

# Buss Loop Reactor System



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# General Overview

Built:	1989 - Operated only 3 months due to business conditions
Designed by:	Buss
Process Description:	Catalytic Hydrogenation of dichloronitrobenzene to dichloroaniline in toluene solvent, used in production of herbicides. Design based on 8 batches per day.
Typical Applications :	<ul style="list-style-type: none"><li>-Reduction of derivatives of nitrobenzene, chlorinated nitrobenzene</li><li>-Alkylations</li><li>-Acetylations and reductions of pharmaceuticals</li><li>-Reduction of nitriles to primary amines</li><li>-Oleochemical ethoxylations &amp; alkoxyations</li><li>-Selective reductions in fragrances</li></ul>



# Design Parameters

## Hydrogenation – catalytic batch hydrogenation of DCNB

Max. Useful Vol. at Reaction Temp.:	2.9m <sup>3</sup>
Max. Reaction Temperature:	120°C (over 250°C feasible)
Max. Reaction Pressure:	40 barg
Operating Temp/Pressure:	120°C, 40 bar
Material of Construction:	316LSS/316 TI Stabilized Construction
Miscellaneous:	Batch Design, Full Pipe external coil, Buss Reaction mixer

## Catalyst Filtration Plant

Type of Catalyst:	Precious metal on charcoal
Maximum Operating Pressure:	5 bar
Maximum Operating Temperature:	120°C
Operating Time:	24 hours per day



# Principles of Operation

The reaction mixture is fed into the reaction autoclave and then circulated through the reaction heat exchanger and then back into the autoclave through a unique reaction mixer which also introduces the reaction gas ( $H_2$ , EO,  $NH_3$ , etc). Mixing is intensive, constant, and with high shear forces that produces high diffusion rates across the catalyst boundary layer.

The intensive mixing provides optimal reaction contact. Any undissolved, dispersed gas is disengaged in the autoclave and returns to the head space. As the reaction gas is consumed, fresh gas is introduced to maintain a constant reaction pressure. The temperature of the reaction mixture is controlled by the reaction heat exchanger. Catalyst is added in a suspension of raw material or solvent. The centrifugal pump used to circulate the reaction mixture is specifically designed to handle suspended catalysts. It has a special seal system that is protected by a pressurized flushing system.

This system provides for:

- Shorter reaction times resulting from higher specific mass transfer rates
- Excellent selectivity giving high quality and maximum yields
- Reduction in catalyst consumption at minimum catalyst loading
- Simple design for easy in product changeover with quick cleaning
- High uptime through limited moving parts



# Equipment

Catalyst Tank

Catalyst Agitator

Autoclave

Buss Reaction Mixer

Product Circulation Pump

Main Loop Heat Exchanger

Sealing Liquid Vessel

Circulation Pump

Sealing Liquid Cooler/Heater

Metering Pump

Catch Tank

Vent Condenser

Main Loop Pipework

Cooler

Circulation Pump

Heat Exchanger

Precoat Vessel

Toluene Wash Tank

Filter Feed Pump w/ Sealing Liquid Vessel

Filter

Polishing Filter

Vent Scrubber

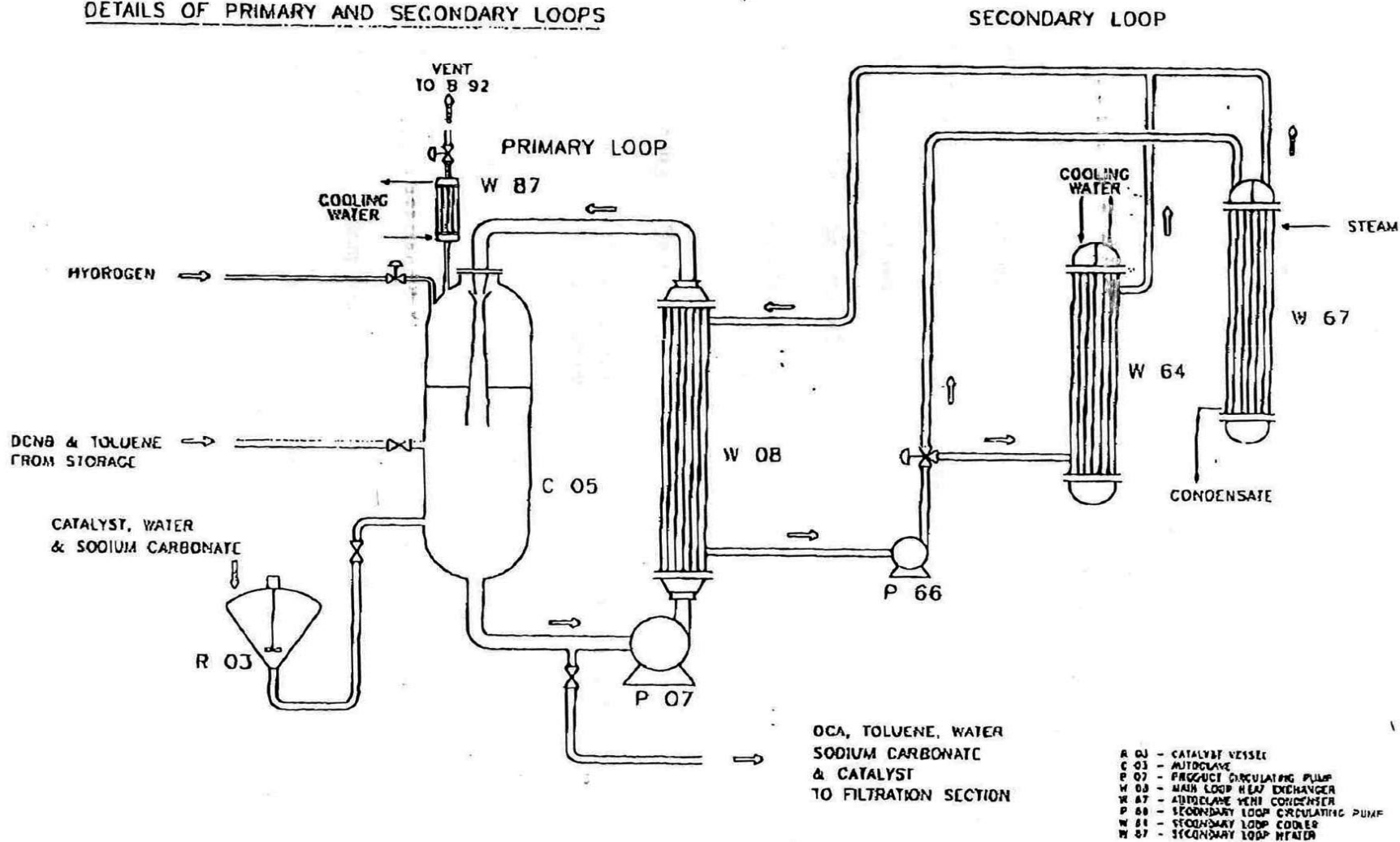
Modicon Programmable Logic Controller

Aqueous Product Separator

# Buss Loop Drawing

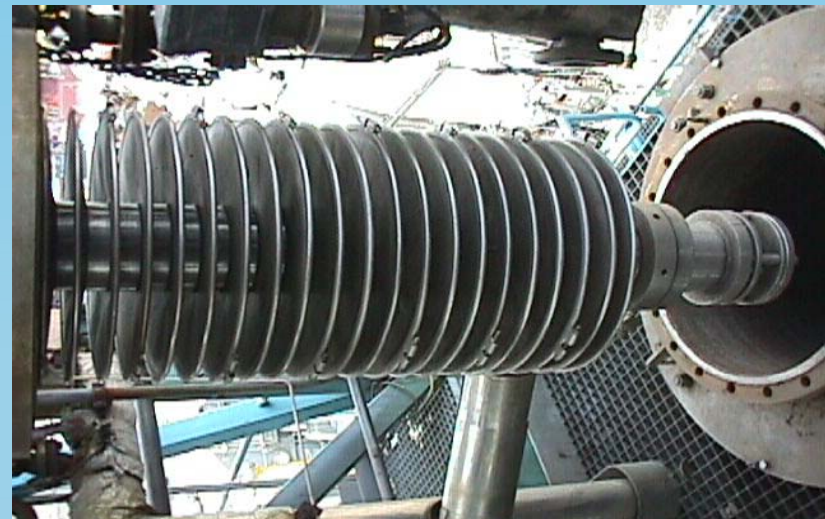
## BUSS LOOP HYDROGENATION

### DETAILS OF PRIMARY AND SECONDARY LOOPS



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# Contact Information

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