# Heat transfer coefficient of railway brake disc

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## Introduction

Rail vehicles achieve braking through kinetic energy converted to thermal energy, which will generate friction heat, this heat can cause forest fire or induce thermal crack. Therefore, predicting the temperature of the brake disc is important, which includes how heat is generated and dissipated. We only focus on how friction heat dissipates. More specifically, we focus on part of the heat which is dissipated by convection in the internal of the brake disc.

## Description

The object is a railway brake disc. The heat transfer coefficient can be influenced by the geometry of cooling fins, which affects the airflow and local heat transfer. Your main task is to calculate the heat transfer coefficient of cooling fins.

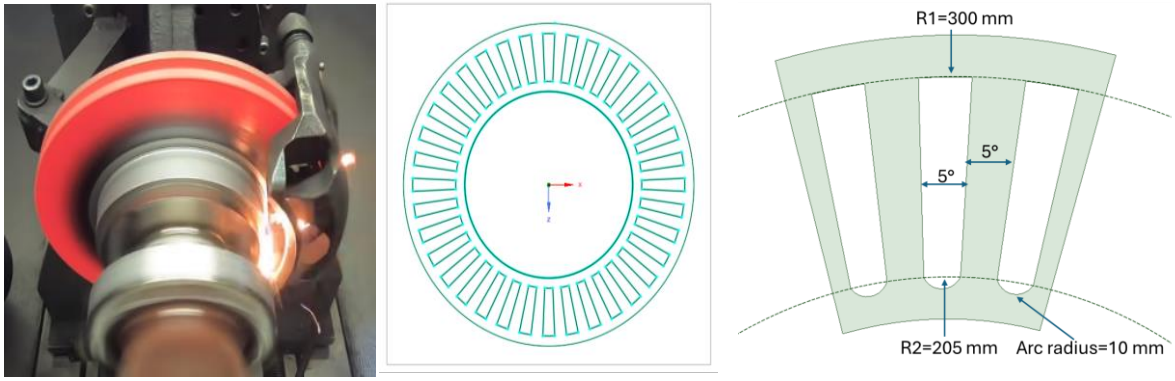


*Figure 1 Brake disc (a): experiment (b): whole view (c) part of brake disc*

You only know the ambient temperature(300 K), the cooling fins temperature(500 K), and the rotation speed(96.6 rad/s). Cooling fins are made of steel. Based on the above information, you need to build a 2D, steady model to calculate the heat transfer coefficient. More specifically, you need to:

1: Choose a suitable model. The brake disc is rotating.

2: Mesh sensitivity analysis, decide the suitable mesh size.

3: Parametric studies, calculate the heat transfer coefficient and change geometry of cooling fins(like different shapes, or slightly twisted in radius direction ).

If you have any questions, please contact me or welcome to Teknikringen 8, third floor.