

KOCHERGIN, VADIM and CY GAUDET, Audubon Sugar Institute, LSU AgCenter, 3845 Hwy 75, St. Gabriel, LA 70776. **Design of clarifiers with turbulence reduction devices.**

### **ABSTRACT**

Solid-liquid separation technologies are critical for various applications in the sugar beet industry. Computerized fluid dynamics (CFD) simulations of existing clarifier designs demonstrated that particle precipitation was adversely affected by the presence of large-scale turbulent eddies. Settling of first carbonation juice is a good illustration of such inefficiency. Precipitation of flocculated particles that takes several minutes in the laboratory conditions requires 40-60 minutes residence time in the industrial clarifiers. Because of turbulence, lower quality juice overflow is observed; larger size of equipment is required with increased potential for sucrose losses. A new design of trayless juice clarifier based on patent pending turbulence reduction devices has been successfully tested in several Louisiana cane sugar mills. A 20 ft.-diameter single-tray clarifier was retrofitted with nine turbulence reduction devices, uniformly distributed over the cross sectional area. Modified clarifier was operated in parallel with multitray 20 ft. diameter Graver and a 30 ft.-diameter Dorr clarifiers for a 90-day long processing season. On average, the newly designed clarifier performed at a 25 % higher feed flowrate than the Graver clarifier, while delivering juice with 20-25 % lower turbidity. Performance also compared favorably with Dorr clarifier that had twice the residence time. Results of CFD simulations and physical testing of the prototypes and factory operating data will be presented along with the retrofitting options.