

Facility and Process Development and Evaluation

1 Design and Development of Dust Control System for NFA Batch Recirculating Dryers by : Engr. Julius B. Sugue, Engr. Danilo G. Natividad, Engr. Diocano D. Alojado, Jr., and Engr. Ma. Elvira M. Martinez	August 2001 – November 2001
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Design and development of the prototype Dust Control System (DCS) was undertaken from August to November 2001. Fabrication was done at NFA, Nueva Ecija branch office with the direct assistance of personnel in the Technical Services Section. The unit was installed and integrated in one batch recirculating dryer located at warehouse # 4 of Cabanatuan Grain Center. The DCS was targeted to complement NFA's batch recirculating dryers. The study aimed to design and develop a DCS appropriate to NFA batch recirculating dryer installations. It was designed to be simple, easy and required less labor to operate. The system was tested mainly to determine its dust control performance and advantages in drying operation. These include the evaluation of the appropriate locally available sprayer nozzle that could produce enough water droplets that could be able to scavenge impurities and fugitive (respirable) dust particles out from drying air. It was observed during the testing that the DCS developed was effective to draw large impurities and dust particle out from the drying air. The impurities were filtered by the mist introduced in the system. Although some technical problems occurred during the testing, it was noted that the dust control system developed was effective in collecting impurities and controlling fugitive dust during drying.

After the evaluation, it was recommended that further testing and evaluation of the developed DCS should be undertaken to intensively evaluate and assess the needed modification and improvement of the prototype before effecting the final reproduction.

<p>2 Performance Evaluation of Bulk Storage Silos of NFA, Isabela <i>by : Engr. Julius B. Sague, Engr. Diocano D. Alojado, Jr., Engr. Ma. Elvira M. Martinez, and Crestituto C. Mangaoang</i></p>	<p><i>February 2001 – February 2002</i></p>
<p><i>This study reports on the performance of bulk storage silo in Isabela Province. The study was conducted in San Mateo grain center (indoor silo storage) and Santiago grain center (outdoor silo storage). Storage of paddy started from February 2001 for the indoor storage and February 2002 for the outdoor storage. Results demonstrated the benefit of aeration. Regular aeration at RH equal to or below 70% maintained the grain temperature and moisture content at low levels which thus prevented grain spoilage. Grain quality analysis showed that bulk storage period had no significant effect in the change of milling and headrice recoveries of palay stored in the silos. Analysis of yellow and damaged kernels however, showed an increase from initial to the ninth month of storage. Moreover, it was observed that incidence of yellowing of new and mechanically dried stocks was minimal than old stocks when stored in bulk.</i></p> <p><i>Instruments such as grain temperature sensing device, ambient temperature and RH sensing device are important in bulk storage process, because they are used to monitor the grain quality characteristics and storage environment condition.</i></p> <p><i>Results suggest that the use of bulk storage silos in NFA, Isabela Province is technically feasible, provided it is coupled with good silo management practices such as aeration system.</i></p>	

<p>3 Modification and Pilot Testing of the Prototype Dust Control System for NFA Batch Recirculating Dryers <i>by: Engr. Julius B. Sague, Engr. Danilo G. Natividad, Engr. Diocano D. Alojado, Jr., Engr. Ma. Elvira M. Martinez, and Engr. Crestituto C. Mangaoang</i></p>	<p><i>September 2002 – November 2002</i></p>
<p><i>The study was conducted to effect the necessary modification based on the result derived from the prototype fabricated in NFA, Nueva Ecija Branch Office. The Dust Control System (DCS) was made to address the dust pollution problem incurred during grain drying operation. The study was conducted in Southern Philippines Grains Complex (SPGC) in Tacurong City, Sultan Kudarat. Actual drying of paddy was conducted to determine the performance of the prototype as an integral part of the batch recirculating dryer. Based on the result of test and evaluation, the DCS was proven effective in controlling and collecting all forms of harmful dusts and impurities that pollute the surroundings during drying of grains. Even the micron size dust particles such as respirable dust had no chance of escaping into the surroundings with the use of the facility. Fine mist and water spray droplets were the media used in the system to control dust pollution. Harmful dust and impurities were filtered by the mist spray leaving a clean air to exit in the dust stack. Economic and operational evaluation showed that no additional labor was needed to operate the prototype. Only minimal expense was added on the cost of drying when the prototype was used with the dryer. Cost incurred was negligible compared to the damage that was caused by dust pollution.</i></p> <p><i>Based on the foregoing result of the study, integration of the prototype to all batch recirculating dryers and adaptability trial of the prototype in rice milling operation is recommended.</i></p>	

<p>4 Development of Corn Dryer for Farmers Cooperatives by : Danilo G. Natividad and Diocano D. Alojado, Jr.</p>	<p>July 2004 – September 2005</p>
<p><i>The project was conducted to address the drying needs of marginal farmers and farmers' cooperatives particularly in Mt. Province and other areas in Mindanao. Fabrication of the dryer was done at NFA-Santiago City. The bin with design capacity of 8.5 tons was 15 feet long 12 feet wide and 4.5 feet high. The depth of the dryer was 2.4 feet. Fabrication started in July 2004 and the testing and evaluation was completed in March 2005. Except for the furnace and blower which was purchased from Kuizon Enterprises, all the materials were brought and fabricated in Santiago City. The cost of fabrication is P70,000.00 and the set of bio-mass furnace including the blower is P170,000.00.</i></p> <p><i>Test results showed that the dryer had favorable performance with respect to drying efficiencies. The dryer could convert the potential heat value of fuel into actual heat by 94.53% efficiency. In relation to drying system efficiency, the dryer have obtained a 79.05% ability to utilize the available heat in the heating system in removing moisture of the grains. Result of laboratory analysis of the dried product showed that there was a very minimal change in quality of the stock. The changes in quality were within the standard of the PGS. Drying cost (as of April 2005) is P 9.90/bag of corn with initial MC of 28%. It is a requirement, however, that for a smokeless operation the ricehull or corn cobs should be dry.</i></p>	

<p>5 Determination of the Capability of Vertical Polishers to Produce Regular Milled Rice by : Adolfo S. Arcilla, Tessie Q. Ramirez, Larry G. Javier, and Bobby E. Quilit</p>	<p>August 2004 – April 2005</p>
<p><i>Three rice mills equipped with vertical whiteners were tested to determine their milling performance using milled rice recovery and number of kernels with bran streaks per 100 grains as indexes. One rice mill tested was NFA's Buivanngo which has two vertical polishers. The second rice mill was also another Buivanngo which has one horizontal and one vertical whiteners and owned by a private rice miller in Pangasinan. The third was Greenmac with two vertical whiteners and also owned by a private miller in La Union.</i></p> <p><i>All the three rice mills produced the desired milling degree of RMR. Yet they yielded high milling recovery of 67.27% for NFA's Buivanngo, 66.11% for the rice mill owned by Pangasinan's private miller, and 68.47% for the rice mill owned by La Union's private miller. All three rice recoveries were beyond the required guaranteed milling recovery of 65%.</i></p>	
<p>6 Establishment of Service Rates for Various National Food Authority (NFA) Post Harvest Operations by : Joewell A. Monreal, Diocano D. Alojado, Jr., Ma. Elvira M. Martinez, Crestituto C. Mangaoang, and Rogelio A. Macutay</p>	<p>June 2001 – July 2001; March 2002 – April 2003</p>
<p><i>The paper generally aims to establish standard procedure for determining service rates for each type of NFA post harvest facility. It focuses primarily on three NFA post harvest operations namely storing, drying and rice milling.</i></p> <p><i>Storage facilities in NFA are divided into three categories to wit: conventional storage (warehouse), Sealed Enclosure Fumigation Storage Technology (SEFUST), and hermetic storage (Volcani Cube™). Cost computations for ricemilling and drying are limited to rubber roll and mechanical dryer, respectively.</i></p> <p><i>Computations in operational costs include fixed cost, variable cost, and indirect cost with given assumptions and computations in each post harvest facilities.</i></p>	