Stress Analysis What's the Purpose?

Relax, let us handle your stress!

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"When I lecture about stress analysis, I always start with the very basic. **Why do we do analyses? What's the purpose? Why bother? What are the consequences if something fails?** Could it cause an domino reaction?"

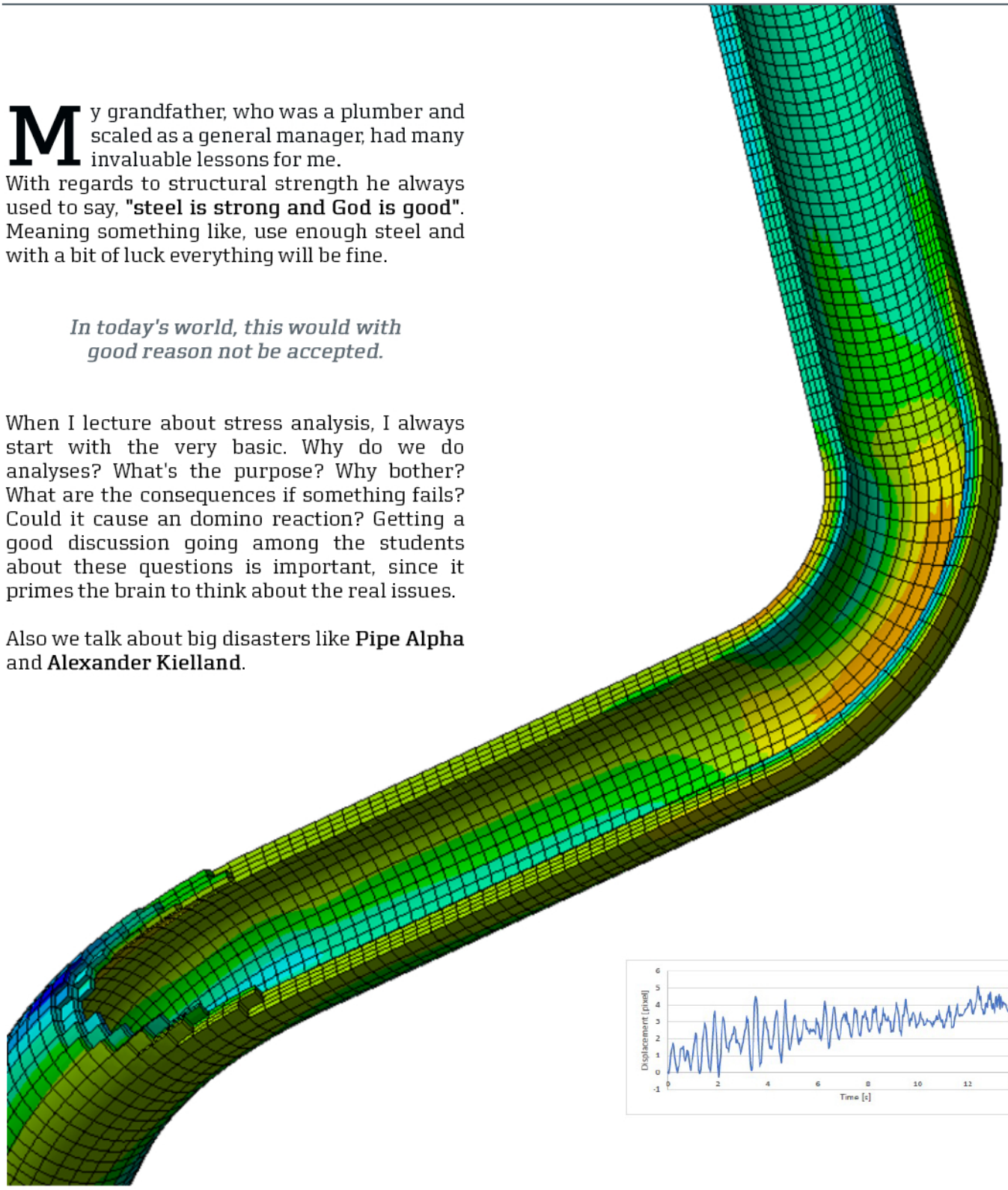
Sondre Luca Helgesen, MSc. - CEO & Founder at Stressman Engineering AS

My grandfather, who was a plumber and scaled as a general manager, had many invaluable lessons for me.
With regards to structural strength he always used to say, **"steel is strong and God is good"**. Meaning something like, use enough steel and with a bit of luck everything will be fine.

In today's world, this would with good reason not be accepted.

When I lecture about stress analysis, I always start with the very basic. Why do we do analyses? What's the purpose? Why bother? What are the consequences if something fails? Could it cause an domino reaction? Getting a good discussion going among the students about these questions is important, since it primes the brain to think about the real issues.

Also we talk about big disasters like **Pipe Alpha** and **Alexander Kielland**.

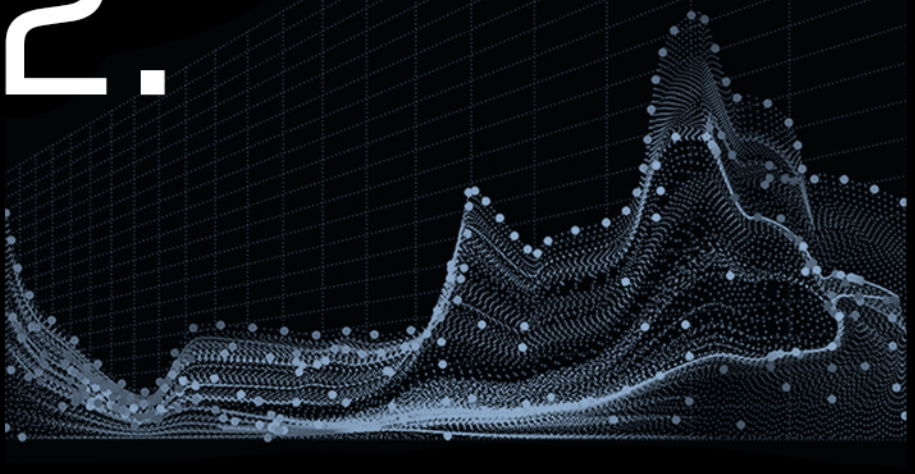


So, why do we do it ?

(in prioritized order)

3.

2.



1.

To reduce the potential of:

1. Human Losses

2. Environmental Losses

3. Large Economical Losses

As engineers we should always strive to get potential risks down to nothing. Not always possible, but with good engineering practice, good mentor system and always asking questions we get a long way.

Analyses are a simplification of our world.

Before starting on any analysis we always need to make assumptions with regards to loads, load cases, boundaries, geometry, and more.

My best advice is:

- **Print out a set of general arrangement (GA) drawings showing the system you're going to analyze.**
- **Shut down your computer.**
- **Get yourself a cup of coffee (or tea).**
- **Really look at the drawings, take an old school pencil and start writing down what's important for that specific system.**

Using this simple exercise rather than a preformatted scenario will make you focused on the real problems of your specific system. In cases of using preformatted load cases, it is easy to overlook and forget about other important issues for your system.

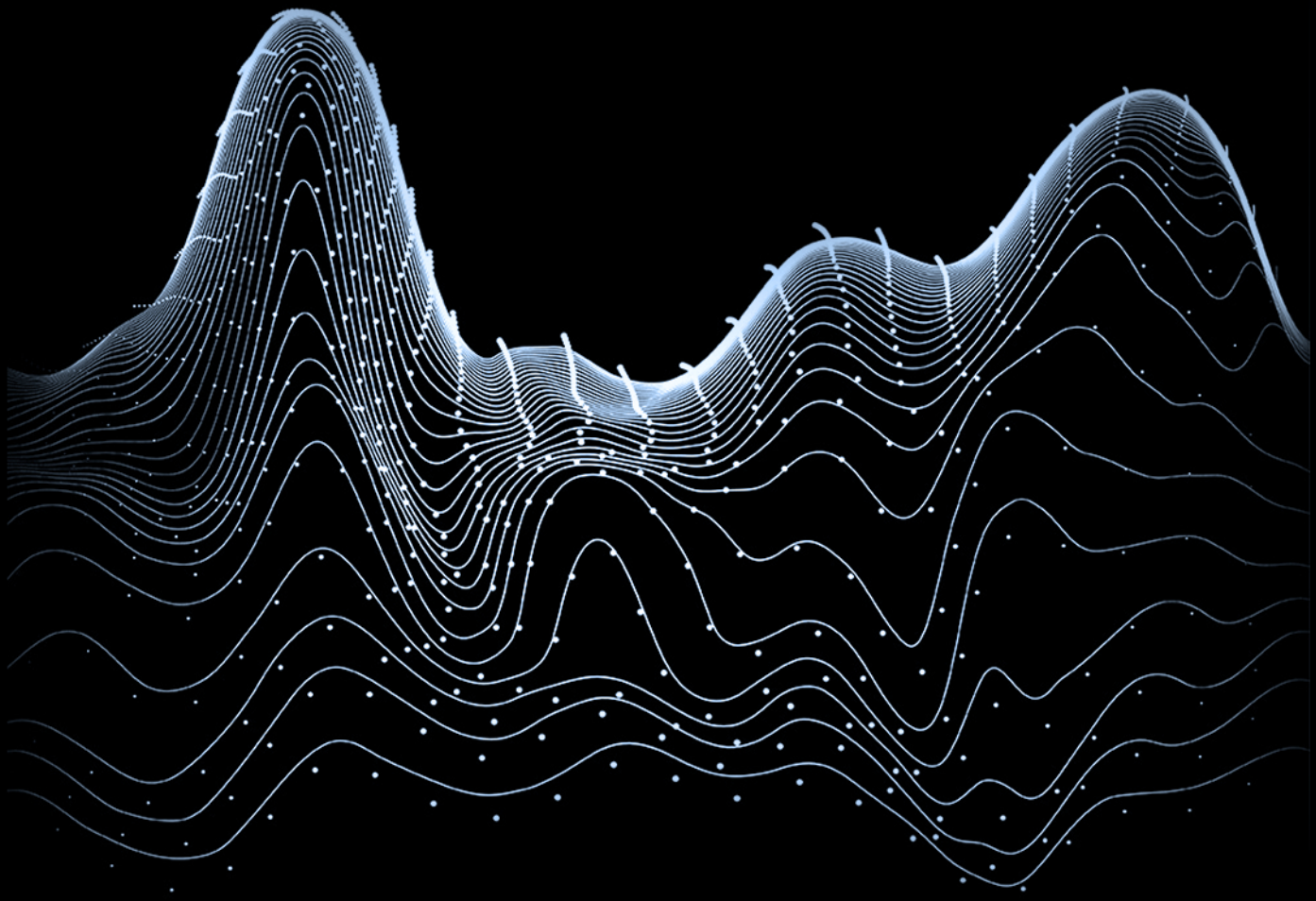
Since analyses are a simplification of our real world we need to consider how much assumptions did we put into the analysis. How did these assumptions impact on our analyses results? What error sources might there be which are not captured in the analysis? Do the results looks too nice?

My personal favorite saying with regards to analysis is: ***"Shit in = Shit out"***. Meaning that if your input is not correct, then of course the output will not be correct either. ***The better input you are using the more accurate will your results be.***

RULES, REGULATIONS & SAFETY FACTORS

Even though you used all the information you got regarding your system, there will be certain things you cannot control.

That is why we use various factors such as **quality factors, stress intensification factors and safety factors**. These factors are specified in rules, standards and regulations such as **ASME B31.3** or **EN13480**.



I hope this philosophical discussion was of interest. Most of the text here is very obvious, but I think it is important to take a step back and rethink what are doing every now and then, no matter if you are a junior or senior.

My name is Sondre Luca Helgesen,
CEO of Stressman Engineering.

Stressman Engineering AS serves the world with mechanical analyses ranging from simple hand calculations to extensive coupled 3D finite element analyses.

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