

Cautionary Tales Part XV

Training for Success – Computer Aided Design

The last few cautionary tales have been about aspects of technology and their use in the spring industry, and this tale is no exception, but I have linked the technology to training. *IST* strongly believe that good training will, in the medium term, enhance the success of individuals and businesses. Similarly, the use of computer-aided-design (CAD) for springs is encouraged, but it is *IST*'s contention is that the CAD program will be more useful and effective if its user has undertaken a training course in spring design.

You don't need training to tap numbers into a CAD program or to read its printout. Maybe you wanted to check whether your customer's tolerances are reasonable, or whether the spring is overstressed – these facts are immediately clear if your customer has supplied information about the working lengths of the spring.

How does training help?

However, training will be beneficial when your customer's load requirements don't stack up with the dimensional information. A training course that gives you all the basic design formulae for springs, will give you the knowledge to know what parameters to adjust to resolve the difference. Also, having reconciled load and dimensional parameters, you will then have to check whether the resultant spring design is safe and reliable. A good training course, which will have a comprehensive reference manual, will give you all the information to check whether the resultant spring is:

- a) is working outside of recommended limits
- b) overstressed
- c) has difficult tolerance requirements
- d) at risk of buckling
- e) at risk of fatigue failure
- f) May resonate in service
- g) at risk of relaxation

The chances are quite high that having resolved the load and dimensional requirements, there are other design aspects that will need resolving with your customer. Keeping in mind all the aspects that need to be considered will be easier, and more likely to be successful, if you have received good training and have a reference manual for those facts you can't remember. The importance of training course manuals was made clear to the author of this cautionary tale recently, when he met a person who had attended one of his training courses in 1988. That person acknowledged that he still takes the manuals with him on visits to his customers, and that the manuals have recently circumnavigated the globe on a round trip that took him from UK to California, to Japan to Germany and back home again, and had been used for a few times on that trip. Training is for long-term success.

IdentifieExample
Part No.:ABC

Spring Drawing	Right hand helix
Material:	ASTM A227 MB Patented Carbon
d Wire Diameter:	0.08000 in
D_e Outside Diameter:	0.4500 in
n_t Total Coils:	8.000
R_s Spring Rate:	193.736 Lbf/in
L_0 Free Length:	1.000 in
L_c Solid Length	0.6400 in
F_{cth} Solid Load	69.745 in
Operating Position 2	
L_2 Length:	0.7000 in
F_2 Load:	58.121 Lbf
Operating Position 1	
L_1 Length:	0.9000 in
F_1 Load:	19.374 Lbf

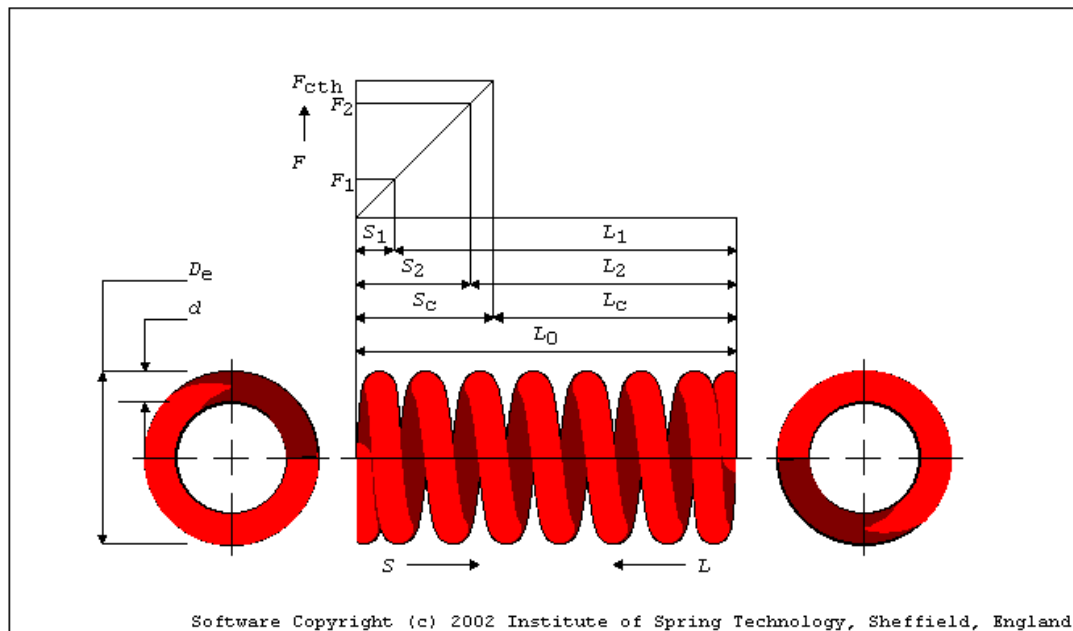


Figure 1 Example spring for which your customer requires a load tolerance of ± 3.0 lbf at L_2 . Is this reasonable? Are there other concerns with this spring requirement?

So, is training in spring design the only training that a spring manufacturer requires to be successful?

Spring design is probably the most important training course, but *IST* also recommend training in the following:

- Spring Material Selection
- Spring Manufacturing Technology, raw material manufacture, forming, heat treatment, grinding, prestressing, shot peening, corrosion protection, inspection.
- Surface engineering for fatigue and corrosion protection.
- Measurement technology.
- Failure Analysis and Prevention.

- Design of springs in strip materials, where CAD programs don't exist.

These courses would make for a spring manufacturer who would be better able to advise his customer's accurately and authoritatively, and such a spring manufacturer would deserve success.

Finally, it is worth mentioning that training at a neutral venue, away from the workplace, is beneficial, but the best training courses are often those given in-house with material suppliers, springmakers and end users all present asking questions from their own perspective.

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