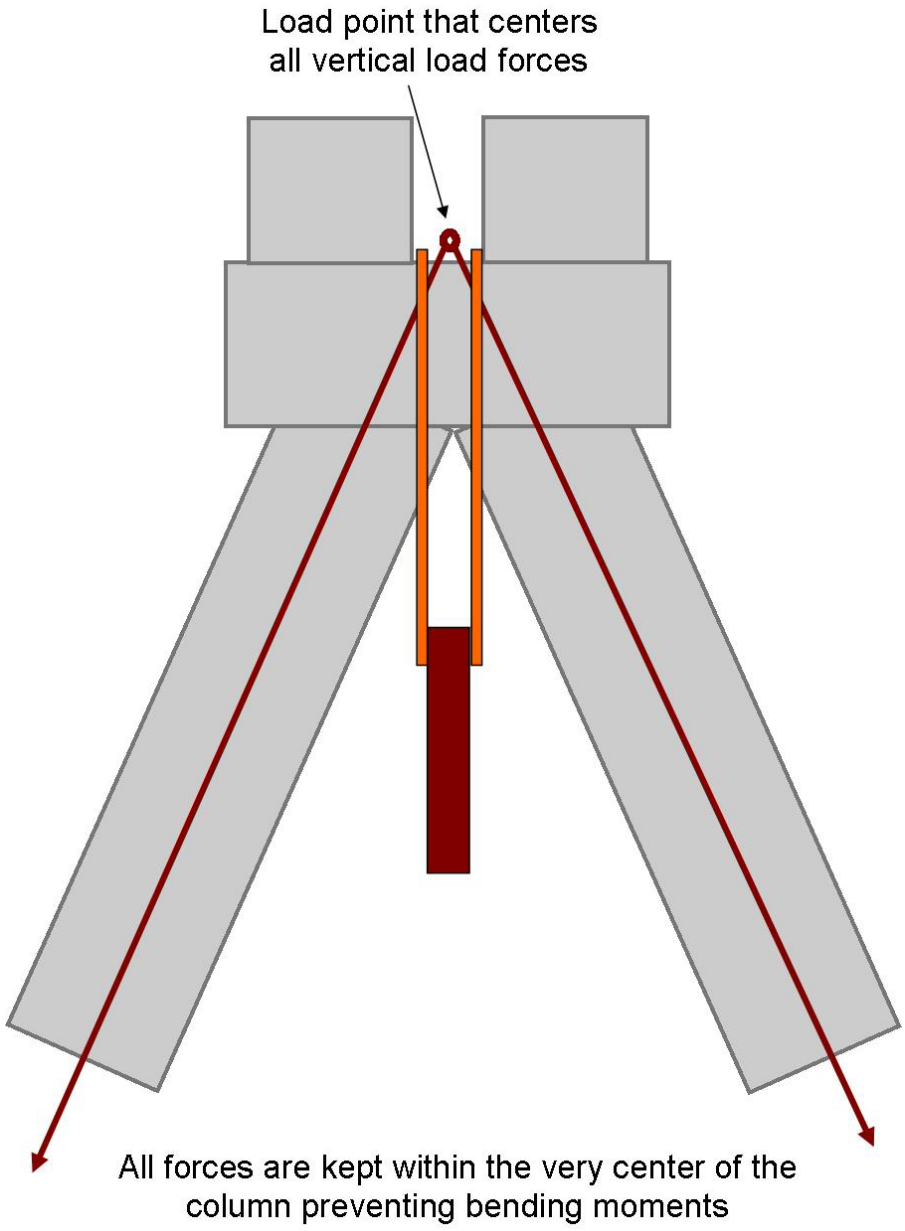
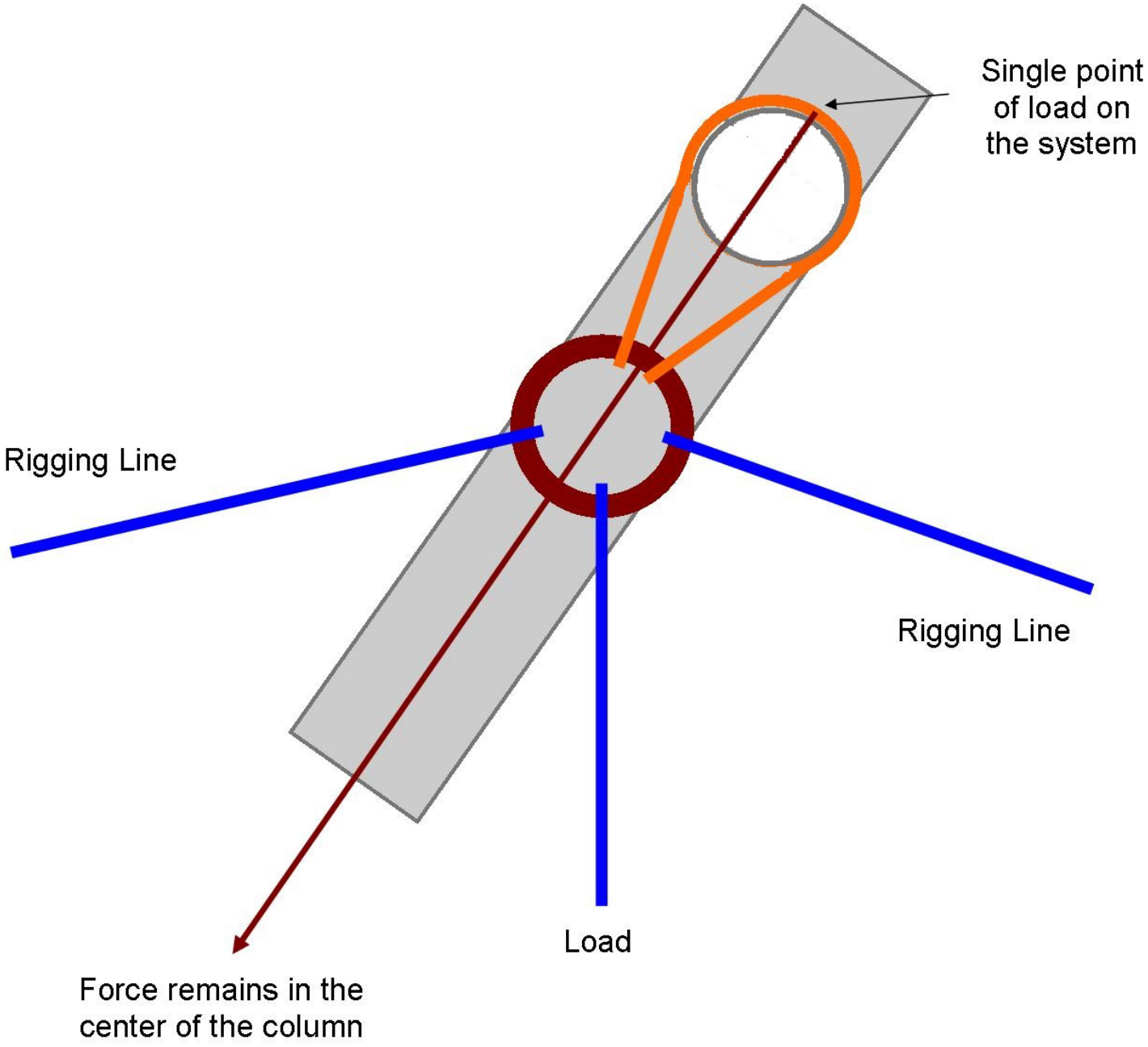
Häst Bipod Design

After observing failures of bipod designs by other manufactures, Häst elected to enter the market with a totally original design. Our driving design criteria required the removal of all "bending moments" that might occur on the support columns. Bending moments are those forces that most frequently come from a poor design of the top of the bipod, especially flat plates that are welded to the columns. A short video showing how flat plates influence column bending can be viewed at: Mitigating Bending Moments

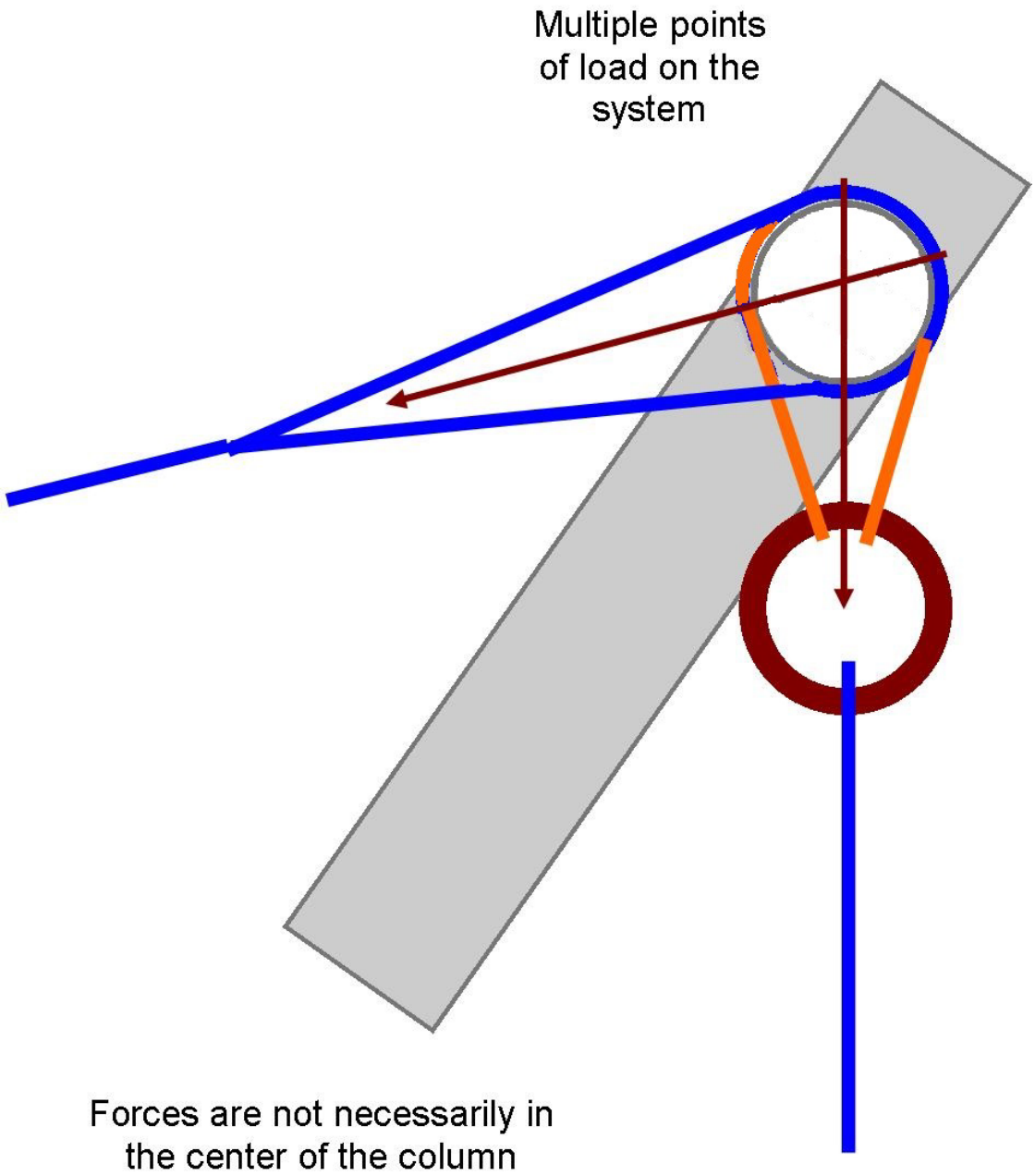
Keeping all the forces inline on the column began at the drawing board and how the bipod head would be physically constructed so that there was but ONE point of force, and that was in the middle of the column. As can be seen in the diagram below, facing the bipod head on, that single point of force occurs at the top of the tubing that connects the two column legs.



To keep the forces in the columns centered in the other dimension, here is a drawing of how that works using a suspended red ring. The red ring represents a point in space, suspended by the soft link created by multiple loops of high strength rope. No matter what forces are placed on the red ring, the bipod head will automatically position itself so that the forces are kept inline and in the center of the column. This would not be possible if the link between the red ring and the bipod head was more rigid. If the position of the red ring changes, as in shortening or lengthening the rigging lines, or if the position of the load below changes, the bipod head will continue to track where ever the red ring goes. This is simple physics.



On occasion Häst is questioned on “alternate” means of attachment of rigging and/or loading lines. This is highly discouraged as the entire design centers around the bipod supporting the red ring and maintaining a single load point at the top of the connecting tubing between the two “ears”. (The function of the “ears” on top of the bipod head are merely to keep the supporting rope in the center and prevent it from sliding off to one side or the other. They do add a bit of strength to the head, but that is not significant.) In the diagram below is shown how some organizations think that the bipod head should be rigged. Again, any configuration that involves attaching lines to any point other than the red ring is not advised. If the bipod is rigged as shown below, no longer is there a single load point. The load points below are on the opposite side of the rigging line, and on top for the load line. Neither point is in the inline center of the column.



To clarify what is happening on the previous diagram, in engineering we “resolve” loads into vectors. By doing this we can better define the effect of the forces on the object. In this case there are two types of forces. One force vector is tangential trying to rotate the bipod on the hinged feet, while the other force is inline. Below is how these forces are diagrammed out, the red arrow being the original force while the blue lines represent the two vectors. The rigging line can often carry a much higher load than the weight of the patient being recovered, thus those lines are longer. Note that now, with two different points of load, the inline forces of the columns are not necessarily in the center, and are certainly not symmetric.

In summary, the design of the bipod head was very specific to maximize the load capabilities. This can be achieved only by putting all attaching lines on the red ring which allows the bipod to auto adjust to the loads and maintain column loading in the center.