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QFT TECHNIQUE APPLICATION ON FROZEN FOOD COLDSTORE TEMPERATURE CONTROL

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ABSTRACT

Due to several reasons, the frozen foods coldstore temperature could present certain control problems, if the evaporator is a flooded and over-feed model. For example, the normal temperature variation interval could be –19.5 to –22.5ºC (around a set point temperature of –21ºC), because of coldstore continuous loads with new frozen foods from freezers, involving frequent coldstore door openings. The traditional control systems (on-off proportional control, for example) are not efficient absorbing these temperature perturbations. This excessive temperature variation could be negative to frozen food quality.

In this work a new control system for these refrigeration system elements is presented and evaluated: the QFT based controller. The QFT (Quantitative Feedback Theory) technique have been used, for example, in aircraft fly control systems and other complex applications, as it is possible to see in the Proceedings of the recent 5th International Symposium on Quantitative Feedback Theory and Robust Frequency Domain Methods, held in Pamplona University (Spain) in 2001. The QFT technique is a mathematical tool allowing to build a control system absorbing these temperature perturbations, avoiding the excessive coldstore temperature variation.

As conclusions, it have bee probed that with this new frozen food coldstore temperature control system, and considering the same work conditions and temperature perturbations observed really in a frozen food factory, the obtained temperature variation interval is –21ºC $\pm$ 0.5ºC and the QFT based controller build is not more complex than a PID controller.