When you play chess you see the board and the pieces in front of you and are presented with a range of potential moves. You are unable to look into the future and predict your opponent’s response and yet you must also try to plan many of your potential counter moves. There is an enormous amount of information to assimilate, just as you have to do when managing raw meal proportioning. ABB’s RMP uses the most advanced forms of mathematical techniques to evaluate the choices and predict the consequences of any potential responses. The solution applies Model Predictive Control (MPC) and Mixed Logic Dynamic (MLD) systems which enable RMP to make predictions about the process and chemistry. It can evaluate the merits of control decisions and select and implement the best series of control decisions into the future. This is done by the model giving a prediction of the quality after the mill and/or silos. Using information from the online and offline analysers, the model compares the prediction to the cost and quality targets. A series of current and future optimal ‘moves’ are selected and then the decision is implemented. Lastly, the effects of process unpredictability and dynamics are absorbed and fed into the model to further improve predictions and decisions. The benefits of being able to make process decisions by looking forward instead of backward are:

- optimal and tight trade off between quality targets and material costs
- early smoothing of long and medium term disturbances
- meeting preconditions for maximised alternative fuel usage
- conveyor belt delays are compensated
- process dynamics are competently handled
- feeder moves are minimised.

Open system
Despite the intricacies that are handled, RMP 5.0 is not a ‘black box’ solution. RMP is optimized during commissioning to provide the best overall performance. After that, customers can change the priorities and weighting of various parameters without input or re-engineering from ABB. It is possible at any given moment to optimise for finance, throughput or quality. It is also possible for customers to choose which, from a selection of raw materials, they wish to use according to seasonal or financial effectiveness.

Real world solution
RMP 5.0 is already installed in several plants with good results, having met anticipated expectations. Thus, the transition from theory to practice to solve real-world plant situations has been met.

Conclusion
The saying ‘put rubbish in, get rubbish out’ was never more true than when talking about getting raw meal proportioning right. It is the start and the key part of the manufacturing process and errors made here are costly to correct further down the line. The new technologies of MPC and MLD uniquely applied by RMP make the quality goal of ‘right the first time’ a tangible reality. Using historical data to plan your moves means you are constantly on the defensive; with RMP, you can be on the offensive. These new tools allow you to take the initiative, making sure that every move is a winner, and that ultimately you can be in a position to checkmate your quality and cost obstacles.