Rules-To-Remember

Engineering Rules-To-Remember

Engineering Rules-To-Remember #1
You will generally be in 1 of 2 distinct worlds, the "Textbook, Academic or **Calculator World**" or the "Business, Social or **People World**". Know the difference and talk/act accordingly.

Engineering Rules-To-Remember #2
When you are working in the "People World", you are making "some kind of a presentation even if it is just presenting your own ability to function in the People World. Do your presentation professionally and when necessary communicate in a manner to better reach the critical audience members.

Engineering Rules-To-Remember #3
Not all words have the same meaning to everyone. In critical conversations, be cautious of "Relative" words like hot, cold, fast, slow, cheap, expensive, light, heavy etc. There is **NO** definition of these words that is applicable to their use in a critical conversation. "Don't let this get hot" is not the same as "Don't let this get above 112 degrees".

Engineering Rules-To-Remember #4
Many words have multiple meanings or do not have the same meaning to everyone. In critical conversations, be cautious of words like this. When you say something using these words, you get 100% positive head nods of understanding, but in fact the people may have all used different versions of the word. "Make sure you **tie** the beams down to the top of the columns". One person connects it with bolts while another one uses a rope. Incidentally, the person who used the rope looks at the one who used the bolts and says "What an idiot, they don't know what tie means."

Engineering Rules-To-Remember #5
Be cautious of "all-inclusive" words like "all, none, never, always, etc." If you use words like this, you need to be sure they are applicable. If you are listening to someone who is using words like this, be cautious and confirm critical points. There is a big difference in the statements "All load bearing walls are perpendicular to the floor joist" and "Most load bearing walls are perpendicular to the floor joists". The first one is totally inaccurate while the 2nd one is better but still misleading. "Most load bearing walls I have ever looked at were perpendicular to the floor joists" is a more accurate statement. Also, if the joists were 45 degrees to the wall it would not be load bearing? People like easy rules to remember but there are consequences at times. Your careless wording can lead to serious consequences. When listening to someone using these words, before you "form a solid but critical opinion" based on those words, confirm they were used properly. (**This would include your Mentor or Associates you have asked something.**)

Engineering Rules-To-Remember #6

Learn to communicate both verbally and visually. Some people are more visual than verbal and vice versa. Sketches, drawings and other visual presentations will sometime trigger new ideas that verbal would not.

Engineering Rules-To-Remember #7

Not everyone communicates the same in all aspects of communication. Most of us believe our communication style is correct or we would not use it. In reality, given an audience of 100 randomly chosen people, you would be a great communicator if you could do your presentation the way 25% of the audience communicated. This is called "reaching an audience". Start practicing now on different ways of "reaching the audience". This is not verbal versus visual. It is more far more complex than that. People take in information differently and they mentally process the information differently. To make it even more difficult to "reach" someone, they make decisions differently. **You need to invest time in learning to communicate effectively.**

Engineering Rules-To-Remember #8

You are ultimately responsible for your design, not the software you used. The use of software can easily help you make mistakes more efficiently. You need to have enough experience and knowledge that you can more easily recognize possible software output that does not appear correct. Most of time it will be input errors by you, but not all of them.

Engineering Rules-To-Remember #9

While an efficient engineering design is desired, it must also be constructible. Designing something that cannot be built without extraordinary effort/cost is not practical and is viewed as inexperience combined with lack of knowledge. Mentally go through the construction of your wondrous design in case it is actually a unicorn.

Engineering Rules-To-Remember #10

Taking a position at a company (especially your first one) is a 2-way street. Both parties need something from the other. No one is hiring a recent college graduate because they just want to. The need some help and do not think they need the cost and experience of a seasoned engineer. You need to really think about <u>what you need</u>. All of you need much more from an employer than just an income. They are the ones who are going to mentor you and provide the specialized training you did not get in college. (Sorry folks but college gave you about 10% of what you will ultimately need.) **You had better interview and research them more closely than they are doing you.** How good are their Engineers? Do they specialize in something you actually want to specialize in? Do they even have a Registered Engineer in the field you are interested in (some don't). Is their idea of training letting you put in a lot of hours learning what college did not teach you? And I could go on for hours.

Structural Engineering Rules-To-Remember

Structural Engineering Rules-To-Remember #1

Structural integrity is non-negotiable. You should/will never compromise structural integrity of your PROPERLY designed structure to allow more money for other features even if those features are necessary.

Structural Engineering Rules-To-Remember #2

Only work in an area that you and/or your Mentor are qualified to work in. You will probably never learn everything there is to know about every aspect of this profession. Making a career out of poor performance designs is not good for the Structural Engineering field as a whole. Besides the potential for structural collapse, poor performance by a Structural Engineer can cause a Client to spend more money than needed overall OR spend it in areas that were not needed at all (Example: When in doubt, make it stout). When a Structural Engineer knows they are performing poorly in an area they should either quit working in that area or adequately improve their skills in that area.

Structural Engineering Rules-To-Remember #3

Regardless of how you designed something, a completed structure behaves based on **ALL** the installed components, how they are connected to each other, the geotechnical properties of the supports and physics. Your "design intent" or "design concept" is not a factor **at all**.

Structural Engineering Rules-To-Remember #4

All structural designs have 3 phases: design loads, structural analysis and material code check.

Structural Engineering Rules-To-Remember #5

Weights are forces but all forces are not weights. The term "Weight" is generally associated with something that has mass such as a steel beam or a person. Wind is an example of Force that is not a weight. The terms Weight and Force are generally used interchangeably but it is best to know the difference. Force and weight have the same units (pounds, pounds per square foot etc.). You are generally capable of seeing a weight but some forces you cannot see at all.

Structural Engineering Rules-To-Remember #6

All Forces have a Magnitude **AND** a Direction. (100 lbs up or 14 psf to the left) "The wall can hold a 1,000 lbs" is not the same as "The wall can hold a 1,000 pounds straight down only".

Structural Engineering Rules-To-Remember #7

It is not whether you will stand by your design, it is will you stand **UNDER** it.

Investigation Rules-To-Remember

Investigation Rules-To-Remember #1
Anytime there is more than one possibility of what caused something, there is also **ANY** combination of those same possibilities.

Investigation Rules-To-Remember #2
It is far more difficult to determine what happened when it is a combination of causes and not a single cause.

Investigation Rules-To-Remember #3
Sometimes it is just as important that you know what evidence **is not** present as it is to know what evidence **is** present.

Investigation Rules-To-Remember #4
Evidence that is not present is in fact evidence.

Investigation Rules-To-Remember #5
Ensuring evidence **reasonably** matches theory is key to establishing the cause of something.

Investigation Rules-To-Remember #6
People rarely look at their property (house, building, land, vehicles etc.) as closely when they buy it or live/work in it than they do when they think new problems or issues have occurred. When they do look **CLOSELY** for the first time, it is logical to them that everything they find is a new occurrence. Regardless of how sure they are, keep an open mind and apply Investigation Rule #5. While they are not lying, they could **easily** be incorrect.

Investigation Rules-To-Remember #7
Every collection of physical things is a structural system of some kind. Even a totally collapsed building became a new structural system when it ceased moving. Don't go tinkering with components unless you know what you are doing. This new structural system can collapse again if the forces change (i.e. a new gust of wind, a drizzling rain or your weight with $2.97 in change in your pockets) or you remove a single "innocent" component such as cutting a tightly pulled electrical wire since it was never designed to be a structural component. All structural systems are constantly seeking a new way to fail.

Investigation Rules-To-Remember #8

Learning to "Look in Detail" is something you achieve over time and with practice. Start practicing this now. Looking in detail is mentally noting smaller details of what you see as compared to just the Big Picture. Two people look at the same building frame for the same brief amount of time. One person saw a steel frame that had two columns and a rafter. The other person saw a steel, non-prismatic frame that had two pin-based columns with a 3-piece rafter that used a vertical splice at the columns. As you learn and practice more, your **brain-to-senses** communication reminds you what to note the detail of. The more you practice, the more information you could have noted in the same length of time. You now see a rusty steel, non-prismatic frame that had two 4-bolt pin-based columns that were about 12" at the base with a 3-piece rafter that used a vertical splice at the web-stiffened columns.