A Retrospective Look at Engineering Innovations in the Peanut Industry.

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As research scientists and engineers, we are able to gaze into the future of peanut production and processing because we stand on the shoulders of those who blazed the way before us. We have made tremendous progress in the areas of peanut harvest, curing, transportation, storage, and processing during the last 50 years. During the 1960's the digger, shaker, inverter that dug two rows of peanuts into a single inverted windrow was introduced in the Texas and New Mexico production areas. By the early 1970's, inverted windrows were used on approximately 65% of the peanut production in the United States. Today, virtually all commercially produced peanuts are dug using 6-, 8-, or 12-row digger/shaker/inverters. Similarly, in the 1950's, J.L. Shepherd is credited with developing a peanut combine towed by a tractor picking up the windrow, separating the peanuts from the vine, and bagging the peanuts. John Deere manufactured and sold the self-propelled 111 SP Peanut Combine in the mid to late 60's. Today, peanut combines are manufactured by three manufacturers and harvest 6 or 8 rows. The development and improvements to the diggers and the combines have significantly reduced the manpower and time required to harvest the peanut crop each year. Curing has changed from days and months in stackpoles to an average of 24 h or less in a drying wagon increasing the control over the curing process. Many of the peanuts are cured using conveyances holding in excess of 20 t compared to 4 – 6 t cured in the 14- and 21-ft wagons in the past. Instrumentation for the drying control process has improved from a simple mechanical thermostat to networked systems that can be controlled and monitored from anywhere via the internet. Incremental changes have been made to improve the equipment used in sampling and grading peanuts at the peanut buying point. While the basic grading equipment and procedures have remained nearly the same since the 1960's based on research by J.W. Dickens, modifications and control systems are available to fully automate the sampling process and present graders with a consistent 1800-g sample without manual division regardless of the size of the conveyance. In the not too distant past, the average farmers' stock warehouse stored approximately 4,000 t of peanuts for an average of 7 months. Current farmers' stock storage facilities may store as much as 13,000 t for up to one year. This longer storage period increases the requirement of well-designed environmental systems and integrated pest management plans. Improved engineering designs have improved peanut shelling plant capacities and product quality. During the past 30 years, packaging for bulk handling of shelled peanuts has progressed from 100-lb burlap sacks to 1-t Gaylord boxes to 1-t flexible intermediate bulk containers or totes. Each container type carried its own challenges and benefits. Engineering research has shown that controlling relative humidity is of primary importance when storing shelled peanuts and should be maintained between 55 and 70%. If the proper relative humidity is maintained, shelled peanuts can be stored at temperatures up to 55 F for as long as a year with no detrimental effects on flavor or other quality factors.

Engineering challenges still exist in all phases of peanut production, transportation, processing, and storage. Some of these challenges include 1) eliminating foreign material at all points in the value chain; 2) achieving a uniform single kernel distribution during curing; 3)segregating and maintaining segregations of peanuts based on quality and food safety; 4)detecting and eliminating peanuts from the value chain contaminated with aflatoxin; 5) maintaining peanut quality during storage and transportation; and 6) traceability of peanuts to the point of origin.