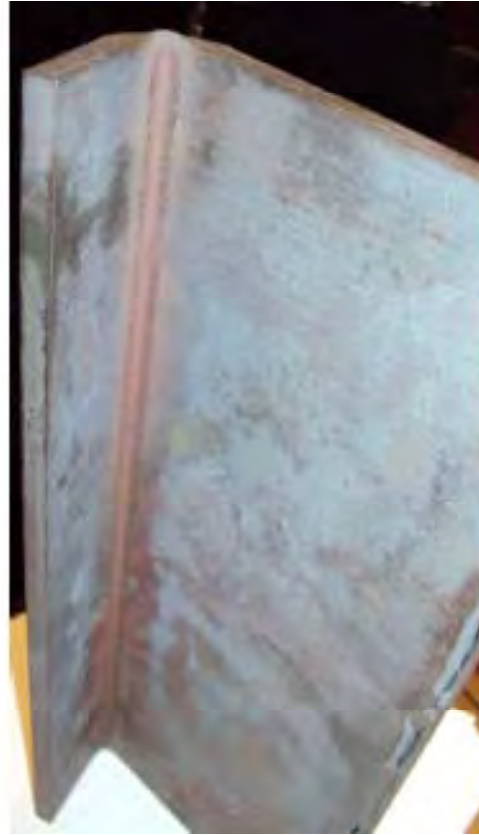
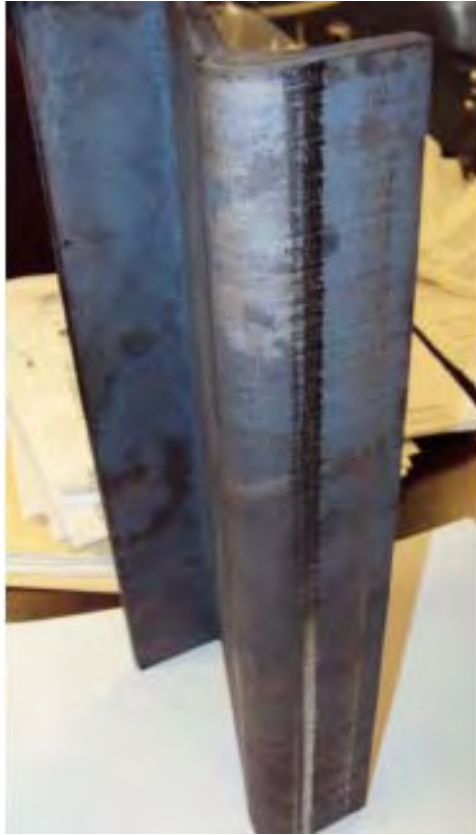
Final Report  
Agreement 2011-303  
10-01-INIT575

June 30<sup>th</sup> 2011

# Parameters for stamping 17-4 with cutoff scrap only

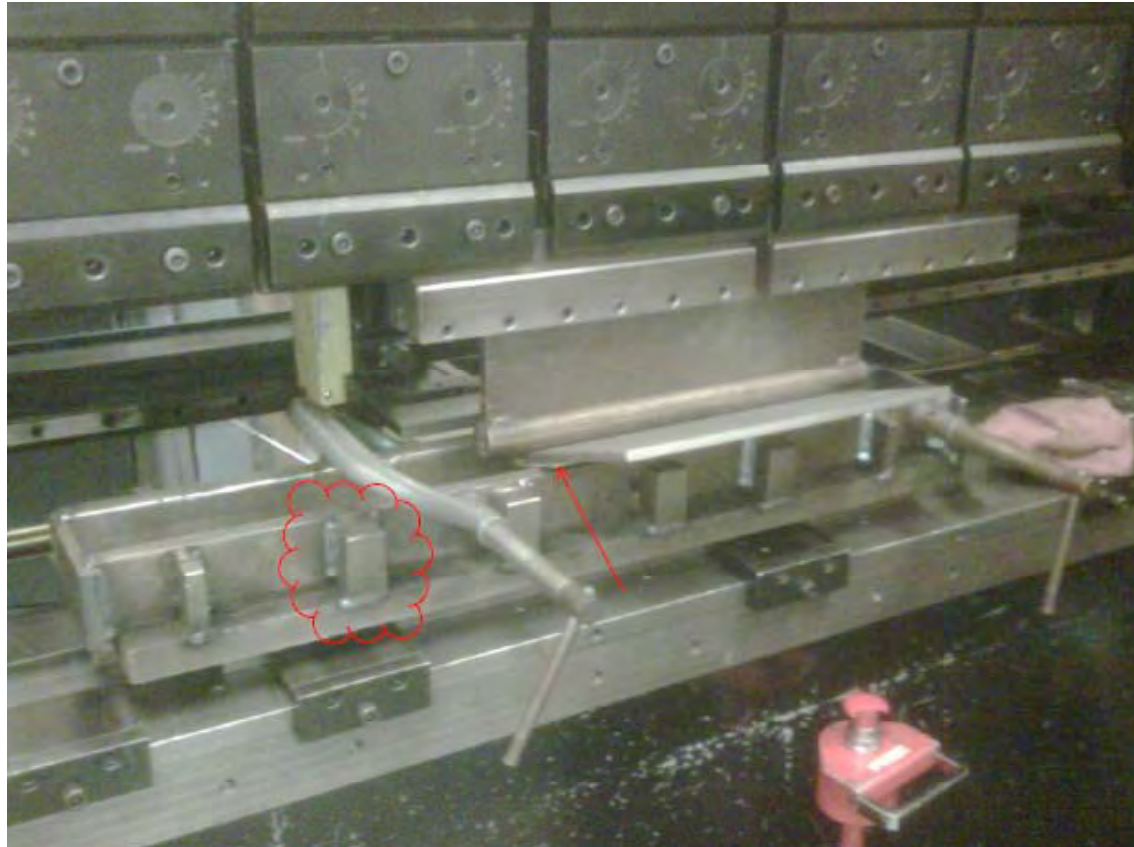


# Heavy Gage 17-4 Forming



Forming heavy gage 17-4 can be achieved by annealing to red hot 1900 F then air cool down to manageable 800 F rather than 800 F as suggest in the material data sheet. While plates were formed consideration for bulging, tolerance capabilities and slow throughput resulting in higher component costs.

# Heavy Gage 17-4 Forming



The forming fixture required weld gussets for support and plates had to be formed with a sub-plate to reduce stress and fracturing.

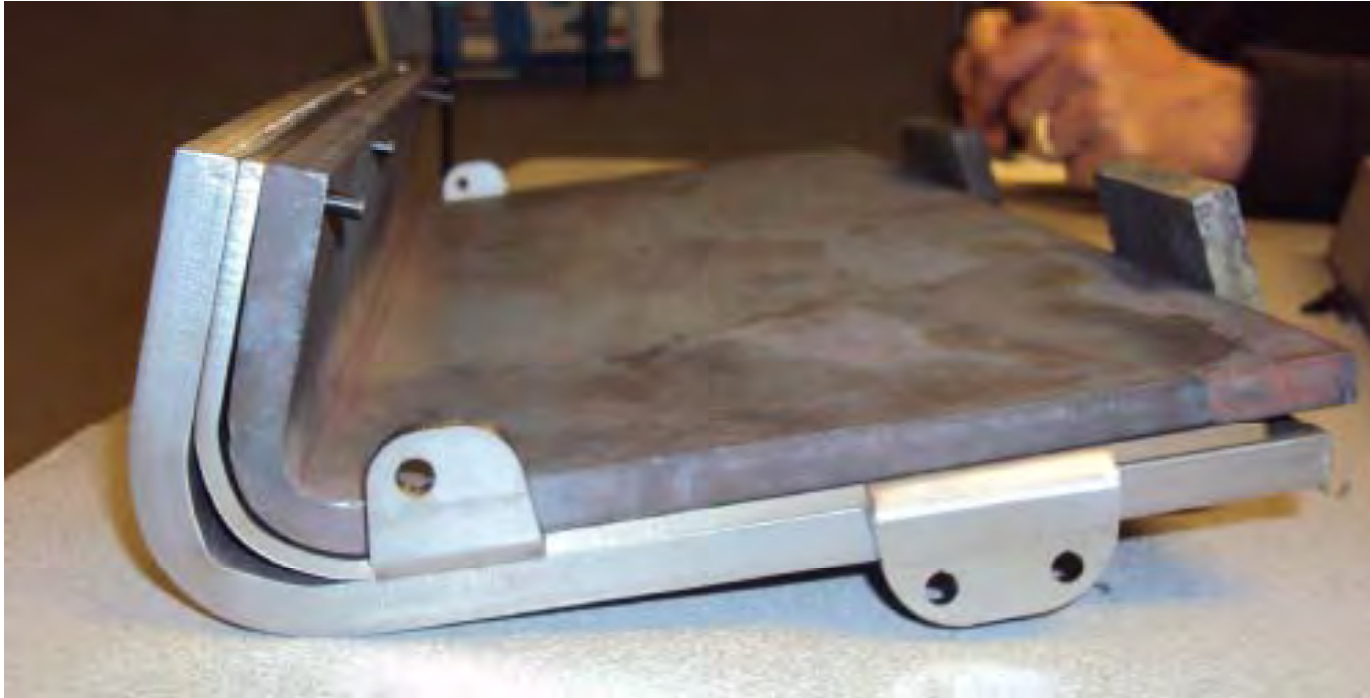
# Heavy Gage 17-4 Forming



Some of the issue are inconsistent forms angles and variation of the material thickness through the bend and metal fatigue on over bends past 90 degrees.



# Heavy Gage 17-4 Forming



Tolerances stack-up became a issue because of the inconsistent forms angles and variation of the material thickness through the bend.

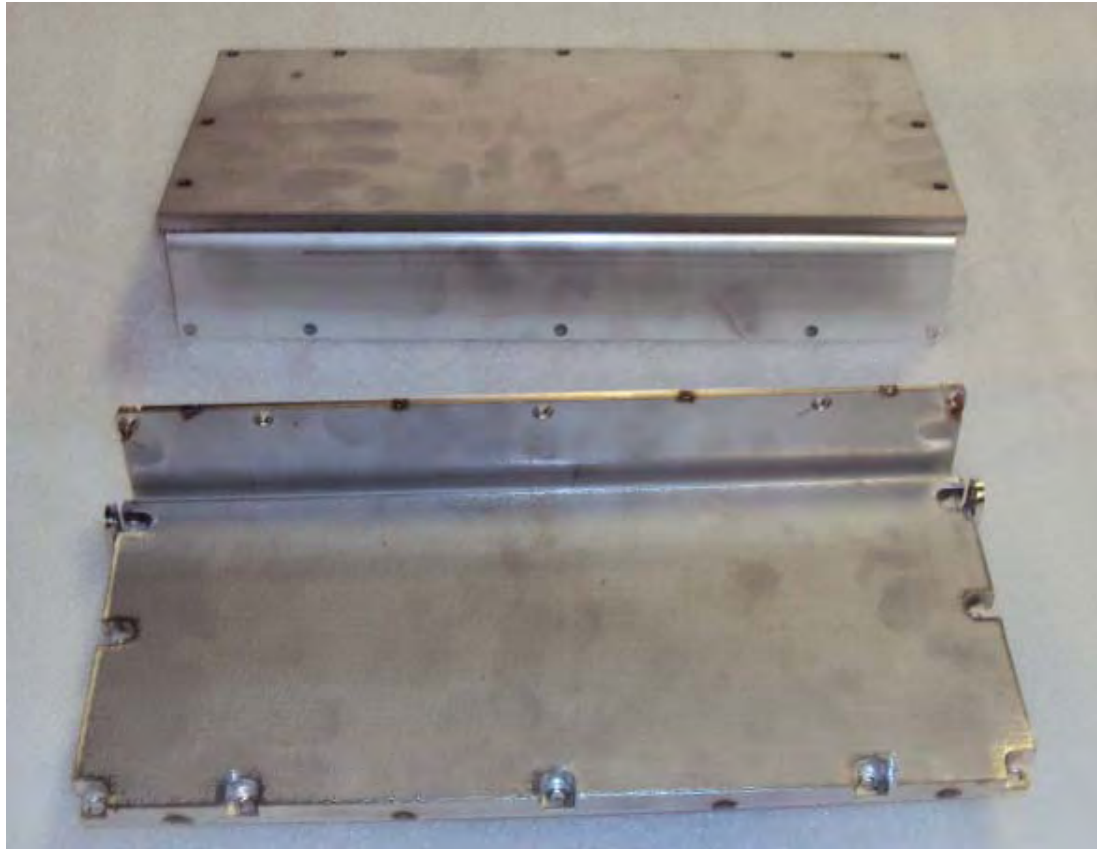
# Heavy Gage 17-4 Forming



The solution for the first six samples was to match each component of the tile by welding on strips to build back up the material to match the rails were the thickness variation resulted in gaps.



# Transformation of Tile to Eliminate Forming



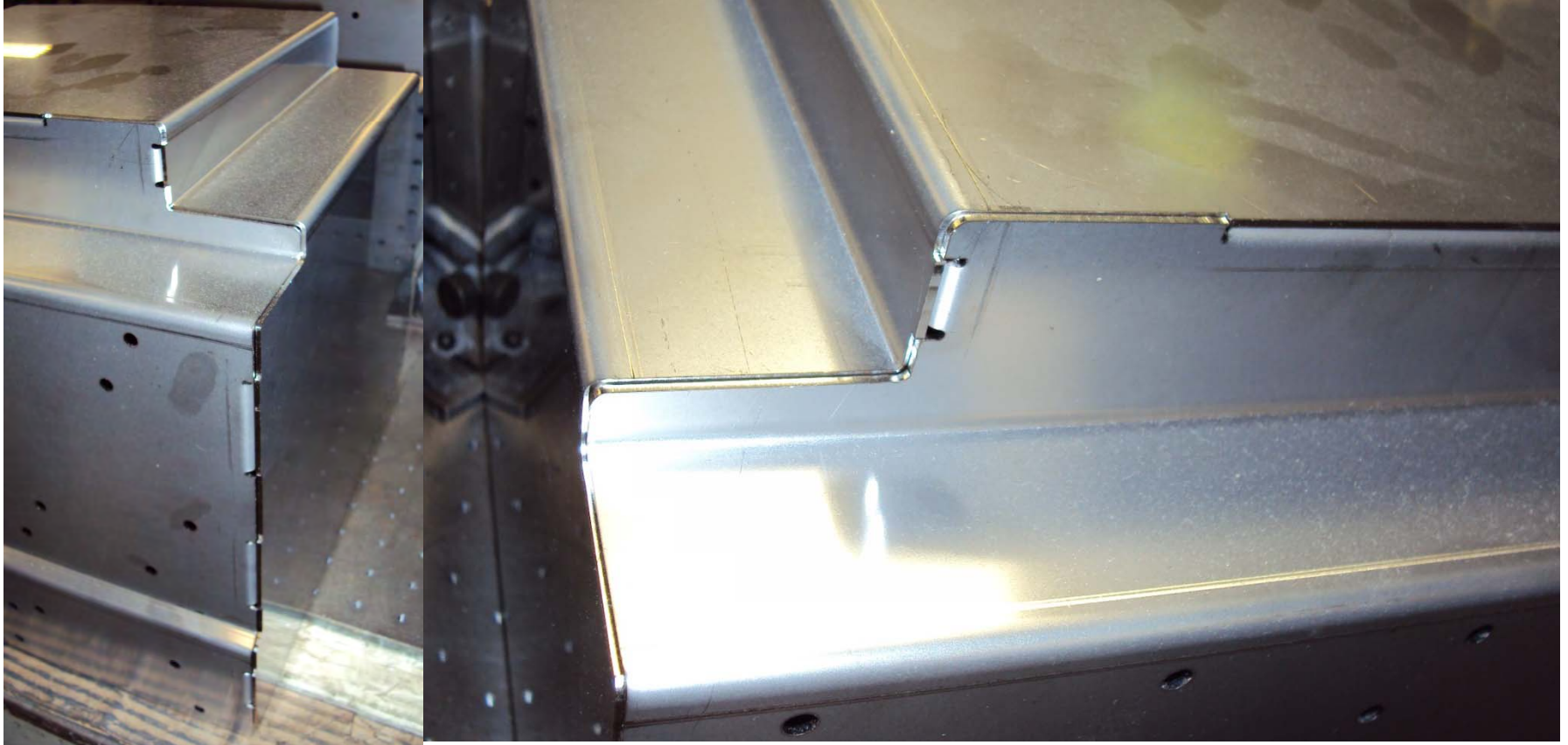
Flat 17-4 tile plates welded to .030"  $\frac{1}{4}$  hard stainless steel

# Transformation of Tile to Eliminate Forming



Flat 17-4 tile plates welded to .030"  $\frac{1}{4}$  hard stainless steel with formed rails between for internal casing

# Precision Component Forming



Mating of Housing components with interlocking features and fit up edges and corners

# Precision laser weld fixture



Weld fixture for precision feature location

# 20 inches per minute laser weld



Laser weld result that could be improved with interlocking cutouts on the edges rather than internal return flanges.