

# MEAT FACTORY CELL – A CONCEPT FOR THE FUTURE?

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**Abstract – Technology is needed to efficiently utilize important resources and enable sustainable and profitable food production. The Meat Factory Cell (MFC) automation concept is proposed as an alternative production process that is suitable for small and large slaughterhouses. MFC aims to be profitable, efficient, environmentally and socially sustainable and flexible. General hygiene will be improved and meat quality will be maintained. The conditions for health, environment and safety will also be improved.**

**Key Words – workstation, automation, innovation**

## I. INTRODUCTION

Increased productivity is crucial for competitiveness. In a global perspective it is also a question of food security – we need to develop efficient technology to utilize important resources for sustainable food production and still make profits.

The traditional line-solution is approaching a point where it is no longer sustainable in a Norwegian context, due to low production volumes, long transport distances, non-specialized abattoirs and high workforce salaries. Global production trends aim at improved efficiency by scaling-up and speeding-up production lines. In order to accommodate this trend another, almost impossible trend, has emerged: the standardisation of animals to reduce variation [1].

MFC is an ambitious automation concept, which is profitable, efficient, environmentally and socially sustainable. It will allow flexible handling of different species in one location and aims to be beneficial for operators' health, environment and safety (HES). General hygiene will be improved and meat quality will be maintained.

## II. MATERIALS AND METHODS

The new concept has been "invented" in a multidisciplinary consortium. Draft scenarios were outlined, taking into account the demands, aims and obstacles arising from the different fields. The “winning model” has been described, sketched, animated and preliminarily tested.

Animations were made in Autodesk 3ds max 2017 and Lumion 4.

## III. RESULTS AND DISCUSSION

The Meat Factory Cell concept is based on four principles:

*Principle 1: Let man do what man is best at (Sense, analyse and cut); let machines do what they are best at (stretch, lift and carry).*

Slaughtering and butchering mainly comprise two operations: Stretch and cut. Cutting has been the focus of automation research but has proven to be challenging to automate. Stretching, a simple and heavy action, has received less research attention.

*Principle 2: Muscle masses should be removed first.*

This principle arose from the question "Why do conventional slaughterhouses remove the intestines first after singeing when most muscles are on the outside of the carcass?" Removing the gastro-intestinal tract before the muscles is cumbersome and poses a risk for fecal contamination since it is effectively working

from the inside out. Why not work from the outside in? The time from killing to grading is so short that bacteria are not able to grow through the intestines and other organs.

*Principle 3: Work should be organised in cells. Capacity can be increased using parallel cells*

Today's production lines have disadvantages: High initial investment, too high capacity for slaughterhouses dealing with limited local volumes or seasonal production, low flexibility, difficult to automate and high maintenance. Another very important disadvantage is that production lines hamper innovation because it is difficult to disrupt the line to try new concepts, techniques or technology.

*Principle 4: Apply available technology to improve meat safety.*

Reliance on traditional food inspection and food control systems is still prevalent even though they are partly out-dated [2]. An innovative approach to risk-based control would be beneficial to both consumers and industry.

MFC (Figure 1) apply three main changes to meat production and processing:

1. Work will be primarily organized in cell stations.
2. Combine and merge elements of the today's separate processes and disciplines "slaughter", "meat cutting" and "deboning".
3. "Disassemble" the carcass from outside-in. Today, the focus is to firstly remove internal organs before presenting "an intact carcass for control".



Fig 1. The concept for parallel cell processing – 3 MFCs are shown (left).

#### IV. CONCLUSION

The MFC may be a concept for the meat industry's current and future needs.

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