PHOTOGRAPH THIS SHEET

AD-A953 971

DTIC ACCESSION NUMBER

LEVEL

1

INVENTORY

WAL-640/135

DOCUMENT IDENTIFICATION

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

DISTRIBUTION STATEMENT

ACCESSION FOR
NTIS GRA&I ☒
DTIC TAB ☐
UNANNOUNCED ☐
JUSTIFICATION

BY
DISTRIBUTION /
AVAILABILITY CODES

DIST	AVAIL AND/OR SPECIAL	
A-1		

DISTRIBUTION STAMP

UNANNOUNCED

DTIC
ELECTE
S OCT 19 1984 D
D

DATE ACCESSIONED

DATE RETURNED

84 06 27 031

DATE RECEIVED IN DTIC

REGISTERED OR CERTIFIED NO.

PHOTOGRAPH THIS SHEET AND RETURN TO DTIC-DDAC

DTIC FORM 70A DEC 83

DOCUMENT PROCESSING SHEET

PREVIOUS EDITION MAY BE USED UNTIL STOCK IS EXHAUSTED.

U.S. EXPERIMENTAL MODEL BASIN
NAVY YARD, WASHINGTON, D.C.

WELDING TEST NO. 170

INVESTIGATION OF WELDED BUTTS AND SEAMS IN S. T. S. SUBJECTED TO BALLISTIC IMPACT - REPORT OF TENSILE AND BEND TESTS

By

U.S. EXPERIMENTAL MODEL BASIN

April 1939

Report R-106

U.S. EXPERIMENTAL MODEL BASIN
NAVY YARD, WASHINGTON, D.C.

WELDING TEST NO. 170

Investigation of Welded Butts and Seams in S.T.S. Subjected to Ballistic Impact - Report of Tensile and Bend Tests

~~CONFIDENTIAL~~

9

April 1939

Report R-106

UNCLASSIFIED

WELDING TEST NO. 170 – TENSILE AND BEND TESTS

Introduction

The tensile and bend tests reported herein are part of a test to investigate different types of butts and seams subjected to ballistic impact (C&R letter to Comdt. Philadelphia, JJ46-1-(19)(TB) 11/4 of October 13, 1938).

Description of Tests

There were fifteen (15) specimens tested, three (3) specimens each for: base metal, double V butt weld machined flush, double V butt weld "as deposited", welded scarph joint machined, and welded scarph joint "as deposited". All specimens were 3" wide of 60 lb. STS plate. Two specimens of each group of three were used for the tensile tests. A section 18" long was cut from the middle of the third specimen for the bend test.

Results

Tensile strengths are given in Table 1. Fractures are shown in the accompanying photographs, Fig. 1-5. The different specimens arranged in order of decreasing tensile strength are as follows: base metal, "as deposited" scarph weld, machined scarph weld, "as deposited" butt weld, machined butt weld. Results were quite consistent. The base metal ultimate strength averaged 114,400 lbs. per sq. in. The welded specimens developed 75 per cent to 88 per cent of the strength of the plate.

Bend test results are given in Table 2. The photographs, Fig.6-10 show the specimens after test. The base metal specimen was bent to an angle of 180° without failure. The failure of the butt welded specimens was gradual, the machined butt being a little more ductile than the "as deposited". However, it is to be noted that the machined specimen failed through the weld while the "as deposited" failed in the bend. (Fig. 7 and 8). The scarph joints failed with a sharp fracture, the "as deposited" joint being considerably more ductile than the machined joint. This apparently increased ductility of the scarphed joints is probably due to the method of testing whereby the maximum curvature came at the center of the weld for the butt welded specimens and between the welds for the scarphed specimens.

Personnel

These tests were made by J. W. Day, Asst. Mech. Eng.

TABLE I.

TENSILE TEST DATA

Spec. No.	Nominal Plate Area Sq. In.	Ultimate Load Lb.	Ultimate Stress lb./sq.in. based on plate area	Type of Joint	Notes on Fracture
1	4.41	502 000	113 800	Base Metal	Failed at surface defect.
2	"	507 000	115 000	" "	Ragged fracture.
4	"	384 000	87 100	Butt, weld	Failed in weld.
6	"	378 000	85 700	Machined	" " "
8	"	398 000	90 300	Butt, weld	Failed in weld.
9	"	395 000	89 600	as deposited	" " "
10	"	432 000	98 000	Scarph	Failed in weld.
12	"	426 000	96 600	machined	" " "
11	"	451 000	102 300	Scarph	Failed in weld, slight bond.
14	"	435 000	98 700	as deposited	Failed at surface crack in plate.

Table 2

BEND TEST DATA

Spec. No.	Span. in. Mid-Point Loaded	Maximum Load Lb.	Angle of Bend at Failure	Type of Joint	Notes on Fracture
3	18	102 000	180°	Base Metal	No fracture
5	18	53 000	28.5°	Butt Weld Machined	Center of Weld
7	18	64 000	22.0°	Butt Weld "as deposited"	Edge of Weld
13	18	71 000	34.5°	Scarph Machined	Sharp fracture, failed near edge of tension weld and thru center of compression weld.
15	18	95 600	72.0°	Scarph "as deposited"	Sharp fracture, failed at edge of tension weld.

Specimen No. 1 – Base Metal.

Specimen No. 2 – Base Metal.

Specimen No. 4 – Machined butt weld.

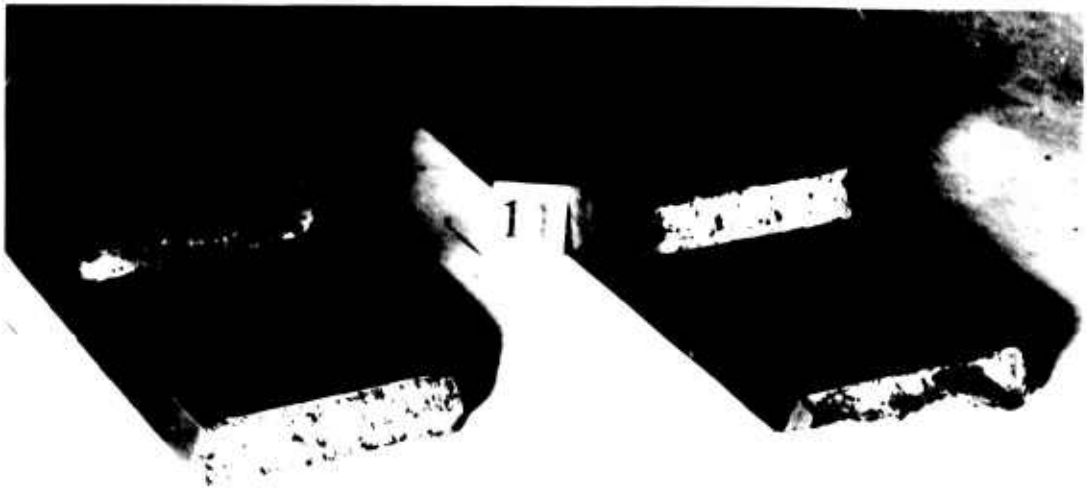
Specimen No. 6 – Machined butt weld.

Specimen No. 8 – "As deposited" butt weld.

Specimen No. 9 – "As deposited" butt weld.

Specimen No. 10 – Scarph, machined weld.

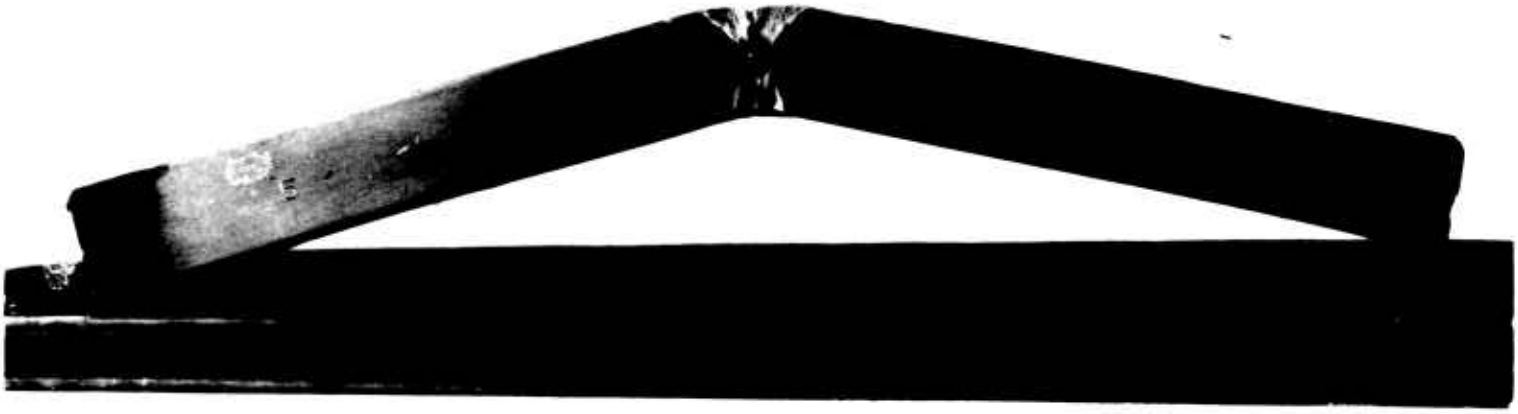
Specimen No. 12 – Scarph, machined weld.



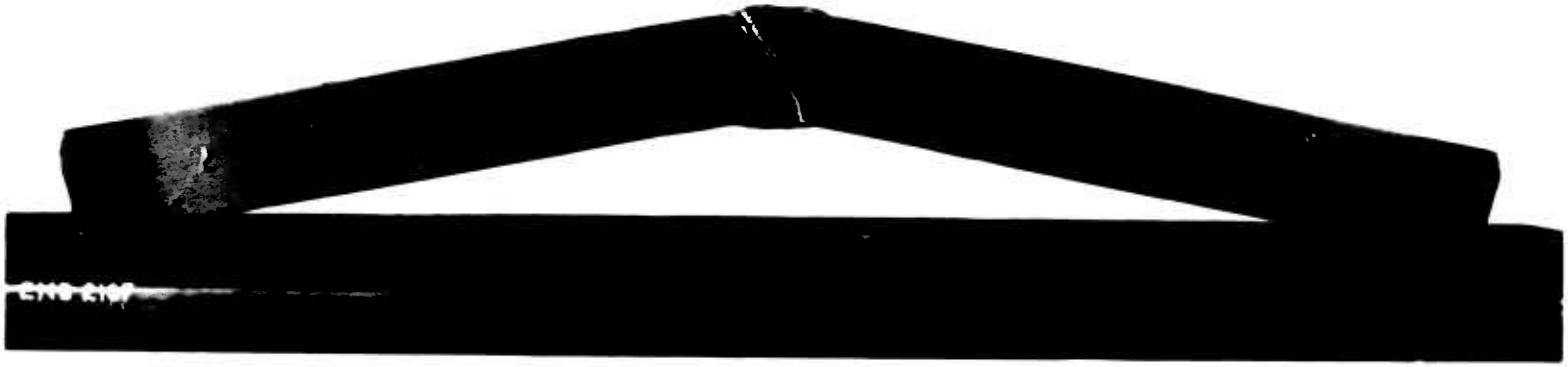
Specimen No. 11 – Scarph, as deposited weld.

Specimen No. 14 – Scarph, as deposited weld.

Specimen No. 3 – Base Metal.

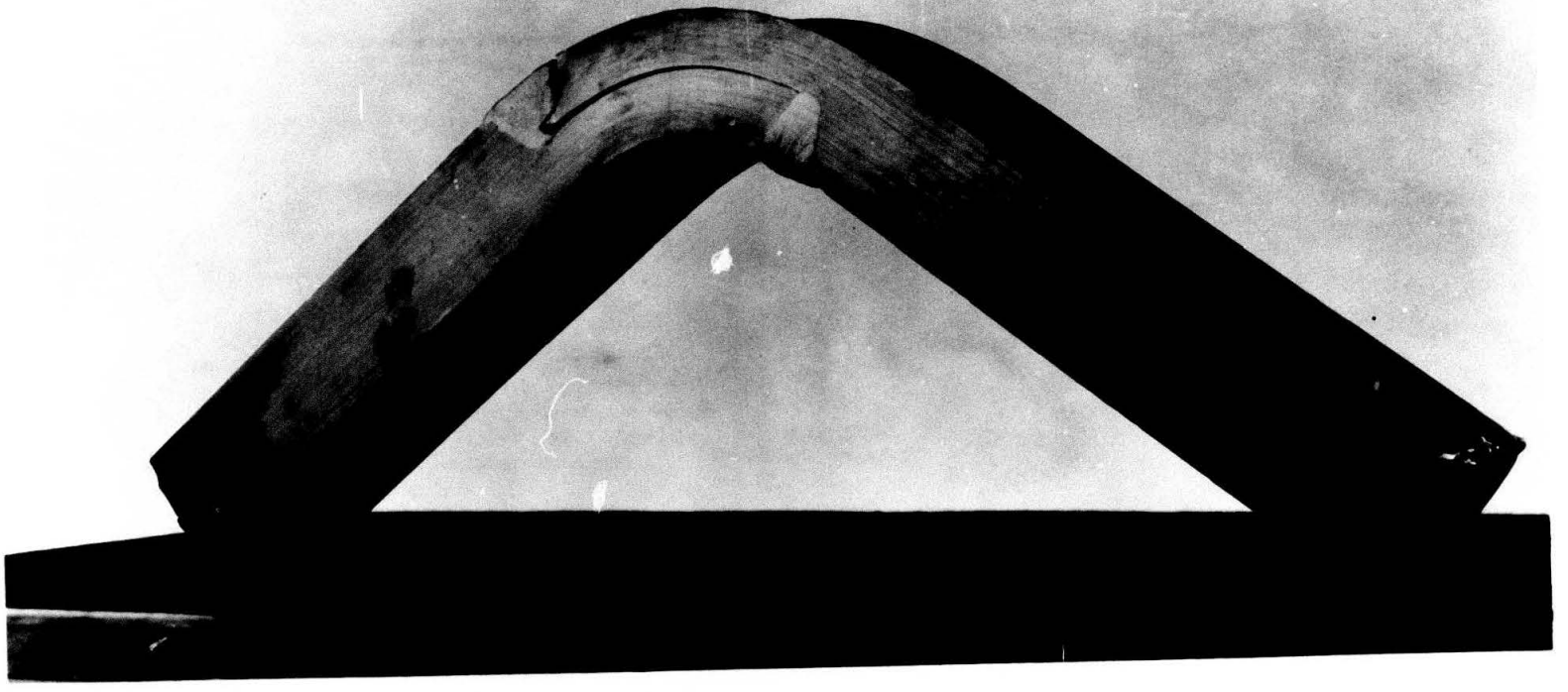


Specimen No. 5 – Machined butt weld.



Specimen No. 7 – "As deposited" butt weld.

Specimen No. 13 – Scarph, machined weld.



Specimen No. 15 – Scarph, "as deposited" weld.