



## Failure analysis of a motorcycle brake disc

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### Abstract

A certain number of motorbike disc brakes, made of stainless steel, shown the presence of small cracks only after a few thousands miles. These cracks were mainly located nearby the holes placed on flange to ventilate and refresh pads.

According to results, the deterioration can be led back to thermal cyclic strain (related with the heating–cooling cycles developed during the brake action) superimposed to the mechanical strain caused by braking torque.

This work analyses the aforesaid disc brakes investigating both the main causes and the evolution of its deterioration in order to find out possible solutions. The short lifespan of such discs has to be ascribed to the rapid decay of the mechanical properties of the manufacturing material. Material decay is liable for starting cracks.

Several actions could be chosen to face this problem. The choice of a particular chemical composition, which will be demonstrated to be unfit for the purpose, produced an extreme tempering of the steel as a direct result of its protracted exposure to high temperatures (a situation which can be considered usual referring to disc brakes).

In this work, we present the effect of choosing a different kind of steel, characterized by a greater resistance to the tempering processes.

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### 1. Introduction

A motorbike brake disc is composed of two main parts, a flange and a bridge ([Fig. 1](#)). The former faces pressure from pads and therefore is subjected to higher temperatures during braking; the latter works in cooler conditions and has the function of transferring brake torque to the wheel hub.

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