

# 1 | TECHNICAL DATA

# Technical Data

## TSLOTS EXTRUSION ADVANTAGES

- Linear adjustment in X, Y and Z axis
- All Fractional TSLOTS are on 1/2", 3/4", 1" or 1 1/2" center lines. All Metric TSLOTS are on 25mm and 40mm center lines.
- Use fractional or metric sized fasteners
- Lightweight and easy to use
- Stocked in 240" lengths
- No welding required to assemble your design – no heat stress or warpage
- Easy to fabricate
- Add to your design or change it at any time – flexibility is the key

## EXTRUSION SPECIFICATIONS

**Alloy** – 6063\*, T6 Temper

**Yield Strength** – Mpa = 200

**0.2% Proof Stress** – ksi = 29

**Tensile Strength** – Mpa = 230

**0.2% Proof Stress** – ksi = 33

**Elasticity (E)** – approximately 10,000,000 lbs./sq.in.

**Hardness** – Webster Model "B" 11-12

**Flatness** – .004" per inch of width

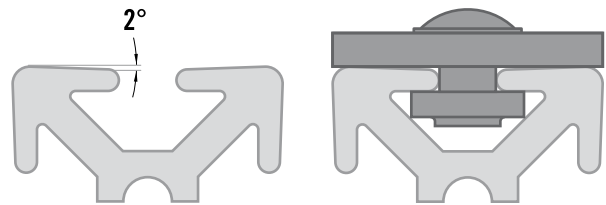
**Straightness** - .0125" per foot of length, not to exceed .120 inches over 20 feet of length

**Twist** – Twist per foot of length does not exceed .25° and total twist over 20 feet of length does not exceed 1.5°

*\*As an extruder, there are many other alloys that we can extrude. If your application calls for a different alloy, let us know and we can extrude it for you.*

## SPRING LOCK FEATURE

All TSLOTS structural extrusions have a 2° taper that spring locks fasteners as they are tightened. Fasteners will not loosen, even under heavy vibration.



## FASTENER TORQUE SPECIFICATIONS

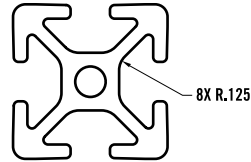
The table (below) indicates the amount of torque needed in foot lbs. to activate the 2° drop lock feature of the extrusion. The nut and bolt combination is pre-loaded when tightened to the minimum torque rating. The pre-loaded state makes a vibration proof connection.

FASTENER DESCRIPTION	TESTED EXTRUSION	MIN FT LBS TORQUE	MAX FT LBS TORQUE
5/16-18 FBHSCS or BHSCS	1.5" x 1.5"	15	20
Economy T-Slot Stud, Washer & Hex Nut	1.5" x 1.5"	20	25
Anchor Fastener & Standard T-Nut	1.5" x 1.5"	17	22
End Fastener	1.5" x 1.5"	17	22
1/4-20 FBHSCS or BHSCS	1.5" x 1.5"	12	17
1/4-20 FBHSCS used as an End Fastener for the 1" x 1"	1" x 1"	13	18
10-32 SHCS or BHSCS	1.5" x 1.5"	9	13

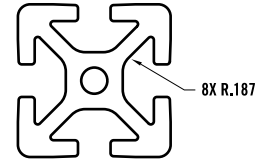
## TSLOTS RADIUS

TSLOTS extrusions incorporate a radius in the T-Slot to ensure drop-in T-Nuts are easy to use.

### 10 SERIES



### 15 SERIES



## ALUMINUM ALLOY

An aluminum extrusion alloy is a predetermined mixture of one or more elements together with aluminum to be heated and hydraulically pressed through an extrusion die. Some common elements alloyed with aluminum include copper, magnesium, manganese, chromium, silicon, iron, nickel and zinc.

TSLOTS extrusions use the 6063 alloy. In addition to aluminum, the major alloying elements for this alloy include: Mg .45-.9% and Si .20-.6%.

## ANODIZING

Anodizing is an electrochemical process that thickens and toughens the naturally occurring protective oxide. The resulting finish makes a corrosion resistant extrusion. TSLOTS extrusions have an etch anodize finish that is .15-.25 mil. thick.

### REMEMBER – WE CUSTOM EXTRUDE TOO!

Futura can ship you a finished extrusion with your TSLOTS orders. Futura provides the following operations:

- Extrusion
- Machining
- Heat treating
- Warehousing
- Cut to length
- Anodizing
- Painting
- Fabrication
- Engineering assistance
- Punch, slot, countersink

## TSLOTS VS. WELDED STEEL

### TSLOTS ADVANTAGES

- No welding
- No painting (unless you want to)
- No rusting
- No cleanup
- No special tools
- No electricity
- Easy modifications
- Add on attachments
- Remove attachments
- Strong support ability
- Linear slide capability
- Comes packed ready to assemble or arrives assembled if desired
- Compatibility with competitors attachments
- Lower cost per project

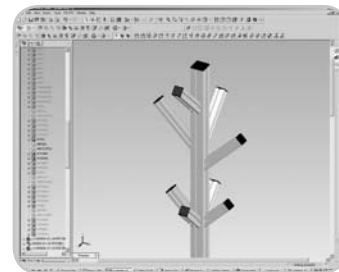
### WELDED STEEL DISADVANTAGES:

- Special equipment, welder
- Welding supplies
- Paint
- Cleaning supplies
- Fabricating equipment
- May rust

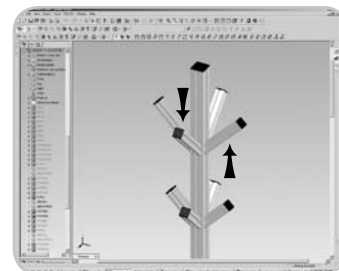
### WELDED STEEL ADVANTAGES

- Permanent assembly

### MAKING CHANGES TO YOUR DESIGN IS EASY!



BEFORE



AFTER

# Technical Data

## DEFLECTION CALCULATIONS

Using the calculations below, find your approximate deflection\* for a specific TSLOTS extrusion. See table below for variations.

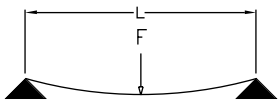
EQUATION VARIABLE UNITS RESPECTIVELY

- Max. Deflection is in inches
- "F" or Force is in pounds
- "L" or Length is in inches
- "E" or Modulus of elasticity is in pounds per inch squared
- "I" or Moment of Inertia is in inches<sup>4</sup>
- "W" or Weight is in pounds per inch

\* For reference only.

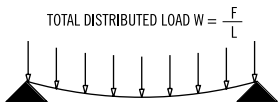
### SUPPORTED LOADS

CONCENTRATED LOAD AT CENTER (*simply supported*)



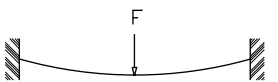
$$\text{MAX DEFLECTION} = \frac{FL^3}{48 EI}$$

UNIFORMLY DISTRIBUTED LOAD (*simply supported*)



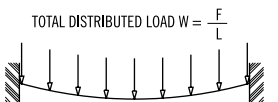
$$\text{MAX DEFLECTION} = \left(\frac{5}{384}\right) \left(\frac{WL^4}{EI}\right)$$

CONCENTRATED LOAD AT CENTER (*between fixed supports*)



$$\text{MAX DEFLECTION} = \frac{FL^3}{192 EI}$$

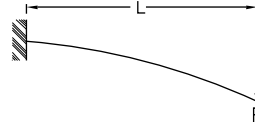
UNIFORMLY DISTRIBUTED LOAD (*between fixed supports*)



$$\text{MAX DEFLECTION} = \frac{WL^4}{384 EI}$$

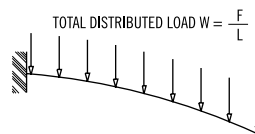
### CANTILEVER LOADS

CONCENTRATED LOAD AT CENTER (*simply supported*)



$$\text{MAX DEFLECTION} = \frac{FL^3}{3 EI}$$

UNIFORMLY DISTRIBUTED LOAD (*simply supported*)



$$\text{MAX DEFLECTION} = \frac{WL^4}{8 EI}$$

EXTRUSION	(E) MODULUS OF ELASTICITY	(Ix) MOMENT OF INERTIA	(Iy) MOMENT OF INERTIA
TS10-10	10,000,000 lbs/sq. in	.046 in <sup>4</sup>	.046 in <sup>4</sup>
TS10-10QR	10,000,000 lbs/sq. in	.0435 in <sup>4</sup>	.0435 in <sup>4</sup>
TS10-20	10,000,000 lbs/sq. in	.087 in <sup>4</sup>	.321 in <sup>4</sup>
TS20-20	10,000,000 lbs/sq. in	.578 in <sup>4</sup>	.578 in <sup>4</sup>
TS15-15	10,000,000 lbs/sq. in	.266 in <sup>4</sup>	.266 in <sup>4</sup>
TS15-15L	10,000,000 lbs/sq. in	.194 in <sup>4</sup>	.194 in <sup>4</sup>
TS15-15QR	10,000,000 lbs/sq. in	.172 in <sup>4</sup>	.172 in <sup>4</sup>
TS15-30	10,000,000 lbs/sq. in	.502 in <sup>4</sup>	1.877 in <sup>4</sup>
TS15-30L	10,000,000 lbs/sq. in	.408 in <sup>4</sup>	1.431 in <sup>4</sup>
TS15-45	10,000,000 lbs/sq. in	.739 in <sup>4</sup>	5.913 in <sup>4</sup>
TS30-30	10,000,000 lbs/sq. in	3.379 in <sup>4</sup>	3.379 in <sup>4</sup>
TS30-60	10,000,000 lbs/sq. in	6.430 in <sup>4</sup>	21.856 in <sup>4</sup>

» Deflection calculations are for reference only - they are only approximate.

## TSLOTS DESIGNPRO™

TSLOTS DesignPro™ is an add-in product for SolidWorks® software that makes designing with structural aluminum extrusions faster and easier than ever before. TSLOTS DesignPro™ reduces the time it takes to create drawings by more than 50% over manual methods. The software also creates an automatic bill of materials (BOM), provides real-time pricing, and allows engineers to send a request for quote (RFQ), place orders, or check the status of orders online.

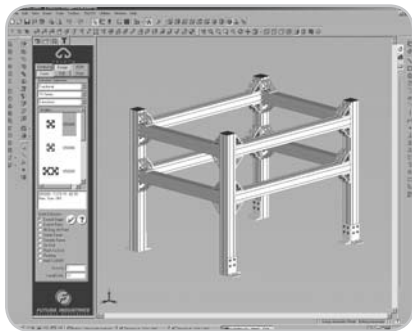
TSLOTS DesignPro™ is available to users of SolidWorks 2004, 2005 and 2006. For those engineers using CAD systems other than SolidWorks, Futura Industries offers design assistance and can provide drawings using SolidWorks eDrawings™ software.

TSLOTS makes the creation of assembly structures faster and easier than using welded steel. The only tools that an engineer needs to complete a structure are a t-nut, fastener, and an allen wrench. Applications include machine guarding, machine frames, workbenches, assembly stations, tool racks, test tables, and clean room structures.

TSLOTS DesignPro™ software is available for free download at [www.tslots.com](http://www.tslots.com) in the Downloads section. Engineers and designers can also request a CD online, or call Futura Industries at 1-800-824-2049.



## USE TSLOTS DESIGNPRO™



Our program creates a bill of materials and generates pricing while you create a 3-D SolidWorks® drawing. This program can be used with full versions of SolidWorks® 2003, 2004, 2005 & 2006.

TSLOTS also offers 2D-DXF, 2D-DWG, 3D-DWG, 3D-STEP, 3D-IGES, and 3D-SAT files that are compatible with AutoCAD® and many other popular CAD programs.

All of these useful design tools and much more are available as free downloads from [www.tslots.com](http://www.tslots.com) and are also available on CD-ROM.

Give us a call at 800-824-2049 or visit our website at [www.tslots.com](http://www.tslots.com)

## FREE DESIGN ASSISTANCE

Our engineers are available to assist you Monday through Friday from 6:00 a.m. until 5:00 p.m. MST. Our highly qualified staff offers design assistance, answers to technical questions, and provides DesignPro support for your projects. Simply contact your distributor and email or fax your project drawings to us.

## DESIGNPRO™ TRAINING ONLINE AT [WWW.TSLOTS.COM](http://WWW.TSLOTS.COM)

Maximize your usage of the TSLOTS DesignPro™ by learning how to use the different features included in the SolidWorks® add-in. Training modules located on our website are designed to quickly teach you how to use the DesignPro's different features. The DesignPro was developed to utilize all of the SolidWorks features that users are familiar with so learning the add-in should be intuitive and the learning curve should be short. Should you have questions or want to learn more about the TSLOTS DesignPro™ please contact our Engineering Department.