



What "R" are You?

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Structural engineers understand the significant role ductility plays in the design of structural elements to resist earthquake forces. We recognize structural systems with higher ductility perform better than less ductile systems in an earthquake. The building codes characterize different lateral force resisting systems by their ability to yield, deform, and absorb energy under load. The ductility factor, or "R" factor, is critical in determining design loads and in understanding the response a structure may go through during ground shaking.

Although we often implement the principle of ductility in the structures we design, we probably rarely apply our knowledge of ductility to ourselves. How do we react when we are pushed to our limit? What ability do we have to stretch and adjust to the rigors of life as a structural engineer?

Similar to the different building systems we use, each of us has different thresholds for the amount of stress we can tolerate before becoming overloaded. Unlike buildings, these thresholds can be modified and may vary within the same individual throughout the day, and from day to day and week to week. Many factors determine how ductile we are to the stressors we face, like genetics, predispositions, personality, physical well-being, relationships, work and civic related responsibilities, and more. Often, a person's perception of a situation is a stronger indicator of how well they adapt to stress, than what the stressors are. For instance, some individuals thrive on living on the edge and look for adventure wherever and whenever they can find it. Others prefer more controlled, predictable, safer lives.

The structural engineering profession has an abundance of stressors. Whether it is a looming deadline, a difficult design or construction issue, or meeting a client's demands, we face stressful situations continually. Stress is not all bad. In fact, stress is a necessary, normal, and natural part of life. Stress motivates us. Stress provides variety and stimulus. Stress may make life exciting and interesting. The object is not to try to eliminate stress from our lives, but to manage it effectively.

Most, if not all, structural engineers have experienced the pressure of a big deadline.

Many times, we receive a boost of adrenaline as the deadline approaches. This helps us work late into the night and work unreasonable hours to meet the client's or employer's demands. This dose of adrenaline, however, is only good for the short term. The danger comes when the body does not have time to rebound. If pressing deadlines and long hours persist week after week, the body may release other chemicals that can start to cause serious physical damage. When stress becomes a regular part of our work routine, we may find ourselves overdosing on our own body chemistry. Stress then becomes distress and may lead to disease.

Stress and its accompanying surges of adrenaline cannot be removed from our lives; nor, because of its beneficial effects, do we want them to be removed. The problem becomes how to manage stress effectively, or in structural engineering terms, increase our ductility. Below are some suggestions.

- 1) Exercise is the number one natural stress release. It helps to balance the body's chemistry. Exercises that are meaningful, consistent, and fun keep the mind motivated and the body in shape.
- 2) Good nutrition builds a strong body and mind. Proper weight and foods can reduce stress on joints and reduce inflammation throughout the body. Small, simple, frequent meals are better than large meals, eaten infrequently. High sugar snacks and empty calorie foods high in fats and salt tax the body's chemistry.
- 3) Sufficient sleep reduces stress. The body requires rest to restore its physiological and processing functions. Without adequate sleep, the mind and body can be stretched beyond the ability to cope.
- 4) Just as important as the connections in our buildings that distribute loads to other members (especially in yielding conditions), our connections with other individuals are vital. When you need support, be willing and wise enough to seek it. Trying to do everything on your own can be overwhelming and is ill-advised. Do not try to go beyond your expertise. Have a team approach to life. Being able to connect with others involves developing

good communication skills. Giving and receiving clearly communicated information reduces stress.

- 5) Breathe slowly, deeply, and rhythmically. Holding the breath or breathing too rapidly (without exercising or undue physical exertion) causes the alarm system to trigger in the brain and adrenaline to be released. If this becomes an ongoing pattern, a chronic stress response is created. Take inventory at regular intervals and assess your breathing.
- 6) Be aware of your thoughts and your self-talk. Stop repetitive negative thoughts. Avoid expecting perfection from yourself.
- 7) Perfectionism, unchecked, can lead to distress manifesting itself as anxiety, depression, obsessive compulsivity, and even suicide.
- 8) Avoid desk rage. Angry thoughts expressed or unexpressed are toxic. Developing good interpersonal skills and respectful relationships does much to reduce role conflicts and burnout. Learn to resolve problems quickly and tactfully.
- 9) Live fully, in the moment. Put distractions aside, especially when you want to spend time visiting with someone or simply relaxing. Make time for the things that matter most and that you truly enjoy.

This is not an exhaustive list. Hopefully, we can recognize habits and tendencies that are helpful or damaging to our ability to deal with stress. Taking incremental steps to improve allows us to expand our thresholds, increase our ductility, and continue to successfully meet not only the demands of our profession but those that come from all areas of our lives. ■

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