# Experimental analysis of T-beam reinforced concrete with holes

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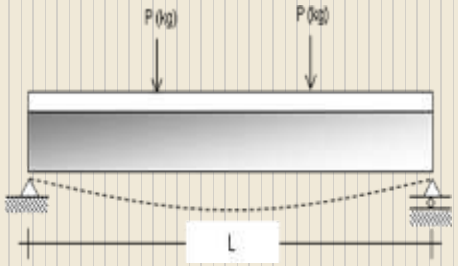
# Background

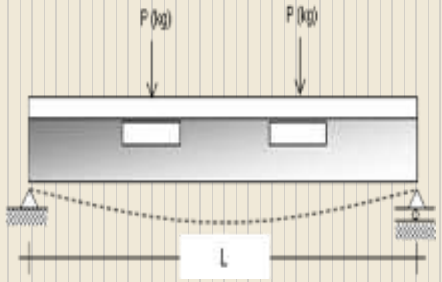
The construction of lanes for the installation of reinforced concrete structures is carried out by creating holes in the structural parts.

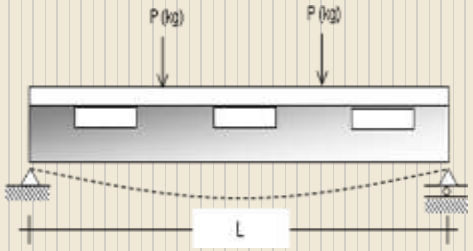
The reduction in the cross-sectional dimension of hollow reinforced concrete beams has a direct impact on the strength of the beam structure. Therefore, a reduction in the cross-sectional dimension reduces the strength of the beam. Also, creating holes on the beams can reduce the stiffness of the block.

# Purpose

- Observe the difference in the ultimate load from the intact concrete cross section with the concrete cross section.
- Observe the patterns of cracks that will occur in concrete blocks and concrete beams.
- Observe the load ratio on 3 specimens as follows:
  - Test Material 1: Intact concrete cross section.
  - Test Material 2: Concrete cross-section with two (2) sections of holes under load.
  - Test Material 3: Concrete cross section perforated with holes between loads and pedestals, and in pure bending areas with three (3) sections of holes

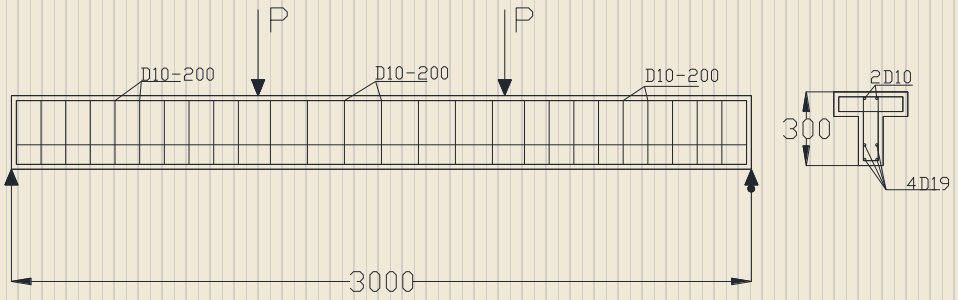


# Dimension of Testing Material

1

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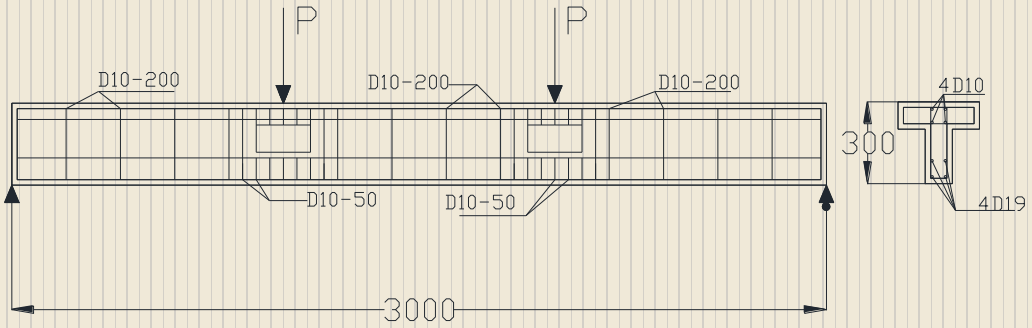


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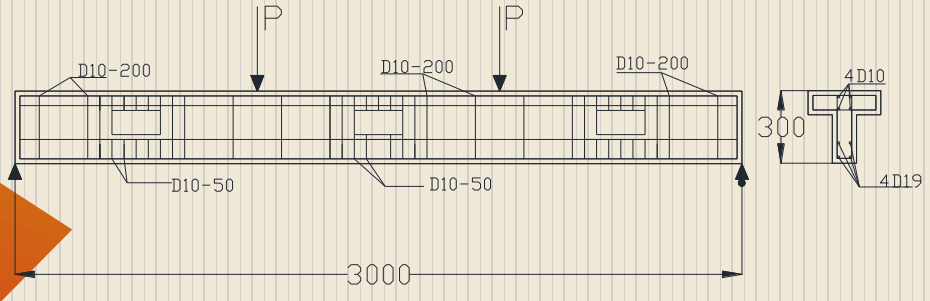


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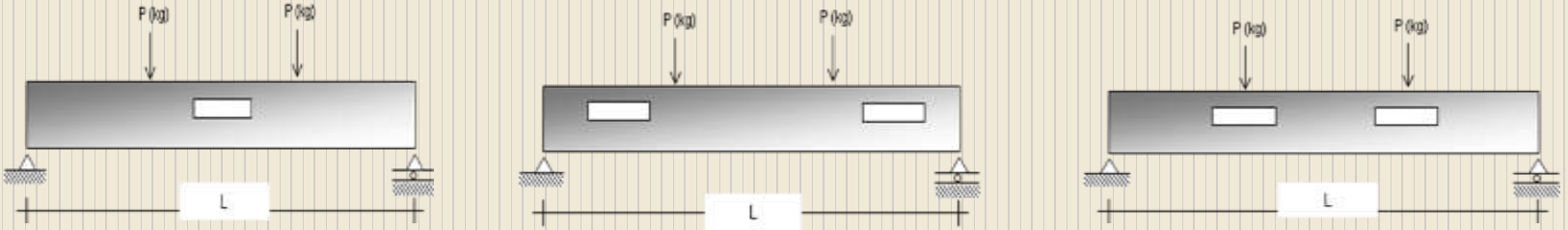
Nicxson Pakpahan

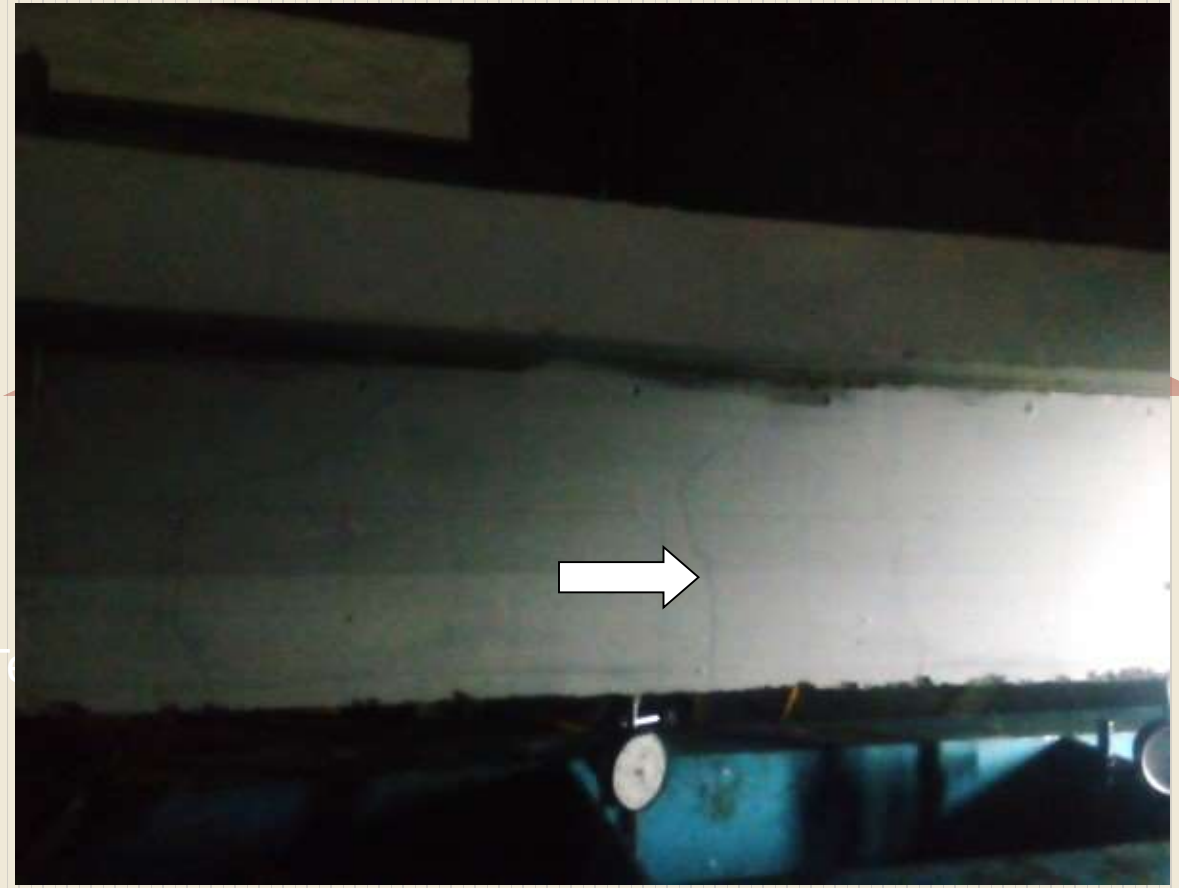
# Previous Research

The previous research regarding reinforced concrete with holes was conducted by Mangantar Silalahi in his thesis of Analysis and Assessment Experimental of Reinforced Concrete with Holes. One of the Modelling of Tests objects in his study was observed with the shape of the rectangular concrete beam as presented



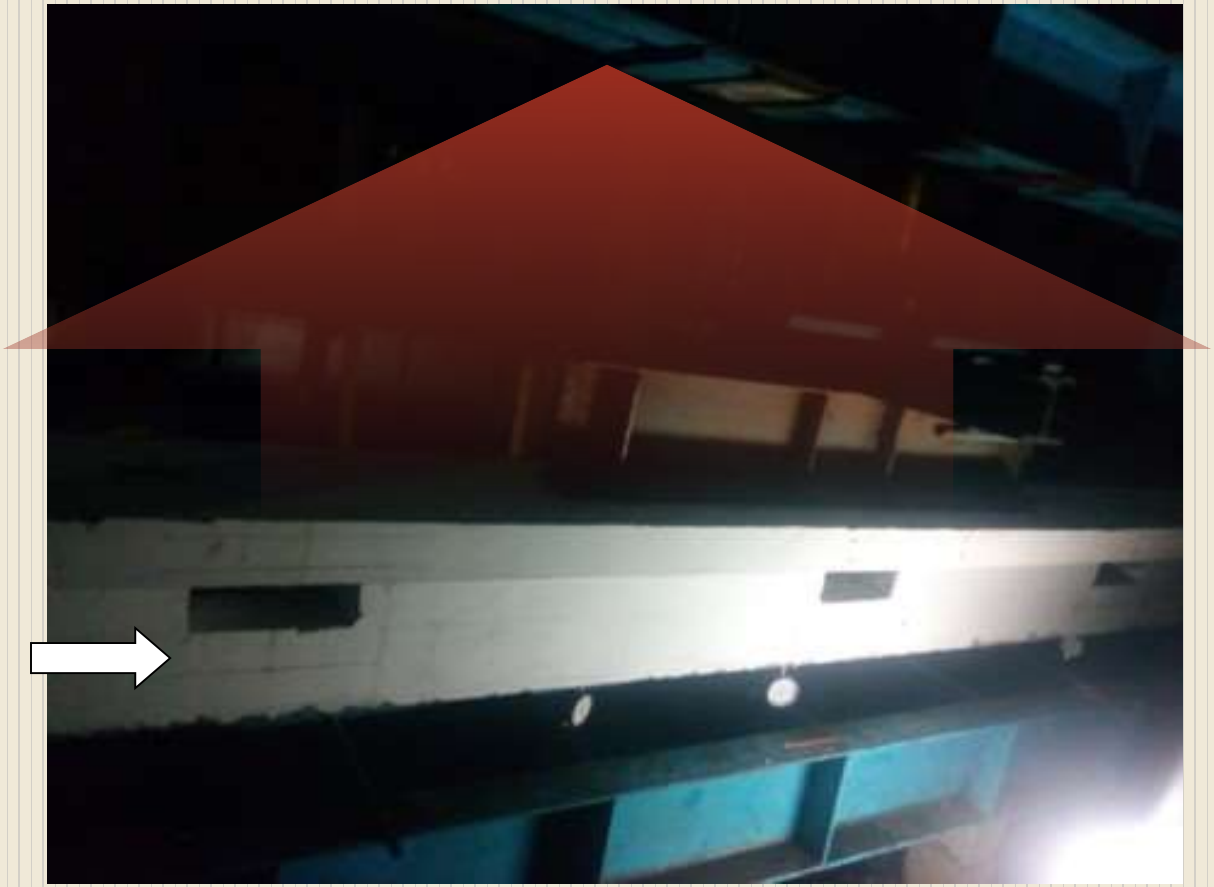
# RESULT

# Failure Type Testing Material I



# Failure Type Testing Material II

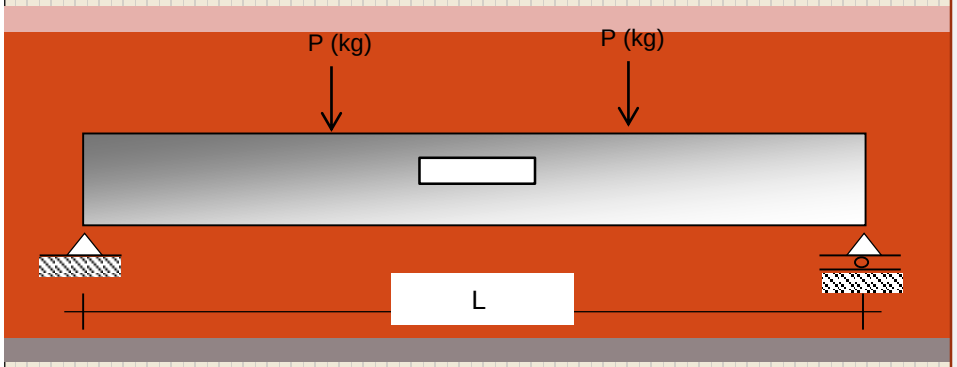
# Failure Type Testing Material III

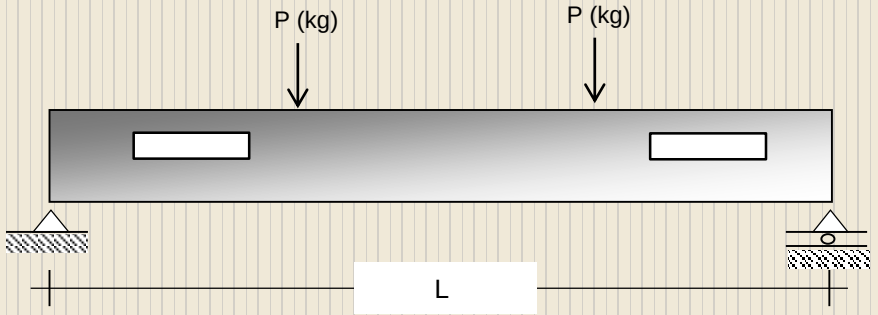


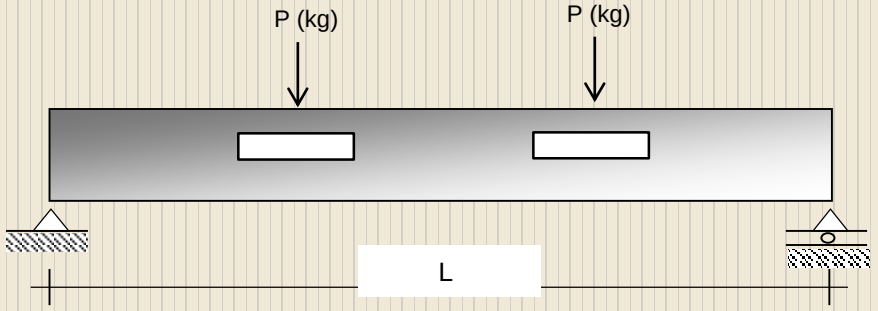
# CONCLUSION

1. Load collapsed on the calculations performed on the test object I T-Beam, at the 18.36 Ton mark while in the laboratory when it was subjected to a test of 19 Ton.
2. The load collapsed on the calculations performed on the Test Material II T-beam with two (2) holes, totalling 19.5 Ton, while it was subjected to a test of 20 Ton.
3. Load collapsed on the calculations performed on the Test Material III T-beam with three (3) holes, totalling 12.15 Ton while it was subjected to a test of 14 Ton.
4. Previous test for Material I, which is a square rectangular beam with one (1) hole in the middle resulted in the collapsed load of 24 Ton.
5. The test Material II which is a square-sectional beam with II (two) holes between load and pedestal in the previous test resulted in a collapsed load of 17 Ton.
6. Testing of Material III on a square cross-section with 2 (two) holes below the load in the previous test resulted in a load of 23.5 Ton.
7. The type of failure of the test specimen I am a type of bending failure that occurs in the pure flexible loading region.
8. The type of failure on test specimen II is a type of shear failure that occurs in holes under a centralized load.
9. The type of failure on test specimen III is a type of shear failure that occurs in the hole in the maximum shear area.
10. The type of failures in Test Material I of the preceding test also showed bending failures, and the failure models in Test Materials II and Third Testing Materials in the previous test showed typical shear failures
11. The beam elements above the hole were not considered because, by observation, the strain of the beam above the hole was pressed.

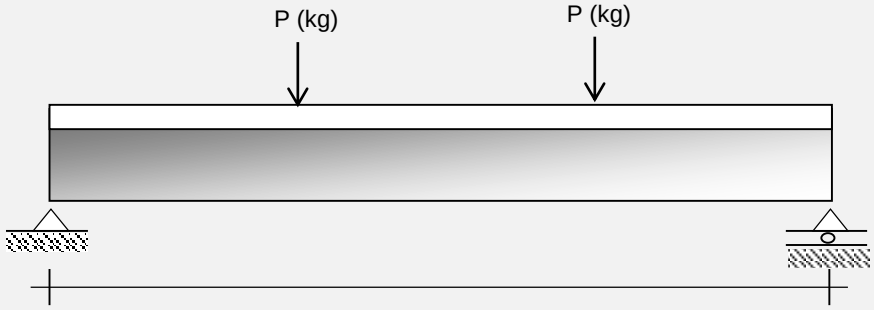
# Previous Research

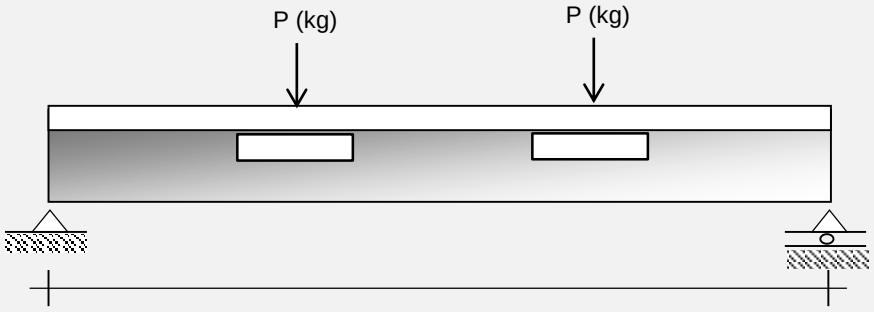


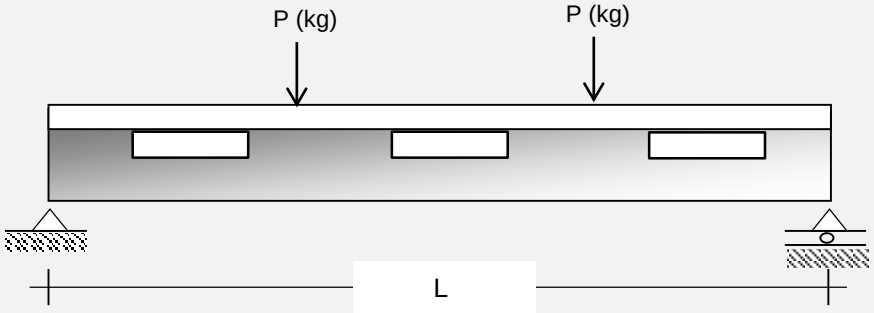




# NICXSON



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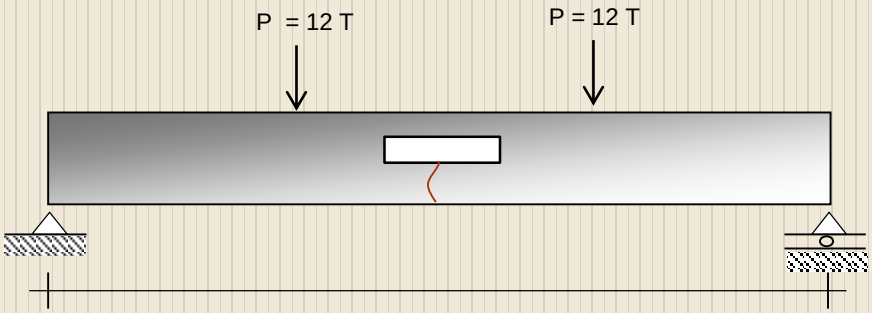


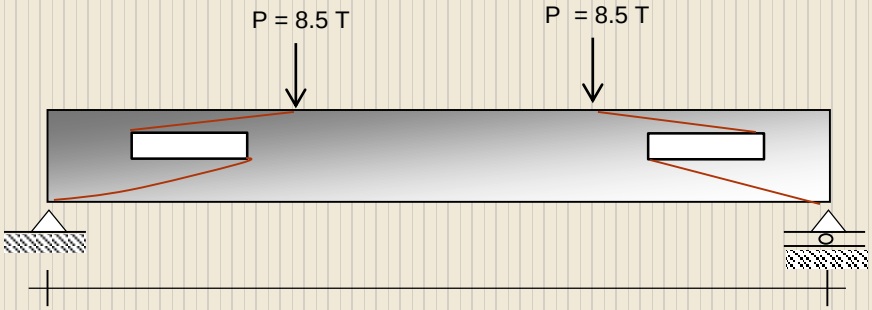


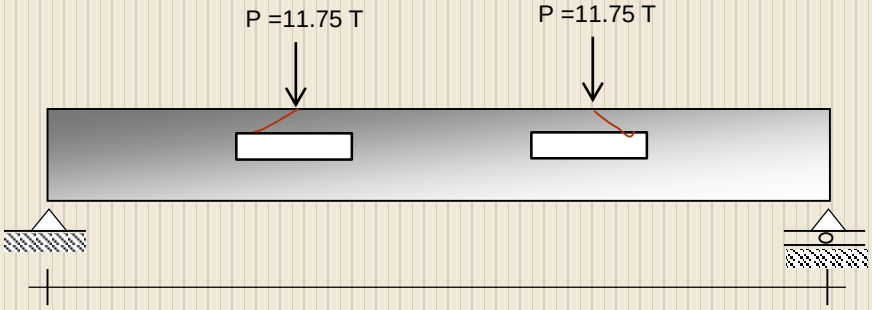


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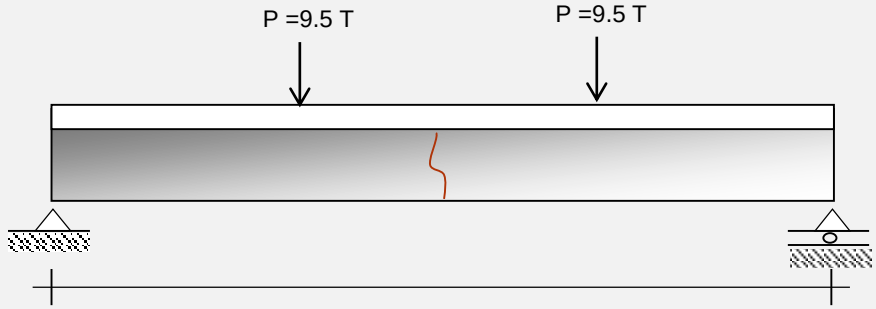


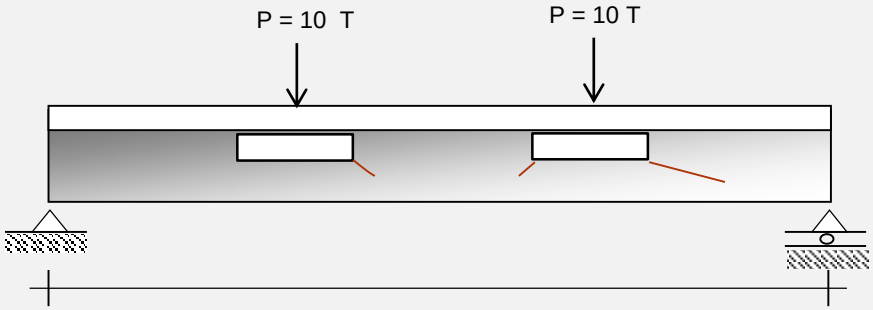


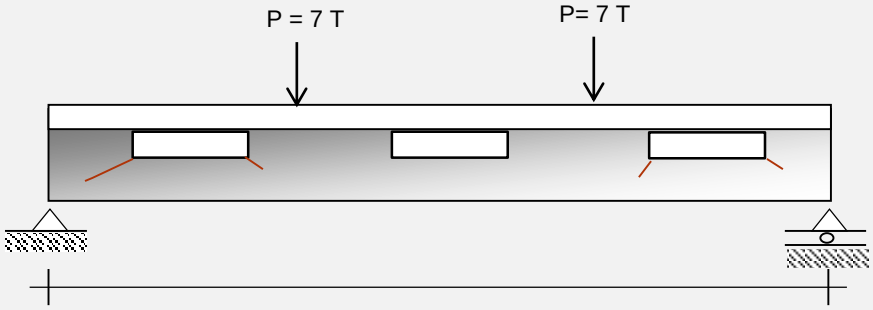

| Previous Research (MANGANTAR) | 2P (Ton) | Deflection mid-span (mm) | Testing Material (NICXSON) | 2P (Ton) | Deflection mid-span (mm) |
|---|---|---|---|---|---|
| I | 24 | 9 | I | 19 | 12.5 |
| II | 17 | 9.6 | II | 20 | 13.8 |
| III | 23.5 | 8.2 | III | 14 | 9.35 |

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# THANK YOU