

**BELOW-THE-HOOK LIFTING DEVICE**  
**Engineering Note Cover Page**

Lifting Device Numbers:

FNAL Site No.: \_\_\_\_\_ Div. Specific No.: 110 Asset No. \_\_\_\_\_  
 if applicable if applicable if applicable

ASME B30.20 Group: (check one)

Group I	Structural and Mechanical Lifting Devices
Group II	Vacuum Lifting Devices
Group III	Magnets, Close Proximity Operated
Group IV	Magnets, Remote Operated

Device Name or Description: SPREADER BAR

Device was: Purchased from a Commercial Lifting Device Manufacturer  
 mfg. name: \_\_\_\_\_

(check all applicable) Designed and Built at Fermilab   
 Designed by Fermilab and Built by a Vendor  
 Assy drawing number: \_\_\_\_\_  
 Provided by a User or Other Laboratory  
 Other. Describe: \_\_\_\_\_

Engineering Note Prepared by: Tony Levand Date: 2/16/00Engineering Note Reviewed by: [Signature] Date: 3/2/00

Lifting Device Data:

Capacity: 1600 lbsFixture Weight: 100 lbsService: normal heavy severe (refer to B30.20 for definitions)Duty Cycle: NA 8, 16 or 24 hour rating (applicable to groups III, and IV)

Inspections Frequency: \_\_\_\_\_

Rated Load Test by FNAL (if applicable): Date: \_\_\_\_\_ Load: \_\_\_\_\_

Check if Load Test was by Vendor and attach the certificate.

Satisfactory Load Test Witnessed by: \_\_\_\_\_

Signature (of Load Test Witness): \_\_\_\_\_

Notes or Special Information:



SUBJECT

ALAYER LIFTING/TURNING FIXTURE MOD

NAME T. Levard

DATE  
2/16/00

REVISION DATE

1) SPREADER BAR:

LOAD = 800 lbs MAT + 550 lbs fixture = 1350 lbs

$$M = \frac{PL}{4} = \frac{1350 \cdot 115}{4} = 38,810 \text{ in lbs}$$

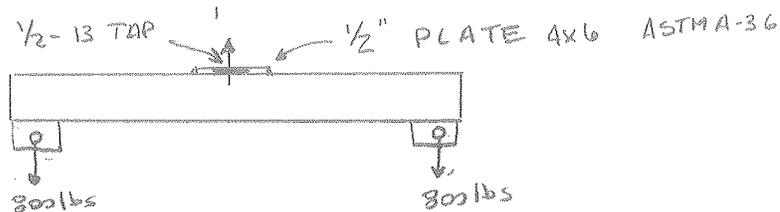
MATERIAL ALLOWABLES ASTM A 500 = 42 KSI

$$f_g = \frac{42}{3} = 14 \text{ KSI}$$

$$S = \frac{38.8}{14} = 2.77 \text{ in}^3$$

4 x 4 x 3/16 = 3.30 in<sup>3</sup> TUBING

ALLOWABLE LOAD = 1600 lbs (fb =  $\frac{1600 \times 115}{4 \times 3.30} = 14 \text{ KSI}$ )



WELD STRESS:  $A = \frac{3}{16} \times 8 = 1 \text{ in}^2$   $f_s = 16 \text{ KSI} < 14 \text{ KSI}$

THREAD STRIP OUT:  $A = .25 \times \pi \times .5 = .392 \text{ in}^2$

$$f_s = \frac{36}{3 \times 2} = 6 \text{ KSI}$$

6 x .392 = 2352 lbs thread stripping



SUBJECT

Δ-LAYER LIFTING/TURNING FIXTURE  
SPREADER BAR

NAME

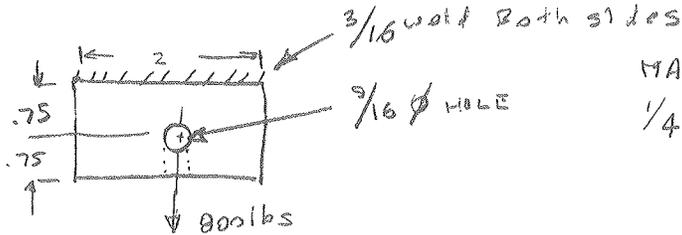
T. LEVAND

DATE

2/14/00

REVISION DATE

LV4 ANALYSIS



MATERIAL:

1/4 ASTM A-36 HR FLAT

$$F_{ty} = 36 \text{ KSI}$$

$$F_n = \frac{36}{3} = 12 \text{ KSI}$$

$$F_s = 6 \text{ KSI}$$

Bolt TENSILE:

$$.5 \times 2 \times .25 \times 6 \text{ KSI} = 1500 \text{ lbs} > 900 \text{ lbs}$$

WELD:

$$\frac{3/16}{\sqrt{2}} \times 2 \times 2 \times 12 \text{ KSI} = 6364 \text{ lbs} > 900 \text{ lbs}$$