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Vertical Pretreatment Reactor System

Two-vessel system for primary and secondary pretreatment at different temperatures

- Biomass is heated by steam injection to temperatures of 120°C to 210°C in the pressurized mixing tube
- Preheated, premixed biomass is retained for specified residence time in vertical holding vessel; material continuously moves by gravity from top to bottom of reactor in plug-flow fashion
- Residence time is adjusted by changing amount of material held in vertical vessel relative to continuous flow of material entering and exiting vessel
- Optional additional reactor vessel allows for secondary pretreatment at lower temperatures—120°C to 180°C—with potential to add other chemical catalysts
- First vessel can operate at residence times of 10 to 60 minutes, or down to 5 minutes with a volume-reducing insert; second vessel can operate at residence times of 10 to 40 minutes
- Reactor system is constructed of corrosion-resistant Hastelloy C-2000 to enable use of sulfuric acid, ammonia, and other chemical catalysts

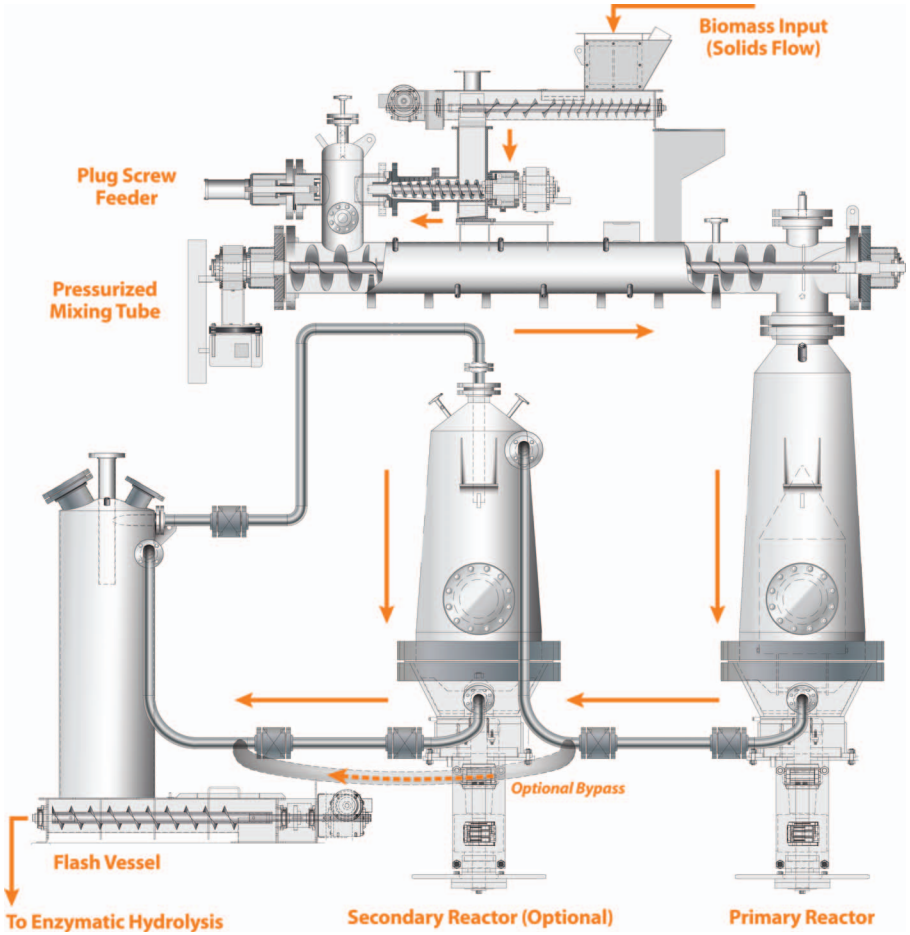

Illustration created by Josh Bauer, NREL

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