Rigorous Heat - X

- Heat Streams
- Rigorous Method - EDR
- Rating v/s Design v/s Simulation

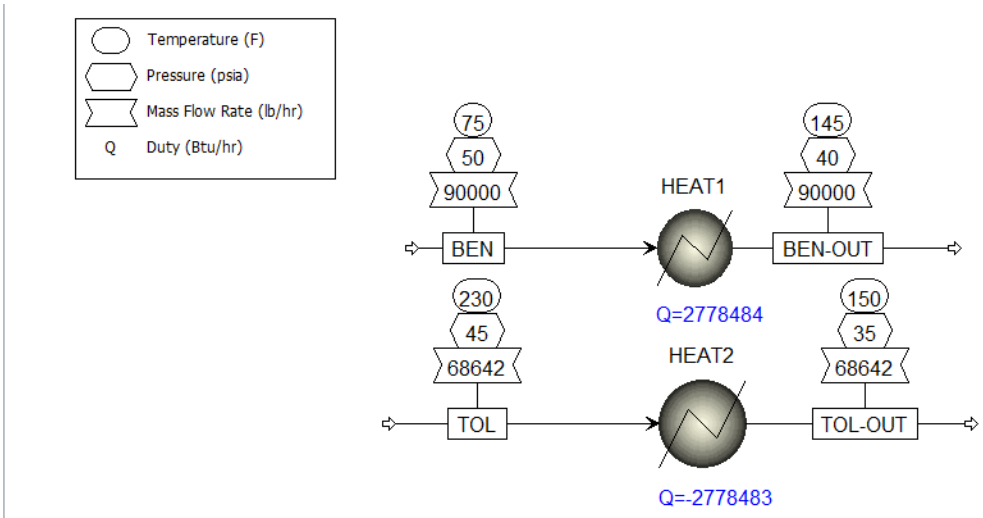
Problem Statement :

- Benzene stream is to be heated from 75°F to 145°F @50psia
- O-toluidine is to be used as heating material. It is available at 230°F and should not drop below 150°F @45 psia
- Max. Pressure dorp is 10 psia per side (Tube/Shell)
- Identify the best Heat Exchanger if this must be a small heater, i.e. use multiple passes (6) to avoid long sizing

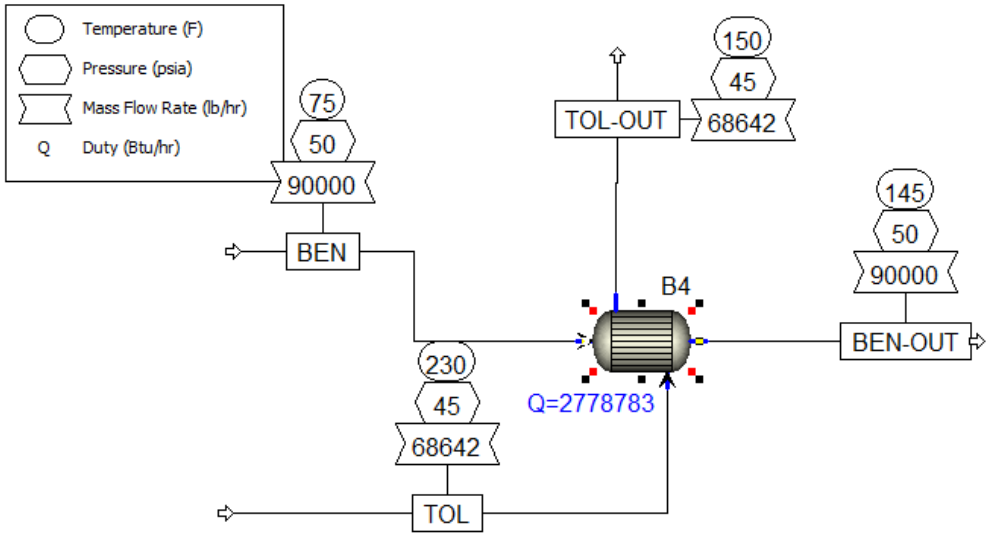
Design Methodology:

- (A) Verify Energy Balances → Heating and Cooling Duties
  - Get Mass require of heating fluid
  - Get Heat duty of heat exchanger
- (B) Get Heat-X → Shortcut
- (C) Convert to Rigorous, verify results
- (D) Specify Shell & Tube Exchanger
- (E) Change conditions
  - HEAT-X → RATING!
  - If Benzene Inlet → 90,000 lb/h to 100,000 lb/h to 120,000 lb/h to 180,000 lb/h

Model Simulation :



HEAT X MODEL



Exchanger details

▶	Calculated heat duty	2.77878e+06	Btu/hr
	Required exchanger area	763.891	sqft
	Actual exchanger area	763.891	sqft
	Percent over (under) design	0	
	Average U (Dirty)	54.8	Btu/hr-sqft-R
	Average U (Clean)		
	UA	41861.2	Btu/hr-R
	LMTD (Corrected)	66.3809	F