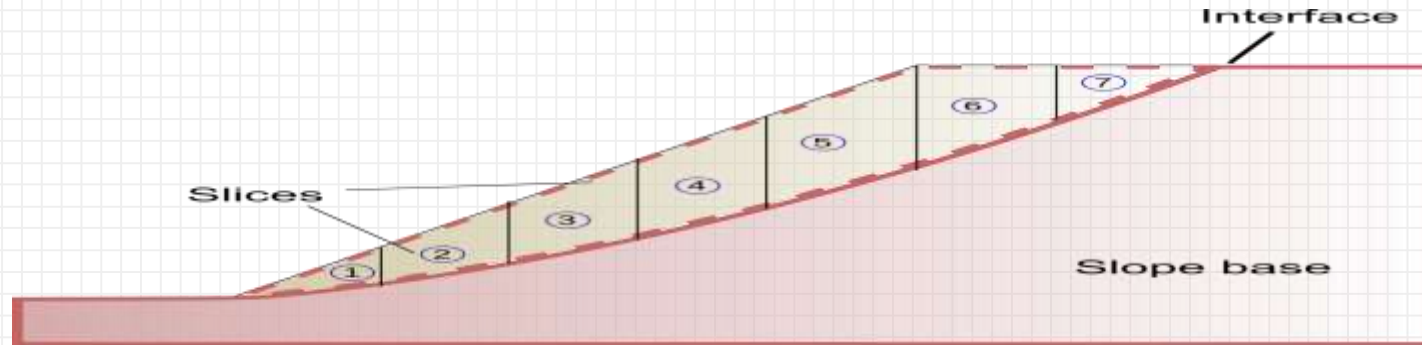


Theories of Failures

When a machine element is subjected to a system of complex stress system.

It is important to predict the mode of failure so that the design methodology may be based on a particular failure criterion.

Theories of failure are essentially a set of failure criteria developed for the ease of design.



<https://tinyurl.com/yblcb9hf>

Theories of Failures

In order to design the cotton joint and find out the dimensions, failure, in different parts and different cross-sections are considered.

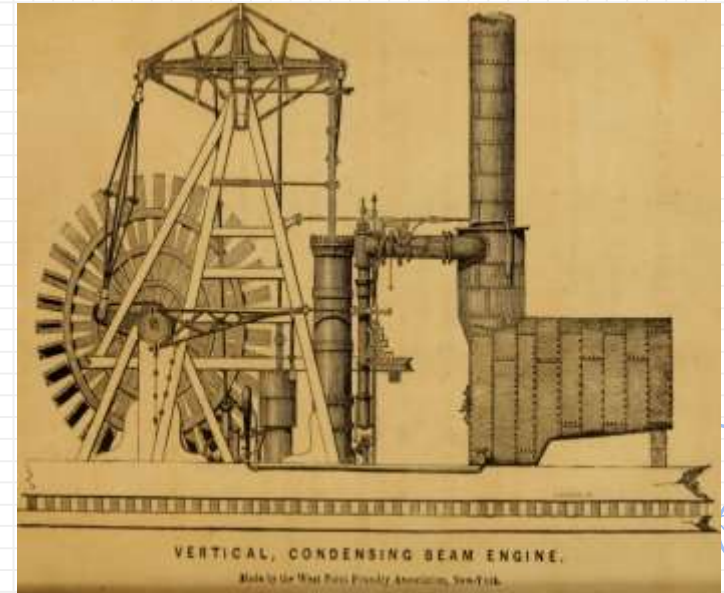
- Cyclic loading
- Long term static loading at elevated temperature
- Impact loading
- Work hardening
- Severe quenching

STATICS FAILURES THEORIES

Static failure theories Predicting failure in members subjected to uni-axial stress is both simple and straight- forward.

But, predicating the failure stresses for members subjected to bi-axial or tri-axial stresses is much more complicated. A large numbers of different theories have been formulated.

A brittle material yields very little before fracturing, the yield strength is approximately the same as the ultimate strength in tension.



<https://tinyurl.com/ya55w5cr>

FAILURES THEORIES

- Failure mode –
 - Mild steel (M. S) subjected to pure tension
 - M. S subjected to pure torsion
 - Cast iron subjected to pure tension
 - Cast iron subjected to pure torsion

FAILURE

VARIOUS THEORIES OF FAILURES

Maximum Principal Stress theory also known as RANKINE'S THEORY

Maximum Shear Stress theory or GUEST AND TRESCA'S THEORY

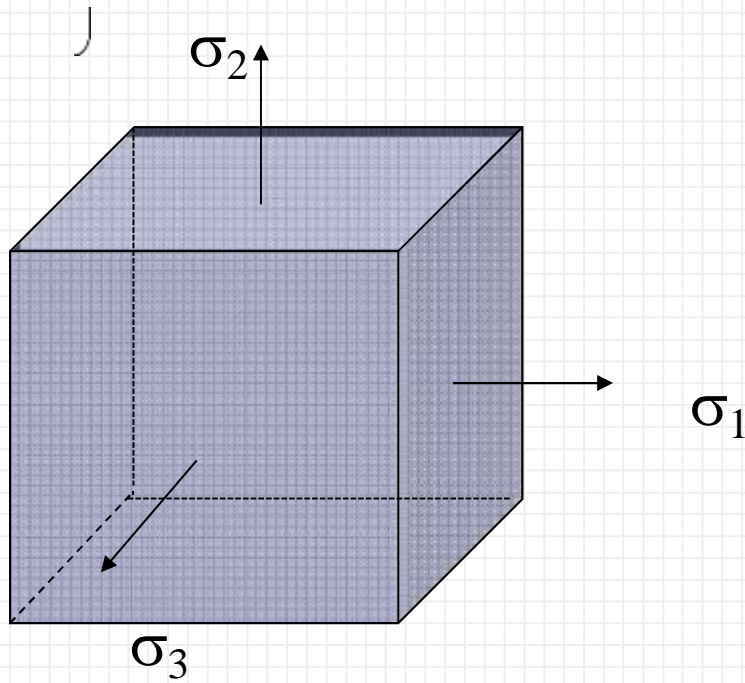
Maximum Principal Strain theory also known as St. VENANT'S THEORY

Total Strain Energy theory or HAIGH'S THEORY

Maximum Distortion Energy theory or VONMISES AND HENCKY'S THEORY

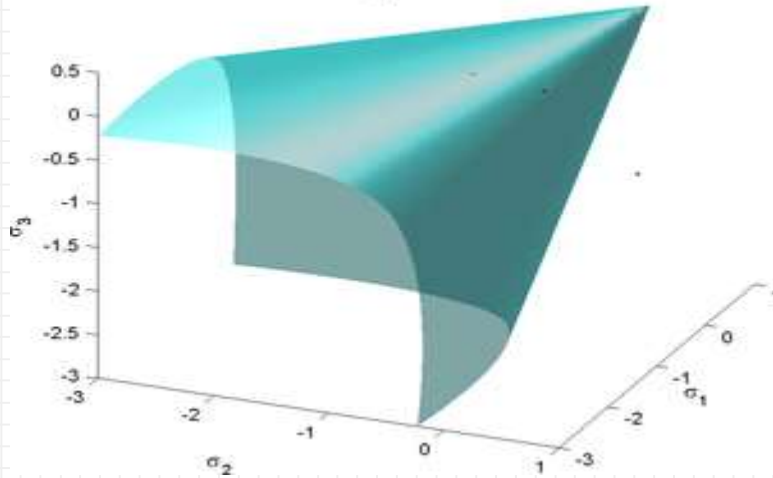
Forces Acting on Body

Represent six surfaces



Yield strength – same in tension and compression

APPLICATION OF THEORIES FAILURES

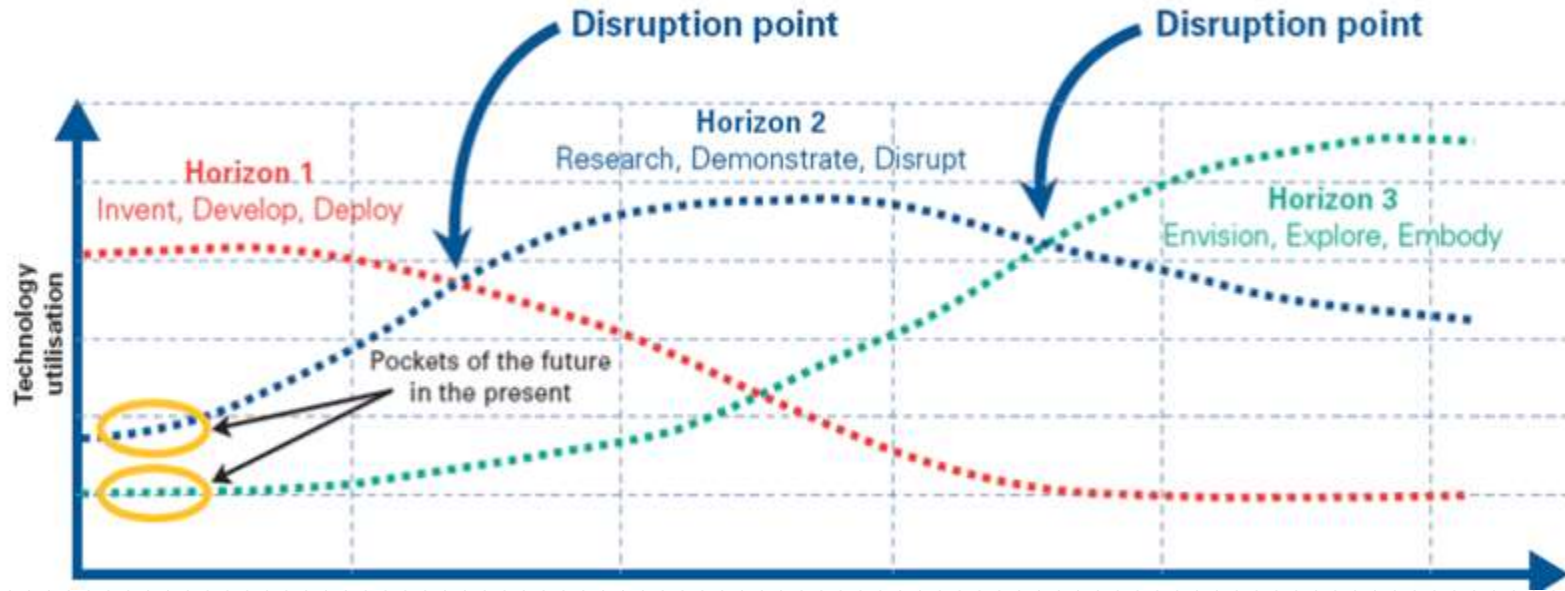


<https://tinyurl.com/yb3cwu26>

The foundation was secured through countless classical analyses, and now the approach is widely practiced through finite element codes.

Now some examples of applications will be given. The purpose is not to evaluate and compare with data, that is covered in Section VI.

INNOVATION OF THEORIES



Assessment

Which of the following statements is/are false?

1. Under fatigue load, casted structures are stronger than welded structures
2. Welding cannot produce complicated structures
3. Welding can join dissimilar materials
4. Rivetted joints produce light weight constructions as compared to welded joints

- (A) Statement 1 and Statement 3
(B) Statement 1, 2 and Statement 4
(C) Statement 1, 2 and Statement 3
(D) All the above statements are false



Assessment

Match the following Group 1 items with Group 2 items and select the correct option

1. Size factor ----- A. K_c
2. Load factor ----- B. K_g
3. Temperature factor ----- C. K_b
4. Reliability factor ----- D. K_d

- (A) 1 – B, 2 – A, 3 – D, 4 – C
(B) 1 – C, 2 – A, 3 – D, 4 – B
(C) 1 – D, 2 – B, 3 – A, 4 – C
(D) 1 – D, 2 – C, 3 – A, 4 – B

Activity

1/2

- Find the common point of both the pictures.
- No negative marks.
- Right answer 5 marks.
- Do not cheat.



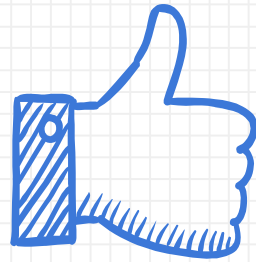
Activity



Activity



Famous person



THANKS!