This paper presents the design method of the new controller for looper system in hot strip finishing mill. Looper response time is related to the performance of the tension control to reduce the delivery width error. The quality of the hot strip product, especially width deviation at the top of the strip, is greatly influenced by the precision of tension control. In this paper, a new fuzzy PID control system is designed to obtain the fast looper angle response and the high control precision. The computer simulation to verify the performance of the new controller is executed. From the results of the simulation, the tension can obtain better performance than that of the conventional PID.

Recently the control accuracy of hot strip mill is greatly improved. Especially in case of strip thickness control, the general hit ratio within ±50μm researches up to 99%. While the thickness precision is improved, the precision of delivery width control is rather low.

The delivery width control of hot finishing mill has two issues. One is the width margin control problem in the middle part of strip and the other is the width minus problem in the head part of strip. The former case is related to the setup and control at the roughing and finishing mill. The setup problems of roughing mill are closely related to the width spread prediction model and dog bone width recovery model. The control problem depends on the AWC(Automatic Width Control) control precision. In case of finishing mill, the precision of width spread prediction model and tension preset model determine the control accuracy of width margin. Moreover the control is absolutely correlated to the feed forward AWC, feed back AWC and the performance of looper multivariable control, and so forth. The latter case is mainly related to the precision of finishing setup model and looper response at the top of the strip.

Until now, the width control of hot strip mill is mainly performed by roughing mill. A target at finishing mill has mostly been the control of thickness deviation, as a result, the width precision of the strip hasn’t been improved. But an active width control at finishing mill is being performed by advanced steel company1,2.

The width for finishing mill is controlled by looper system which is located between rolling stands. The looper is a device for balancing the mass flow. The control purpose is obtained by regulating the strip tension and looper angle to the desired value. Thus, it can prevent the changes in width and thickness of a strip due to the inter-stand tension and the formation of strip loop due to the mass flow unbalance.

However, if the control performance is not good enough, there may be an over tension and over loop. In this case, the thickness and width quality of the strip are low and the formation of an over loop is induced sometimes a miss coil. Therefore, looper system should be designed to have high performances in order to prevent these problems. That is to say, the fast response of looper system can make earlier the start time of a tension control and execute stable looper control.

In this paper, a new fuzzy PID control system instead of existing PID controller is designed to obtain the fast looper angle response and the high control precision. This paper is organized as follows. In section 2, a control target system is described in detail. In section 3, the problems of the existing control system are explained and the new controller is designed. The simulation analysis is carried out in section 4 followed by section 5, which contains conclusions.