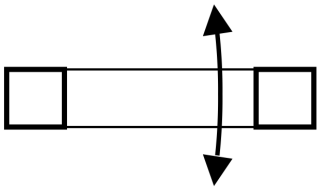
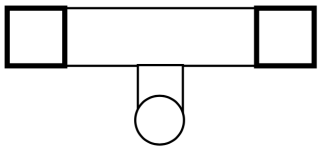
System Architecture – Bridges & Space Frames

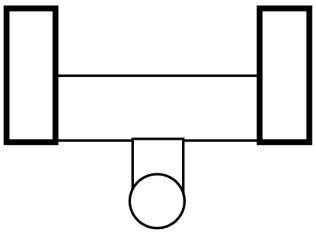
A common requirement of a laser system is to fix the optics in space above part positioning, typically on a bridge spanning the latter; the bridge here in plan view is indicated by bold line for the cross section of the 'legs', lighter line from the cross member. Such a bridge has good lateral stability(provided that joints between legs & cross member are rigid), but relatively poor fore & aft stability, indicated here by arrows.



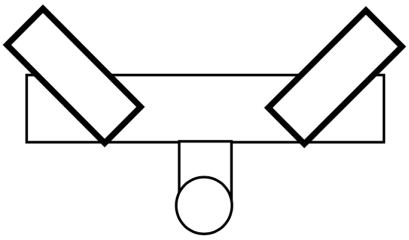
Generally, the optics, indicated here by the circle, are set on an offset position somewhat forward of the cross member, compounding the problem.



Improved fore & aft stability can be obtained by increasing the footprint of the legs in that direction, and at equal weight by reducing width on the lateral direction.

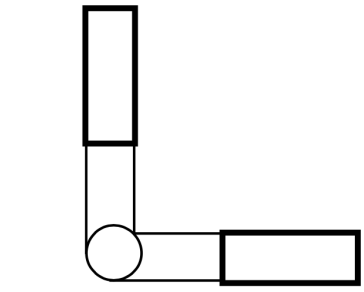


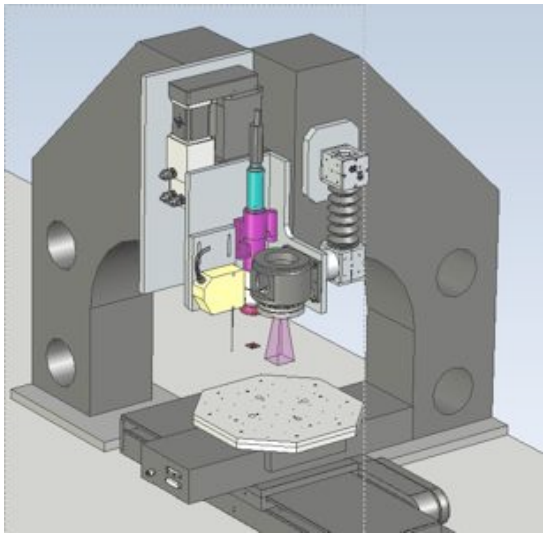
As far as the optics position is concerned, even better stability is obtained by angling the legs so that the major footprint lies in the direction of the optics.



Continuing the legs in the same plane results in a neater structure, with no loss in stability, and which is now composed of two parts, rather than three, with the well-known & inherent stability of an 'A' frame compared to Π frame; in the former each leg is supported by the other in its high compliance direction .

The complete structure can be orientated to suit machine architecture, and provides a stable optics support with excellent access to the critical volume around optics & part.





Optec (Lasea Group) has termed this system architecture a Space Frame to convey the idea that it rigidly fixes a point in space,- where the optics are supported.

In essence, as the above evolution shows, it is a bridge, modified to improve stability at the optics position, whilst optimizing access.