



[Unfollow Mojtaba](#)

## Plant Turndown Operation

**Mojtaba Habibi**  
Process Engineer at Wood Group

Dears,

At this topic I would like to discuss about plant turndown operation case such that everybody share their experiences.

Turndown operation as one of the design cases of every plant can potentially involve many challenges. This mode of operation can cause interruption at normal operation, damage to equipment, process shutdown and increased process downtime.

For turndown case as you know all the times designers are faced with challenges to prevent/minimize the plant suffering from turndown, to keep plant productivity & availability and to prevent plant shutdown.

Some queries in this regards are as follows:

1. How to decide and plan about a reasonable value as turndown value of a plant? How much turndown have you experienced at your projects? I have seen values like 20%, 30% and 50%.
2. In reality how much turndown you could achieve at your plants?
3. Based on your experience with different equipment and packaged units such as instrumentation (control valve, flow meter, etc) , pump, compressor, column, desalter, gas sweetening package, TEG gas dehydration and etc, how much turndown is achievable?
4. Which control & shutdown options do you propose for smooth operation of the plant in case of turndown?
5. Which design options do you propose to cope with turndown operation difficulties?

Some options in this regard:

- 5.1. Compressor Equipment: Recycle operation via anti surge/capacity control system, consideration of low suction pressure over-ride
- 5.2. Pump Equipment: Recycle operation via minimum flow line
5. 3. Column Equipment: Some vendors offer special internals that can help in case of turndown
- 5.4. Implementing training concept for example considering 2x50% trains for packaged equipment.
- 5.5. Consideration of surge tanks can be regarded as short term solution

Let me know your idea and expeiences.

All The Best,  
Mojtaba

Like (2) • Comment (2) • Share • Unfollow • Reply Privately • 11 months ago

[Add to Manager's Choice](#) • [Close Discussion](#)

### Comments

[Ashley Nguyen Ha Huyen Van](#), [Umesh Yeole](#) like this

2 comments



### S M Kumar

Process Design Consultant

S M

Mojtaba: I am afraid to touch this on account of follow-on queries that may come. I have never seen turn-down an issue to warrant such a detailed analysis. Generally we have 2 trains – shutting down one and affordable turndown of individual pieces of equipment in the still running single train usually gets what one wants.

1. Equipment are in series. While one may allow 20% turndown, one next to it may demand minimum 60%. Hence it is difficult to give a generic response.
  2. See first para and item 1
  3. Control valve: 20-30% You can go for reduced Cv seats if so required. Flow meter: Depends on type. At best you may lose a bit on accuracy within calibration error – should not matter if it is NOT custody transfer. Pump: Does not matter with minimum flow; large head and large MW pumps may heat up liquid recycle via min flow; again shutdown a parallel pump. Compressor: Does not matter with recycle + speed control. Column: Depends on internal and how close the design case itself to weeping. Usually column and fired heater may impact entire train's turndown. Desalter: A vessel – as long as its PCV/FCV/LCV can open and close it is OK; You can go for reduced Cv seats if so required. Gas sweetening package: Its column may limit the show. TEG gas dehydration: Its column may limit the show.
  - Fired Heater: Gas burner may allow 20%. Liquid burner – 40~50%. Here again, you can cut out a few burners in a multi-burner unit as long as heating symmetry is possible. Two phase flow “regime” viz annular, slug kind of things, inside coil – 60%. Slurry or sand borne line: Min velocity required to avoid sedimentation and line plugging.
  4. Depends. Shutdown of a spare train. Will help rotating machineries.
  5. See 3.
- Final: Not a big deal as long as you consider each piece of equipment in series and go by the governing one.

Like (1) • Reply privately • Delete • 10 months ago

👍 [Mojtaba Habibi](#) likes this



### Saeid Rahimi Mofrad

Senior Specialty Process Engineer at Fluor

Top Contributor

The lower turn down you specify, the higher cost you need to bear. In reality, in oil and gas production plants, the plant can be designed for any turn down ratio. However, there are few points to consider:

The lower turn down ratio demands for specific flow meters to satisfy the required accuracy for such a wide range of operation.

You may need two control valves in parallel (one small and one large) to handle turndown case.

Equipment are all explained by Kumar. Columns have normally 50% turndown but they can be operated at very low capacity if you over-reflux the column or circulate part of the product back to the inlet and run the reboiler above what is needed according to turndown case simulation. It is just waste of energy but can make the system work.

Reactors are the only equipment that I have not seen any flexibility in terms of turndown when I discussed with licensors or technology providers.

In short, if you have proper justification for turn down, the plant can be designed for it but everything has its own cost.

I have designed a condensate stabilizer unit for 6% turn down because there were four condensate producing trains upstream, each one designed for 25% turndown. So when one train was working on turndown the condensate stabilization unit was on 6% (25% divided by 4).

Keep in mind that most of the times, the operating headaches and cost of running at such a low turndown is so significant that operating companies do not ask for less than 15-20% turndown ratio. They are ready to shut down the plant instead of keeping it running with extra trouble and operating cost.

Delete • 10 months ago

👍 [Baher Binesh, M.Sc, Ehsan Rajaei](#) like this

Add a comment...