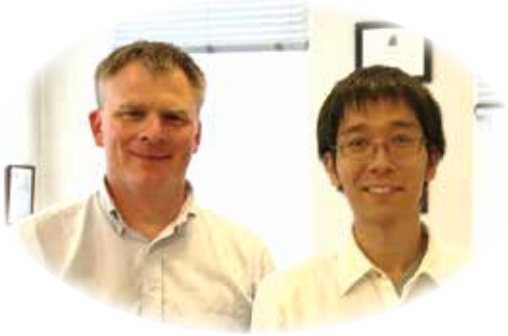
Collaborative Research with Sheffield University

RTRI has researched the in-situ measurement of the wheel/rail contact condition with Professor Roger Lewis at The University of Sheffield from April 2017. Sheffield is famous for pioneering novel steel-making processes, metals and metal products, and The University of Sheffield has developed to teach applied science with the foundation from the steel industry. Professor Roger Lewis teaches tribology in the university and the world-leading researcher in the area of wheel/rail contacts issues.

Since the friction condition between the wheel and rail plays a vital role in the transmission of driving and braking forces, it should be kept at an optimum level to secure the proper acceleration performance and braking distance. On the other hand, it is known that high traction coefficient and slip at curves could lead to severe wear and deformation of wheel and rail, energy consumption, squealing noise and wheel-climb derailment. It is important to understand what is happening at the interface between the wheel and rail to understand the mechanisms of these phenomena. However, the difficulty in obtaining accurate non-destructive interfacial measurements has hindered systematic experimental investigations. Professor Roger Lewis has conducted in-situ measurement of the wheel/rail contact using ultrasound

Full-scale wheel/rail test facility



Prof. Roger Lewis and Mr. Shinya Fukagai

The University of Sheffield

waves. This technique enables us to obtain information on the contact conditions, such as the contact shape and the distribution of contact stiffness with consideration for surface topography.

RTRI has applied this technique to the rolling-sliding contact between full-scale wheel and rail and clarified the relationship between contact stiffness and friction force. The work will allow recommendations on how to treat the surface topography of the wheel and rail to control the friction force.

Our future work will aim to apply this technique more widely to the wheel/rail contact issues, such as wear, damage, traction, noise and derailment.

(**Shinya Fukagai,** Frictional Materials)