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Support Bracket Analysis

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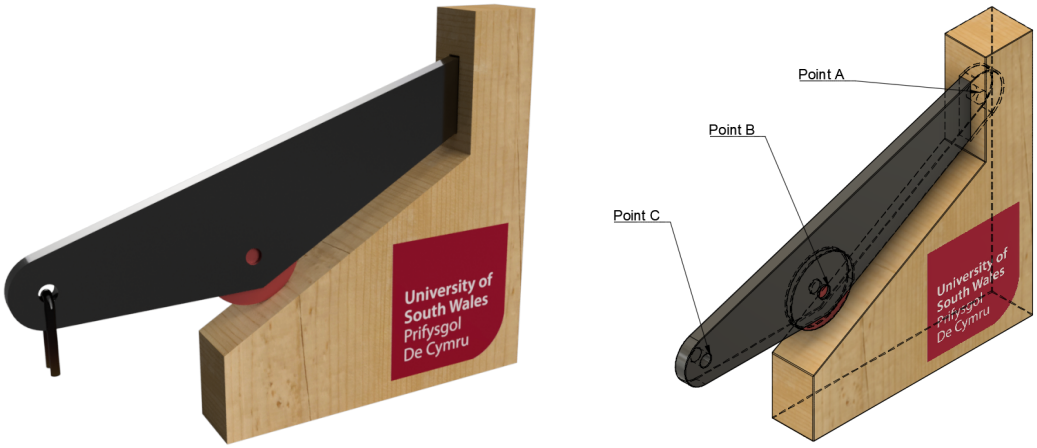
1 Introduction

Support brackets are omnipresent and decisive for many construction, even if many people are not aware of them. As the name implies they support crucial parts of constructions by holding a weight or by holding two parts together.

1.1 Problem description

In this paper a support bracket with a specific load is investigated. For a better understanding of the assignment two oblique view of the given problem are shown in figure 1. Point A is fixed in all degrees of freedom and can not move anywhere. Point B is stabilized with a castor so that the bracket can not move in perpendicular direction to the diagonal wall. In Point C a load is applied. This load pulls the whole bracket downwards, which should be prevented through the wall.



(a) rendered oblique view (b) transparent oblique view

Figure 1: Schematic representation of the given assignment

1.2 Given values

For a better overview of the given assignment values, they are recorded in the following figure 2 and table 1. These values are approximations and necessary to analyse this problem.

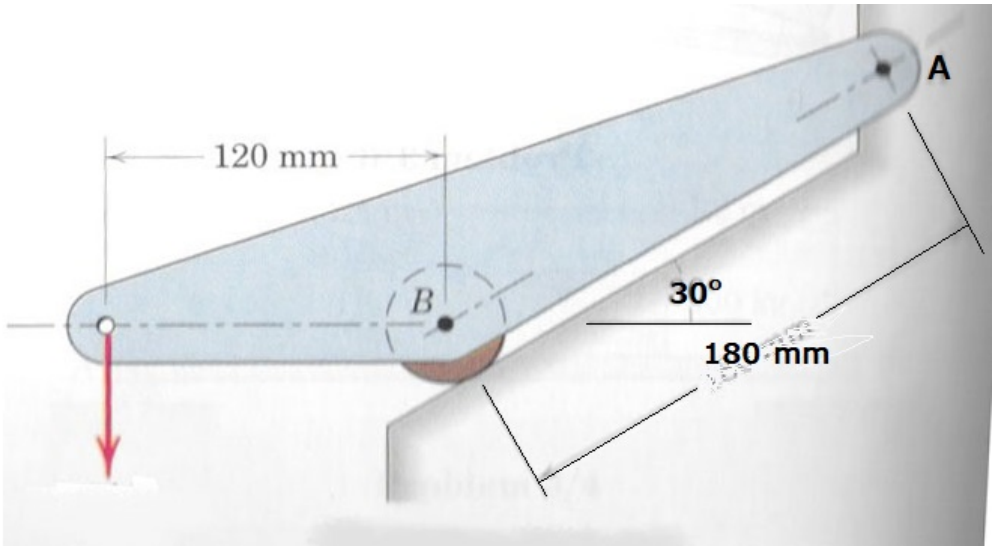


Figure 2: Front view of the given assignment

Symbol	Description	Value	SI-Unit
F	Applied Load	1885	$N = \frac{kg*m}{s^2}$
E	Modulus of elasticity (aluminium 2014) [MatWeb, 2018]	$73 * 10^9$	$Pa = \frac{N}{m^2} = \frac{kg}{m*s^2}$
ν	Poisson's ratio	0.33	-
thk	Bracket thickness	10	mm

Table 1: Given values from the assignment

1.3 Objective of this analysis

The intention of this research is to determine, whether this support bracket can be used without any doubt of breaking under the given circumstances. To reach this goal it is fundamental to evaluate the internal stresses of this bracket and judge, whether a plastic deformation or even a rupture is likely to happen.

2 Assumptions

A realistic problem has an endless amount of variables influencing the results. This causes various problems. On the one hand it's possible to reach nearly a perfect analysis by including as much variables as possible. On the other hand imaginable to simplify an analysis by using some assumption, so that not every variable has to be taken into account. For this study the second approach is used. Therefore in the following some assumptions are made:

1. static
2. homogeneous material
3. isotropic material
4. Linear elastic
5. two dimensional
6. plane stress (small thickness)
7. weight can be ignored (no gravity)
8. Evenly distributed load (1885 N at each point)
9. Friction is ignored
10. Axle/Pins are rigid
11. Pins/Axle fits perfectly in holes

3 Modelling the analysis

4 Results

5 Discussion

6 Conclusion

References

[MatWeb, 2018] MatWeb (2018). Aluminum 2014-t4; 2014-t451. http://www.matweb.com/search/DataSheet.aspx?MatGUID=3d9e8f4ace364f648d7efd6cda91348e.