
# DFNEXT Camera Floor Mounted Stand Design

*Sarah McMullan*[1,*] *and Luke Daly*[2,3,4]

[1]Impact and Astromaterials Research Centre, Dept. Earth Science and Eng., Imperial College London, SW7 2BP, UK
[2]School of Geographical and Earth Sciences, University of Glasgow, Glasgow, G12 8QQ, UK
[3]Space Science and Technology Centre, School of Earth and Planetary Sciences, Curtin University, GPO Box U1987, Perth WA 6845, Australia
[4]Australian Centre for Microscopy and Microanalysis, University of Sydney, Sydney 2006, NSW, Australia
[*]Corresponding author: Sarah McMullan, s.mcmullan16@imperial.ac.uk

November, 2020

# About

The UK Fireball Network has designed a stand for mounting DFNEXT cameras using off the shelf building/electrical equipment. The stands have been designed to be mounted on the floor, however, the design is easily adaptable for installations on the side of buildings or on a flat roof. This guide will describe the materials needed and build instructions for a floor mounted stand (Fig. 14) but Figure 1 shows a few modified installations used for DFNEXT cameras in the UK.

The stand design in the UK uses the Unistrut system—a metal framing system widely used in electrical and mechanical projects—however an alternative brand can be used if this system is not available. The stands are designed to be weather resistant; all cut metal edges should be galvanised to prevent rust, terrace pads should be used to elevate the wooden base and minimise water damage, and the prevailing wind direction and strength in the installation location should be considered when positioning concrete blocks and deciding the size of the base.

(a) Shed mount

(b) Flat roof, tall stand

(c) Tiled roof mount

(d) Flat roof, short stand

Figure 1: Modified Stand Designs.

# Build Instructions

## Materials needed

- (1) Base Unistrut (1.3 m) ×2
- (2) Standing/Vertical Unistrut (1.7 m) ×2
- (3) Support Unistrut (0.75 m) ×4
- (4) Camera Attachment Unistrut (0.4 m) ×2
- (5) Cross Brace Unistrut (0.75 m) ×2
- 90° fixings (L-bracket) ×4
- 135° fixings ×8
- 50mm M6 Unistrut Bolt ×6
- 30mm M6 Unistrut Bolt ×36
- M6 Nut ×6
- Zebs (spring nut) ×42
- Screws 30 mm
- Screws 50 mm
- Penny washers
- Scaffold Boards (38 mm thick) ×4 (∼2 m)
- Roof battens >6 (0.5 m)
- Terrace pads
- Dense concrete blocks ∼1900 kg/m$^3$ (440×215×100 mm) – up to 16
- Waterproof glue

# Placing a zeb (spring nut)

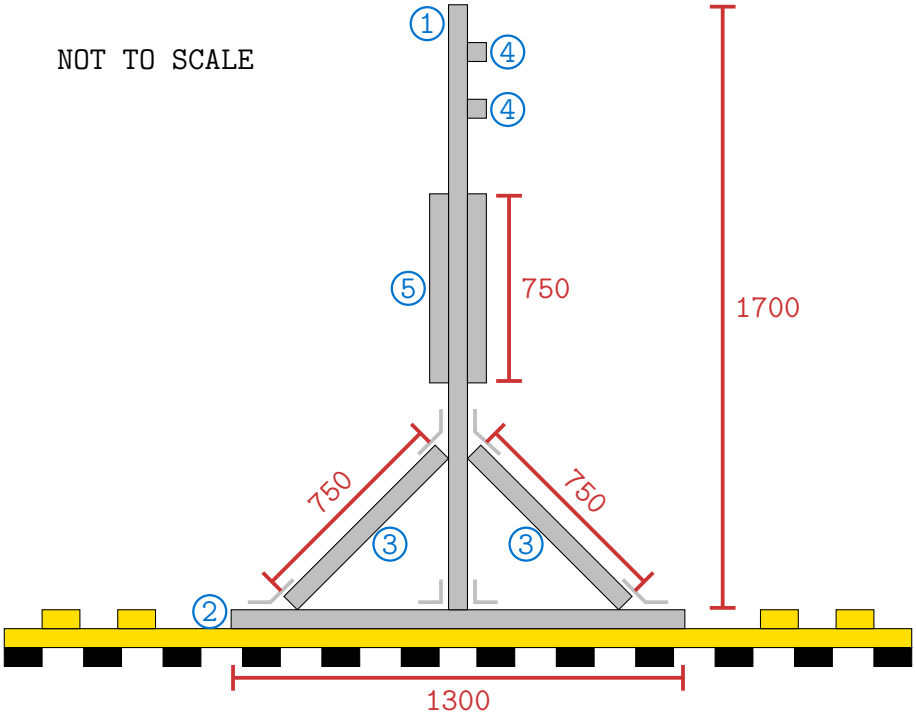
1. Place spring down in Unistrut. Always place over solid metal, they can be moved later.
2. Press down and rotate clockwise 90°.
3. Release and the zeb. Groves should lock in place under the edge of the Unistrut.
4. To move, press down, push along channel into place, and then release.

How to install a Unistrut spring nut.

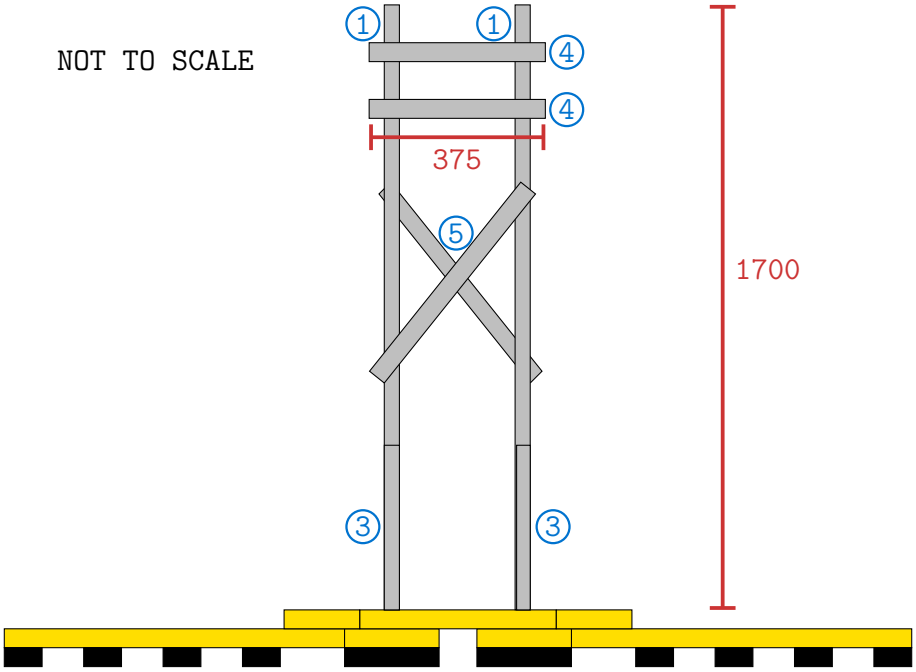
(a) (b)

Figure 2: Unistrut zeb.

# Stand schematics

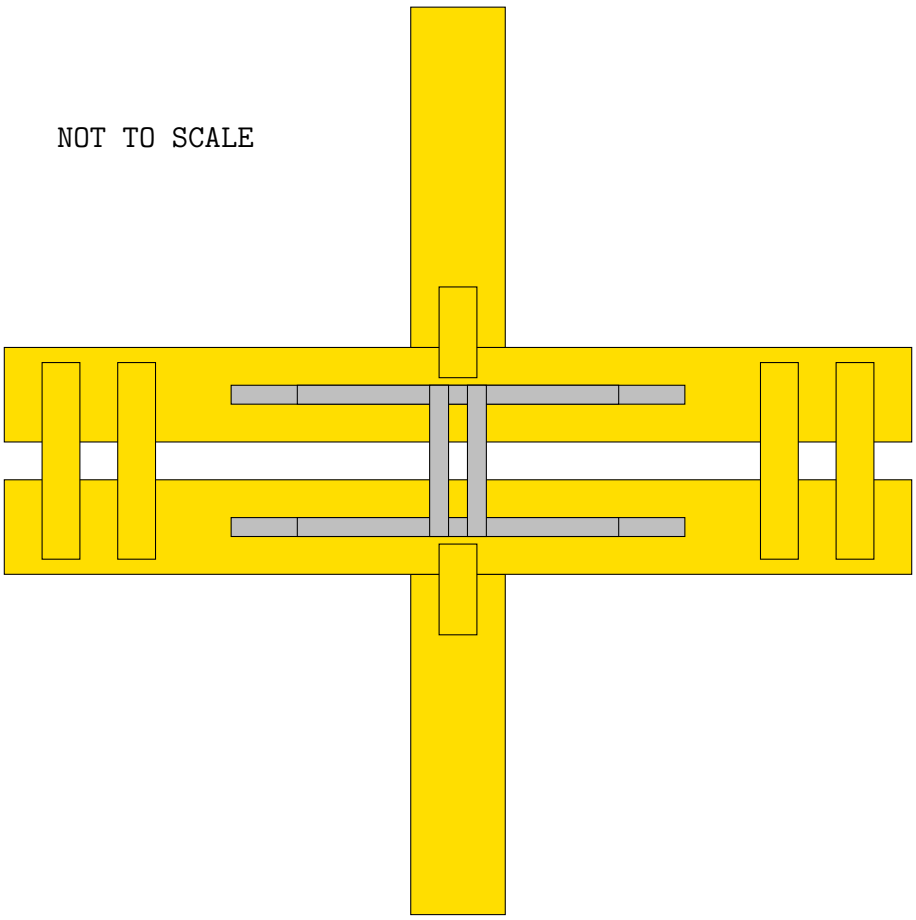



(a) Side view.




(b) Front view.

Figure 3: Fireball camera stand design side view schematic. Silver = Unistrut, silver lines = brackets, yellow = wood, black = terrace pads, and red = dimensions (mm). Unistrut pieces labelled as: (1) vertical, (2) horizontal, (3) 45° braces, (4) camera attachment, and (5) cross braces.




(c) Top view.

Figure 3: Fireball camera stand design top view schematic. Silver = Unistrut, silver lines = brackets, yellow = wood, black = terrace pads, and red = dimensions (mm). Unistrut pieces labelled as: (1) vertical, (2) horizontal, (3) 45° braces, (4) camera attachment, and (5) cross braces.

# Build Instructions

1. Layout all your materials. All following measurements are from the left unless otherwise stated, and zeb positions are from the left side of the zeb.

2. Glue terrace pads evenly spaced, with gaps between, to the base of the scaffold boards. Leave to dry whilst assembling Unistrut. Terrace pads prevent scaffold boards sitting in water and protect surface.

3. Place four zebs on base Unistrut at 555, 605, 680, and 730 mm.

4. Check these are in the correct location by placing two L-brackets, with the short end up over the zebs, and the standing Unistrut between them. The zebs should line up with the holes in the L-brackets. If not, adjust accordingly.

Figure 4: Location of zebs on base.

5. Using 4 short M6 Unistrut bolts and a M6 washers, loosely attach the two L-brackets to the base (these may need to be removed later to reposition slightly). Unistrut should be placed with the open channel facing up and zeb nuts visible (solid part on the ground), in some of the following photos it is incorrect (Fig. 4 is correct).

(a) (b)

Figure 5: Install of L-brackets (base Unistrut channel should be facing upwards)

6. Place a zeb at 20 and 55 mm on vertical Unistrut.
7. Place the vertical Unistrut between L-brackets, with the open channel to the left, and check zebs align with holes.
8. Secure using two 50 mm M6 Unistrut bolts, washers and nuts through both holes.

(a) (b) (c)

Figure 6: Securing vertical Unistrut.

9. Place a zeb at 20 mm on base Unistrut and one at 20 mm from the right.
10. Place a zeb on vertical Unistrut at 580 mm.

Figure 7: Location of 45° support bracket.

11. In support Unistruts, place two zebs 37 mm from either end.

12. Position the support Unistrut at 45° between the base and vertical pieces. Position one 135° bracket at the base of the support piece, and one at the top, with the long sections along the support piece.

13. Loosely secure the bracket to the base piece with a 30 mm Unistrut bolt and washer.

Figure 8: Loosely secure 135° bracket.

14. Secure the long side of the 135° brackets to either end of the support Unistrut using 30 mm Unistrut bolts and M6 washers.

Figure 9: Secure 45° support brace.

15. Repeat steps 12–14.

16. Support Unistrut brackets should line up with each other and the zeb at 580 mm. If not, adjust positions. You may need to remove bolts attaching L-brackets to brace to allow you to move those zebs slightly.

Figure 10: Move L-brackets and respective zebs if necessary.

17. Secure together using 50mm Unistrut bolt, two washers and a M6 nut.

(a) (b)

Figure 11: Secure support braces to vertical Unistrut.

18. Tighten all remaining bolts.

19. Repeat steps 3-18 so you have two matching pieces.

20. Attach the base of one Unistrut piece to the centre of the scaffold board (none terrace pads side) using 30 mm screws and penny washers.

21. Repeat for the other Unistrut piece.

Figure 12: Securely fix Unistrut sections to scaffold board.

22. Measure distance between vertical pieces, and position with a distance of 250 mm between their inside edge.

23. Place zebs at 50 mm and 329 mm on camera attachment Unistrut piece. Repeat.

24. Attach camera attachment pieces to vertical Unistruts 150 mm apart using short M6 Unistrut bolts and M6 washers.

Figure 13: Attach camera attachment pieces between vertical sections.

25. Secure scaffold boards together using lengths of roof batten and 50mm screws and washers.

26. If necessary for stability, add lengths of scaffold board perpendicular to the stand to create a cross-shaped base. Attach using roof batten pieces and 50 mm screws and washers.

27. Add two zebs on both vertical pieces.

28. Add bracing pieces of Unistrut diagonally between vertical pieces, securing with 30mm M6 bolts and M6 washers. One brace should be on the front and one should be on the back.

29. Move camera into position and attach to camera attachment Unistrut pieces. Check cabling is long enough and fasten cables to Unistrut using cable ties.

30. Use concrete blocks on wooden base as kentledge counterweights. Exposure to the wind needs to be considered when evaluating the extent of any additional bracing and or concrete block kentledge.

Example installation:

(a) (b)

Figure 14: Floor mounted camera stand install of a DFNEXT camera at the Knighton site.

# Cutting Instructions

To build a floor mounted stand you will need 4 × 3 m stainless steel, 21 mm single channel Unistrut. The lengths to cut the Unistrut into are detailed in Table 1.

| Piece Number | Length (mm) | No. per stand |
|---|---|---|
| 1 | 1700 | 2 |
| 2 | 1300 | 2 |
| 3 & 5 | 750 | 6 |
| 4 | 375 | 2 |

Table 1: Cut lengths for Unistrut pieces, with piece numbers labelled in Figure 3a as: (1) vertical, (2) horizontal, (3) 45° braces, (4) camera attachment, and (5) cross braces.

Materials should be prepared by:

1. Measure out lengths of Unistrut required.
    - Unistrut 1: 1700 & 1300
    - Unistrut 2: 1700 & 1300
    - Unistrut 3: 750 × 4
    - Unistrut 4: 750 × 2 & 375 × 4
2. Cut Unistrut.
3. Smooth edges.
4. Spray edges with galafroid spray.
5. Leave to dry for 30 mins.
6. Saw scaffold boards and battens to lengths.
7. Sand edges.