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**SUBJECT:** MALTING SYSTEMS, INSTALLATION AND OPERATING COST COMPARISONS

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Putting together a business plan for a Malting Operation can be an intimidating exercise – and fraught with peril and long lasting consequences! Incorrect or missing assumptions and or costs can drastically affect the future outcome of any business – Malting is no exception!

As I talk with potential Maltsters and folks investigating new and or growth opportunities, the discussion eventually comes down to the inevitable ‘how much will it cost’ question. Many times the answer, to quote Dave Thomas, is ‘how long is a rope’! The upfront cost of the malting equipment is only one small part of the equation.

Over the past few years, I have developed a work sheet to help me better understand the financial aspects of the malting business. I have since realized that what started as an exercise for my edification could potentially be a useful tool for folks exploring Craft Malting as a new business and for existing operations looking at potential expansion and growth. This write-up is intended as a companion document for the worksheet.

Ultimately, you need to evaluate your malt house based on the actual finished malt production capability; how much malt can you produce annually versus the total cost to make that malt. That is the end goal of this worksheet. So to start with, we need a reasonably accurate estimation of the annual installed finished malt capacity of the system.

A couple of notes and or disclaimers before we get started!

- Unless otherwise noted, any reference to ‘per pound of malt’ is finished malt
- All system performance and dollar amounts estimates are just that – estimates and for reference only

### **Malt House Capacity;**

This calculation assumes 5 variables;

- Malting Loss;  
Malting losses will vary with the product, grain type and malting practices, 18 - 20% is a good starting point.
- Operating weeks per year (self-explanatory!)
- Batch Cycle (days);  
Different system configurations will result in different batch cycle times (days). In an all-in-one configuration, the cycle time will include the steeping, germination, kilning and time to unload,

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(Robert) Wayne Moore  
5270 N Trail Ridge Ct  
Salina KS 67401  
720.626.7458  
wayne@mooreandmore.equipment

clean and be start another batch. A system with a separate steep and combination G/K vessel needs to include the germination, kilning, unloading and cleaning times. A separate germination and kiln system only needs to include the germination, unloading and cleaning times. Here is an example of the batch cycle times (days) based on system type;

	S/G/K	S+G/K	S+G+K
Steep	2		
Germination	4	4	4
Kilning	1	1	
Cleaning / Unloading	1	1	1
<b>Cycle Time</b>	<b>8</b>	<b>6</b>	<b>5</b>

- Number of Vessels;  
How are you planning your current (and future) operation? Are you starting with only one vessel with room for expansion or multiple vessels?
- Batch Size;  
The batch size is pounds of incoming dry grain (not finished malt)

### Malting Equipment Costs:

This category is your capital outlay and includes two sections; Malting Equipment and the Equipment Installation. Each section is further broken down into three sub-sections; Malting Equipment, Malting Support Equipment and Grain / Malt Handling Support Equipment.

- Malting Equipment;  
This is the category probably gets the most attention – and probably has the greatest variability of any other category in the list! Whether you self-build your system, buy a complete automated system or have a system custom built – all I can say is “do your homework”!
- Support Equipment, Malting;
  - Chiller; Most malting operations will need a glycol chiller for controlling germination air temperatures and conditioning steep water. Chiller sizing is dependent on system size and geographic location.
    - 5-ton chiller +/- \$13,000
    - 10-ton +/- \$15,000
    - 12-ton +/- \$17,000
    - 30-ton +/- \$37,000
 Note; A chiller ‘ton’ is 12,000 btu/hr
  - Boiler; If your installation will operate on both a heated and a chilled glycol system for temperature control of steep and germination, you’ll need a boiler for the hot glycol side. Ballpark cost of +/- \$2,000 per 200,000 btu/hr boiler.
  - Air Compressor; I recommend a good commercial quality compressor. More money up front – but much longer service life, higher efficiencies and quieter!
    - 5 hp tank mounted with air dryer +/- \$8,000
    - 7 ½ hp tank mounted with air dryer +/- \$10,000
    - 15 hp tank mounted with air dryer +/- \$12,500
  - Steep water buffer tank; Depending on your water supply, you may need a water storage tank for your steep water needs. Polypropylene Tanks work well for this application, are affordable and there are numerous suppliers (Google is your friend here).
  - Water pump; if you use a water buffer tank, you’ll need a water transfer pump for filling your steep tank. Assume \$750 for a decent pump.

- Support Equipment, Grain / Malt Handling;
  - Augers;
    - 8” dia x 34’ electric auger +/- \$4,000
    - 4” dia x 11’ Utility auger +/- \$1,000
  - Grain Vacuum;
    - Walinga 3510E 4” grain vacuum with hoses +/- \$25,000
  - Grain Bins;
    - GSI 171 bushel cone bottom bin +/- \$1,750
    - GSI 231 bushel cone bottom bin +/- \$1,850
    - GSI 266 bushel cone bottom bin +/- \$2,000
    - GSI 1,290 bushel cone bottom bin +/- \$5,000
  - Grain / Malt Conveyors;
 

This is a difficult category to provide any ballpark estimates for. These can range from re-purposed used equipment off EBay to all stainless Chain-vey chain disc systems.
  - Debearder and Malt Cleaner;
    - Clipper, Q-sage and others will happily give you a proposal for your malt cleaning needs!
  - Dust Collector;
    - You will need a dust collection system for your malt processing / cleaning area. I’ve seen everything from re-purposed woodworking dust collectors to commercial system specifically designed for the application – and the costs vary accordingly!
  - Bagger, Sewing and Conveying;
    - Manual Bagging Scale / Bagger +/- 3,000
    - Electric Bagging Scale / Bagger +/- \$8,500
    - Bag conveyor +/- \$4,500
    - Bag Sewing Machine, portable +/- \$950
  - Bagging Hopper / Support stand;
    - You will need to either buy or build a support stand and infeed hopper for your bagger +/- 7,500
  - CIP cart;
 

Every Malt house needs some method for cleaning – either a CIP system or power washer.
- Equipment Installation;

This category has three sections that match up with the three capital equipment sections. I didn’t attempt to provide any estimates as these will vary greatly depending on your location, how much you will do in house and the type and scope of the system being installed.

### **Malting Plant Cost / Pound Annual Malt Capacity**

Once you have made it this far, you will now have the total installed cost of your fully operational malting system. However – how do you really factor this dollar amount into a cost per pound of produced malt? I have included two methods in the worksheet; Annual payments based on term and interest (financing) and Straight Line Depreciation. (I am sure there are other methods that would work as well or perhaps better but these are simple and straightforward) The worksheet calculates either – just leave the term blank or “0” for the approach you do not want to use. Once you enter the info into the term, and interest if applicable, the sheet calculates what your installed malting system will cost per pound of install annual malt capacity.

Note; if you want to exclude the cost of money from your malting cost estimates, just leave the term blank (or “0”) for both options and the spreadsheet will return a zero cost / lb for the malting system costs.

## Malt Plant Operating Costs

This category is an attempt to capture the basic costs associated with operating the malting facility. There are three sections; Labor, Utilities and Facility costs.

- Labor;  
You enter the operating weeks per year, labor cost weighting, full time rate, part time rate and estimated full and part time hours per week – and the sheet calculates your labor costs per pound of annual malt production.

Note; the labor cost weighting is to factor in the additional labor costs such as taxes, insurance, etc.

- Utilities;  
This section estimates the costs of operating the malting equipment. The assumptions I have in the sheet are estimates – not measured actuals – and will vary considerably with geographic regions, system design and types of malt being produced!
  - Electrical;
    - \$ / Kwh - your local utility rate
    - Kwh / lb of malt - an estimate of the total electric power required to produce a pound of finished malt. I’m estimating an average of 0.4 Kwh / lb.
  - Gas (based on Natural Gas);
    - \$ / Therm – your local utility rate
    - Btu / lb of malt – and estimate of the total Btu’s to produce a pound of finished malt.
      - 3,000 Btu / lb is my estimate for a base malt produced on a system with heat recovery heat exchange on the kiln
      - A system without a heat recovery heat exchanger can use up to 50% more gas for the kilning process. For estimating purposes, use 4,200 Btu / lb for a system without heat recovery.
  - Water;
    - 1.0 gallons / lb of malt is my estimate for steep water usage. You may want to increase this number to include water for cleaning and incidental usage.
    - \$ / 1,000 gallons is your utility rates for both water supply and sewer – if applicable.
- Facilities;  
This section is an attempt to capture the cost of the facilities for the operation. This may or may not fit your needs. Entering your local rates and the estimated space requirements will generate an estimated annual cost of the facilities.

If this does not fit your needs, unprotect the worksheet and manually enter your annual facility rent / cost and annual facility operating costs – and the sheet will go ahead and calculate the facilities costs / lb of malt production.

- Raw Grain Costs;  
Almost done! Enter your estimated raw grain information – and the worksheet will calculate the grain costs / lb of annual malt production.

### **Total Cost / Lb for Malt House Operations;**

This is the estimate of what it will cost to produce your malt at the Annual Finished Malt Production Capacity.

### **Potential Annual Income / Return On Capital:**

This is what it is really all about! Entering the estimated selling price will complete the worksheet – and the estimated Annual Gross Income, Annual Net Income and simple ROI are displayed for each completed option / column.

### **Exploring Different Scenarios:**

Now is when you can start to play with the options to create difference scenarios. Here's some potential scenarios you may want to consider;

- **Annual Finished Malt Production Volume vs. Annual Sales Volume**  
You may want to project several years of operation based on different production volumes. You can enter the same costs and expense data in all the option columns – but adjust the volumes (by changing the batch size or cycle times) to reflect your sales projections year on year. The worksheet will now calculate and estimate your cost / lb of malt produced as well as the gross and net income projections based on project sales volumes rather than installed capacity.
- **Compare System Configurations**  
I've included 4 option columns. If you want to compare more options than this, you can unprotect the sheet and copy / paste an option column to add more if you need. You can play around with system configurations and the resulting batch durations to explore potential annual production capacity of the various options.

### **Conclusion;**

I hope this worksheet has been of benefit to you. If you have any questions, comments or would like assistance with your planning, feel free to contact me.

Wayne Moore  
[wayne@mooreandmore.equipment](mailto:wayne@mooreandmore.equipment)  
720-626-7458