AUTOMATIC SAMPLER DESIGN FOR SUBMERGED FERMENTATION

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Introduction. From fermentation processes important metabolites are obtained for mankind. Bioreactors offer appropriate conditions for microorganism growth and metabolite generation. Obtaining the maximum yield and productivity for a bioprocess requires wide knowledge of the microorganisms and its environment, implying measure on-line variables such as: pH, temperature, dissolved O_2, and exhausted O_2 and CO_2, etc. However, other determinations like biomass, substrate and product concentrations require obtaining samples from the broth and apply off-line techniques (1). Sampling requires extract a fixed volume from the bioreactor every determined time, even at night. Sampling could be repetitive, tedious and exhausting, and special care must be considered for the sample in order to avoid the physiological degradation. It will be desirable for a researcher has an automatic and economical device capable to extract a sample from a bioreactor, saving the liquid in appropriate environment until processing.
In this contribution an inexpensive auto sampler for submerged fermentation is proposed.

Methods. The auto sampler is located within a container of 216mm × 216mm × 216mm. A cylinder of stainless steel of 171 mm of diameter with 16 perforations is used to place the sampling tubes. The main cylinder is sorrounded by a cooling coil of cooper whose function is to keep the samples refrigerated. The sampler system is moved with a stepper motor with resolution of 0.8°, and controlled by an electronic card with digital outputs (1024LS DAQ from Measurement Computing). The control algorithm was programmed with the software LabVIEW™. More information can be found in a similar multiplexed system reported previously in reference (2).

Results. The main contribution of this work is the design of an automatic sampler device for fermentation processes. Figure 1 A) shows the container of the auto sampler and the figure B) represents the internal structure of the sampler. The motion of the system is based on a stepper motor with a resolution of 0.8°. The software allows selecting the number of samples to be taken. Movement sensors precisely allow knowing the exact positions of the sampling arm.

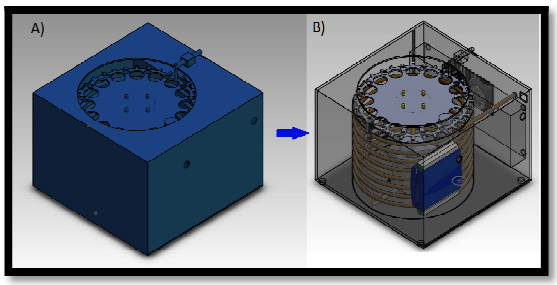

Fig.1 Design of automatic sampler system. A) General structure, surface view, B) Internal view of structure.

The system is able to obtain 16 samples sequentially at different time intervals. The device is able to flush and cool the sample with a control software program made in LabVIEW™.

Conclusions. An automatic device capable to take up to 16 programmed samples from a bioreactor was designed. The sampler could maintain the samples cool through a coil that can be coupled to a refrigerated system. A friendly user software interface was designed. Due to its size, weight, and low cost the sample is portable and can be adapted to different fermentation systems. In addition the system has low cost.

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