***Plastic part clip design to save on screws and speed assembly*.**

These require a certain amount of deflection as they move out of position and then back again. Often, they face the same deflection over and over again. Good clips / well-designed clips handle the stress with ease, recovering fully after each deflection and remaining none the worse for wear. Bad ones that are poorly designed often break immediately or fail to fully recover, become weakened and eventually break.

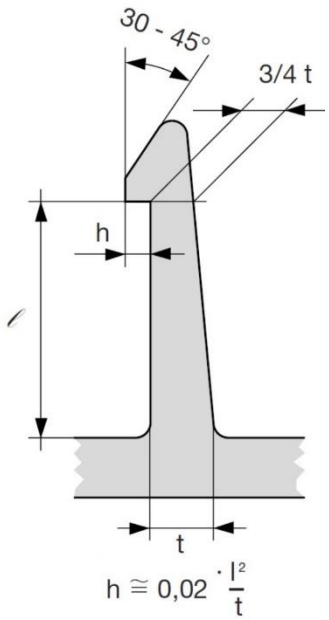
One crucial decision that contributes to the effectiveness of a clip is the choice of material. Obviously, a spring clip requires some flexibility. If, for some reason, the resin in which a part is moulded cannot be as flexible as you'd like, other factors must compensate for that inflexibility.

Well-designed clips are proportionally long and slender so they are flexible with fillets at the connection base for strength. Also, if you want to avoid the use of sliding cores, they should use a generous through hole for coring where possible and be well drafted with a clip head that is not too large, to improve filling and reduce deflection.

Stress and Flexibility: -

There are three factors affecting the stress caused by flexing a clip. The first is the length of the flexing arm. A longer arm creates less stress for a given deflection of the end.

If your design limits the length of the clip's flexing arm, you can increase the arm's effective length in several ways. One is to loop or coil the arm, allowing more functional length in less space. Another is to notch the wall to which the clip is attached, making the notched part of the wall effectively part of the clip arm. Similarly, you can design the wall itself to flex slightly without being notched, accomplishing the same result.



The second way to reduce stress on the clip is to limit the size of the hook at the end of the arm. Obviously, the hook must be large enough to do its job, but the smaller it is, the less the arm has to move as the hook engages. Finally, be aware of features such as sharp corners that can concentrate stress over small areas. Pay special attention to the base of the clip where rounded corners and fillets can be used to distribute stress just as they are used to strengthen other features in a moulded part. See suggested clip proportions formula / diagram to the right.

Considering Mould Draft: -

One other issue that should always be considered in designing a clip is mould draft. Because clips are long and narrow, it is particularly important that they be properly drafted along their lengths. In addition to easing ejection of the part from the mould, this also strengthens the clip at its base, the location of the maximum bending moment. And don't forget to make the through-hole at the base of the clip generously larger than the clip-head. This allows clearance for the core in the mould which forms the underside of the clip-head. If you can visualize this core and cavity, try to give it an absolute minimum of 3 degrees and better if it's 5 degrees for mating core and cavity drafted shut off faces. Also note re the Clip length, make it no more than 8 times longer than its thickness.

SolidWorks Premium includes a finite element analysis (FEA) simulation program which does a good job of predicting stress levels in Plastic clips when using its large displacement option. If you are unsure about the reliability of your clips design, especially given your exact material specification and duty cycle give us a call at Design Smart. We could save you a lot of time and money by getting it right first time.

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