A new transducer for roll gap measurements of the roll pressure distribution and the friction condition in cold flat rolling

Background/purpose: The only way to establish the true rolling pressure and the true friction condition in cold rolling is to conduct measurements in the roll bite. A new transducer design is therefore proposed, this to overcome problems in previous measurements in the past 70 years. Method: The new idea is to increase the contact surface of the transducer, to be larger than the arc of contact. This is in the opposite way, compared to the smaller and smaller contact pin design that has been prevailing. Results: The measurements where conducted during cold dry rolling of both copper strips and stainless steel strips in a pilot mill. The recordings were selected from a steady state with no disturbance from the material flow. The transducer was able to simultaneously measure both the normal pressure and the friction stress. An estimation of the coefficient of friction was accordingly performed. Conclusions: The new transducer works very well, it was seen to be robust and able to avoid signal disturbance. The pressure and friction stress distribution results was as expected by the authors and a good reproducibility, together with a proven agreement between recorded signals and signals simulated.

Keywords: Friction stress, normal pressure distribution, roll bite measurements, cold flat rolling of metals.