

# Rolling contact fatigue (RCF) defects of rails in Japanese railways and its mitigation strategies

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**ABSTRACT:** Rail is the one of the most important materials to support and guide railway vehicles safely and smoothly. Since rail suffers from various interacting forces and environmental atmosphere, wear and fatigue pose large problems with wheel and rail. Hence, wear and fatigue of wheel and rail have been studied so far to keep running safety and some level of riding comfort of vehicle taking into account track maintenance cost. In this review, rolling contact fatigue (RCF) of rail which is one of typical fatigue phenomenon for steel wheel-on-rail system is focused on and the history of RCF defects and the maintenance experience of their mitigation measures in Japanese railways are described. The concept of mitigation strategy is balance between wear and RCF. Controlling wear amount is a key word to mitigate RCF defects based on selecting rail material suitable for vehicle/track interaction together with grinding and lubrication. Furthermore, the purpose of Japanese bainitic steel rail is to obtain the suitable amount of wear to prevent the initiation of RCF crack.

*Keywords: Rail, Wear, Rolling Contact Fatigue, 2D Roughness Contact Model, Preventive Grinding*