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# Electrofishing techniques: Slaughtering and quality analysis for BFT

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**SUMMARY** – Fresh water electrofishing techniques have been adapted in order to be used in sea water for electrofishing of some fish species such as the Bluefin Tuna (BFT). The effect of the current flow from the harpoon through the spine may damage it, decreasing the final quality of the meat obtained. This paper describes a project that approaches the development of a non conventional electronic power converter that allows to study different waveforms and its effect on the quality of the product, as well as an automatic system of visual inspection for the objective evaluation of shape and the quality of tuna meat.

**Key words:** Tuna farming, electronic systems, multivariate quality control, power systems, computer vision, food processing.

**RESUME** – "Techniques de pêche électrique : Abattage et analyse de la qualité du thon rouge". Les techniques de pêche électrique en eau douce ont été adaptées afin d'être utilisées en eau de mer pour la pêche électrique de quelques espèces de poissons tels que le thon rouge. Le passage du courant du harpon à travers la colonne vertébrale peut causer des dommages, et diminuer la qualité finale de la viande obtenue. Cet article décrit un projet qui envisage le développement d'un convertisseur électronique de puissance non conventionnel qui permette d'étudier différentes formes d'onde et leur effet sur la qualité du produit, ainsi qu'un système automatique d'inspection visuelle pour l'évaluation objective de la forme et la qualité de la viande de thon.

**Mots-clés** : Elevage du thon, systèmes électroniques, contrôle multivarié de la qualité, systèmes électriques, vision par ordinateur, transformation des aliments.

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## Introduction

Nowadays, shotgun slaughtering is the most widely used technique, but this method has two main drawbacks: on the one hand, the slaughtering is very stressful and on the other hand, scuba divers are required to stay inside the cage in order to "strain" the nets, working under risky and unsafe conditions. In order to avoid these annoyances, the managers of the G. Méndez España S.L. enterprise, adopted the electrofishing at their farms. This technique has been widely used for electrofishing in fresh water (Reynolds, 1996), which little conductivity facilitates the application of high voltage fields through the body of the fish.

## Problems associated with electrofishing

The main problem that limited its use in sea water (high conductivity 50 mS/cm) was overcome by means of an underwater harpooning system connected to an electronic power converter installed onboard (registered at the owned EU patent No. 005001131.8).

The main goal of this project is concerned about improving the knowledge of the nature and the problematic associated to the use of the electro-slaughtering technique used at this time, by the development of a specially designed equipment for the research in this field, to carry out a scientific analysis of data to be collected.

## Equipment development

### Electronic power converter

The research has involved the development of three different stages for the electronic system (Fig. 1): (i) Electronic Power Converter; (ii) Arbitrary Signal Generator; and (iii) Security System.

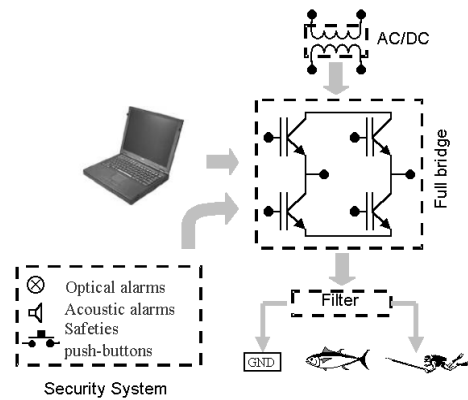


Fig. 1. Electronic power converter.

### Visual inspection system

In this respect is being developed an Automatic System of Visual Inspection with which is tried to realize a study of the quality of the meat of tuna, acting as feedback inside the process of analysis of the ideal waveforms to obtain the sacrifice of the tuna with the best qualities regarding of meat colour and non break of dorsal thorn (bone); both determinant parameters in the evaluation of the BFT.

The above mentioned system of inspection will use samples of meat of tuna proceeding from the central zone and distal zone just before the tail (Fig. 2).

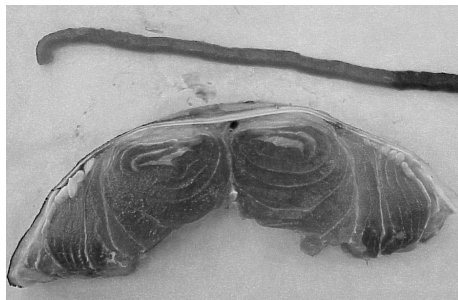


Fig. 2. Tuna meat samples.

These samples are taken in the initial stage of the line factory processing of the tuna. To the images obtained from these samples were applying Artificial Vision techniques, based on the analysis and modelling of colour and texture, together with the utilization of other technologies of analysis.

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