The Oregon State University Mini-Malter
Josef Hortnagi, John Parmigiani, Tyler Froemming
Oregon State University

Abstract
In this poster we will be describing a custom machine, designed and built at Oregon State University, called the mini malter. This project was created for the OSU senior capstone design Class. The following describes the creation of the project and a description of the machine itself.

In the past 30 years the growing micro brewing community has stimulated research in the science of brewing beer. The OSU food science and crop science departments are resources for such research. The food science pilot brewery has the capability of brewing 50 gallon batches of beer, approximately three kegs. The crop science department is constantly researching and growing new strains of barley, around a thousand pounds per strain, for brewing. There has existed a gap between the two departments that hinders the combination of their work. This gap is the production of malted barley, which is a key ingredient in beer. There currently exists no industry equivalent that can malt a batch size on a scale appropriate for the pilot brewery. Large scale industrial malters have batch sizes near 140,000 to 300,000 lbs, and laboratory malters can only create a few pounds. These factors were the motivation for the mini malter project. This project was a collaborative effort between the schools of mechanical, industrial, manufacturing engineering and food science technology to design and build a prototype malting machine. The design chosen was a round stainless steel vessel for washing, steeping, germinating and kilning. Its main capability is incorporating all the different processes required for malting barley into a single machine.

To accomplish this, the mini malter features a 144 gallon malting chamber capable of processing custom sized batches in the range of 150lbs to 300lbs. The plumbing system automatically fills and drains the malting chamber according to a preset hydration schedule. The machine continuously monitors the grain moisture content and temperature during the entire malting process. This required unique features like a free floating base incorporating a load cell for monitoring the barley weight and thermocouples incorporated into the malting chamber. Also featured is an onboard auger agitation system for stirring the barley. A Steam heat exchanger and 400 CFM air circulation system aerate the grain bed and kiln at a maximum temperature of 180 °F. These multiple systems are controlled by a dedicated PC, data acquisition and conditioning hardware, and a custom LabVIEW program. After calibrating to produce malt similar to industry standard the mini malter has become a permanent addition to the food science department. The mini malter has also attracted interest from local brewers and barley farmers. Industry leaders from Oregon breweries such as Widmer Brothers, Rogue, Ninkasi, and Oak Shire Brewing, as well as many prominent Oregon farmers have come to see the mini malter. Great Western Malting has been a very helpful industry resource throughout the entire project as well.

Corresponding Author: Josef Hortnagi, hortnagj@gmail.com