



FORTIFICATION OF MILLED MAIZE PRODUCTS

What is food fortification ?

Fortification is the strengthening of food with the addition of **essential micro-nutrients (vitamins and minerals)**.

Essential micro-nutrients include **Vitamin A, B1, B2, B6** as well as **Zinc, Iron, Niacin and Folic Acid**.

Why is it important to fortify ?

- ❖ Maize meal is a staple diet for many African countries including Zambia.
- ❖ As a cheap, filling and readily available food, maize is consumed on a daily basis especially by low to medium income families.
- ❖ Maize meal alone does not make up a balanced diet therefore those families that consume maize meal in every meal suffer from nutrient deficiencies.
- ❖ **Fortification of maize meal will ensure that those who consume maize meal as a major part of their diets also get their daily dose of essential micro-nutrients.**



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How do we fortify ?

The traditional milling process of receiving, cleaning then grinding grain is followed with an added step of **adding and mixing the micro-nutrients in the form of a premix to the finished product** before the product is packaged.

What is a premix ?



This is **a precise combination of micro (and macro) nutrients specifically designed to suit the unique food product**. Each nutrient component is pre-scaled and precision blended into a premix.

Why use a premix ?

A premix is a single product purchased by the miller and in so doing:

- a) Improves purchasing efficiency** by minimizing the number of raw materials
- b) Improves adding and mixing accuracy** as one product is added to the finished product in order to fortify it.



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How do we add the premix to the finished product ?



When vitamins, minerals and functional ingredients (premix) are added to a food product, they **must be added in precisely the right amount and at the right time during the production process** in order to achieve accurate fortification.

The milling industry has motivated the design for equipment that suits the needs for fortification i.e. **Micro-Dosing Unit.**

Why a Micro-Dosing Unit ?

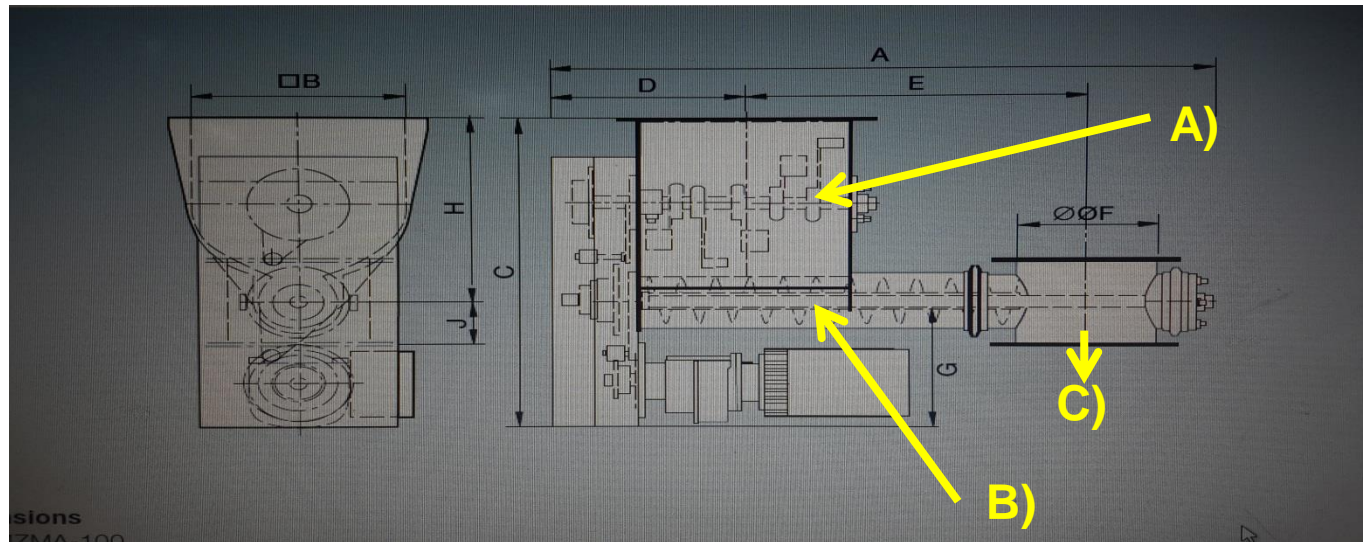
A micro-dosing unit is preferred for fortification because:

- a) **It has precise control**
- b) **It has high proportioning accuracy**
- c) **Easy installation at the appropriate location in the milling process**
- d) **It requires low maintenance**



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How do micro-dosing units work ?



- A. Premix to be proportioned (added) is **loosened in the mixing chamber** since the premix is not free flowing in its natural state.
- B. Loosened premix then enters the **proportioning screw which is operated by a variable speed drive to regulate premix addition.**
- C. Proportioned premix is discharged from the micro-dosing unit through this **outlet that is connected to a paddle conveyor.**

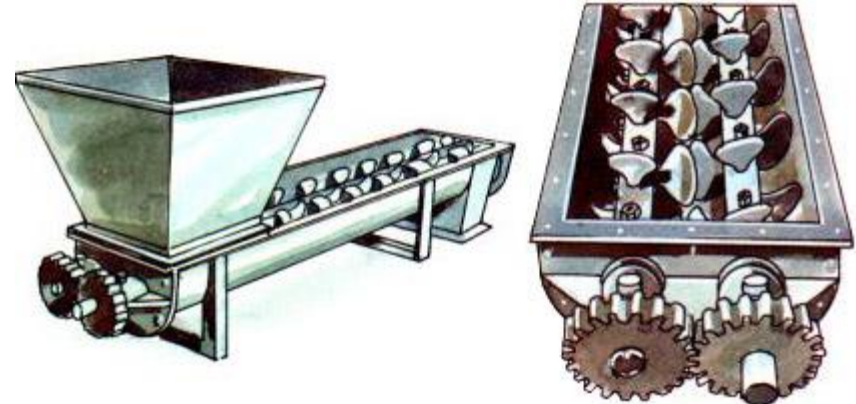


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How do we ensure the premix and finished product are mixed ?



- 1) With recent technological advancements, the micro-dosing units come with user **friendly interfaces to program and regulate premix addition**.
- 2) The control units can be connected to the mill central control system and monitored remotely to ensure accuracy.
- 3) Premix and finished product are mixed together in **specially designed paddle conveyors which simultaneously blend and transport** the two together.
- 4) The **micro-dosing unit and the paddle conveyors are inter-linked** to ensure that one cannot operate without the other.





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Are there any process control measures in place ?



The world today is dominated by **computer operated systems** that control industrial operations on a large scale and the milling industry has followed suit with the introduction of **Programmable Logic Control Systems (PLC's)**.

PLC's are connected and control all equipment in a mill and will report any faults or deviations.



In spite of all these advancements in technology and computerisation of industries, **in food processing, we still ultimately rely on the human factor.**

As such, **the most important factor in the process control** in the milling industry is and will always be, **The Miller.**



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What is a miller ?



Milling is among the oldest of human occupations.

A miller is a person who operates a mill to grind grain into fine or powdery foodstuffs that are easier to consume and digest.

Responsibilities of the miller ?

Utilizing skills obtained through professional qualifications and on the job training, the miller will be responsible for:

1. Receiving good quality raw materials fit for human consumption
2. Cleaning the raw materials before the milling process
3. Milling the raw material to a standard and quality expected by the consumer
4. Packaging and warehousing the finished product before sale
5. Overseeing all other activities that affect or impact on milling operations



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Millers best practices !

Millers are expected to conduct their operations in a manner that will produce the highest quality product which meets the consumers needs:

1. Ordering raw materials from reputable and accredited sources.
2. Auditing the raw material supplier to ensure they conduct their operations in a manner which does not bring harm to the consumer of the end product.
3. Conduct milling operations in safe, hygienic and pleasant environment.
4. The production process of the finished goods is controlled by the miller and monitored by the quality assurance department and that the two will remain separate entities.
5. Follow industry best practices as stipulated by organisations such as the Grain Milling Federation, IAOM, ISO and adopt best practices that include Hazard Analysis Critical Control Plan (HACCP), Good Manufacturing Practice (GMP), Fumigation Management Plan (FMP) etc.
6. Ensure all milling equipment is regularly repaired, maintained, cleaned and calibrated to ensure hygiene, operational efficiency and reliability.



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Any Questions ?

