

The promise and reality of Optimized Profile Descents

Marie-Jo Fremont and Mark Shull – August 13, 2016

As part of NextGen, the FAA implemented Optimized Profile Descents (OPDs) that were supposed to enable smoother and quieter idle descent flight paths as compared to the traditional step-down approaches. The FAA and airports commonly describe OPDs as, “using flight-idle throttle settings and keeping the aircraft ‘clean’ until several miles from touchdown” (LAX Roundtable, July 8, 2015). The FAA’s actual definition is closer to reality, which is that OPDs are “a descent profile normally associated with a published STAR [Standard Terminal Arrival Route]... designed for maximum use of Continuous Descent Operation, considering the following: airspace and Air Traffic Control (ATC) constraints, traffic, environment, aircraft capabilities and local airport issues.” (FAA presentation, LAX Roundtable, July 2013). In other words, near the ground, OPDs are almost any flight path the FAA defines for the arrival STAR.

The FAA has simply not been able to make quiet OPDs work in congested airspace; most aircraft cannot fly idle all the way to final approach, and there is no evidence they will be able to do so in the foreseeable future. As a consequence, moving SERFR will only move noise, not reduce it. As consultants from Palo Alto and Portola Valley have pointed out, the only way to reduce noise is to work with local NorCal ATC to develop changes to approaches that can be implemented by controllers, rather than the empty promises that OPDs and other FAA technology futures represent.

Why OPDs Don’t Work in Crowded Airspace

For OPDs to work, aircraft must be sequenced prior to entering TRACON terminal airspace (an area about 60 miles from the arrival airport) using long-range sequencing tools such as Time-Based Flow Management (TBFM). Unfortunately, as detailed by the Department Of Transportation’s Office of Inspector General (report [number AV-2015-081](#)), as late as August 20, 2015, the FAA has not yet successfully deployed TBFM. The Inspector General’s report specifically calls out Oakland Center’s inability to use TBFM, stating that “Oakland Center cannot rely on Los Angeles, Salt Lake City or Seattle to help manage arriving traffic”.

Consequently, Oakland Center cannot sequence planes for arrivals en route to the airport. More often than not, aircraft are forced into noisy vectoring and speed changes within the low-altitude terminal space. The inability to execute true OPDs for SFO arrivals results in more noise and increased fuel consumption.

The FAA is fully aware that OPDs are not suitable for high traffic environments such as ours. Noisequest, an industry group sponsored by the FAA, states that “Due to the issues that could arise during heavy traffic, Optimized Profile Descents are best suited for use during periods of medium to light traffic.” They also explain that “an air traffic controller may issue a level-off altitude, a speed restriction or instruct the pilot to execute a go-around” in order to maintain the required separation between aircraft. They finally conclude that “these correction techniques may increase the noise exposure of the community, counteracting the intended benefits of the continuous descent approach.” (Source: <http://www.noisequest.psu.edu/noiseeffects-optimizedprofiledescent.html>.)

The FAA has acknowledged that only 25% of the flights followed an OPD on SERFR in June 2016, and that this occurred only when traffic was light. **Furthermore, the FAA recognizes that OPDs are noisy. OPDs like SERFR are not designed for idle-to-final in the first place.** Such OPDs will not be quiet until they are designed for aircraft to fly idle all the way to final approach. Glen Martin made it clear in the May 25,

2016 Community Hearing in Santa Cruz: “It does not mean that the Optimal Profile Descent does not create noise. But these maneuvers certainly create different noise or additional noise.” (See video <https://www.youtube.com/watch?v=g2ZJCpSvc-8> around 34:50). In addition, Steve May stated on August 4, in response to a question about the proposed DAVYJ route, that “[the FAA’s] desire would be for it to be an OPD, and an OPD on a new route 3 to 4 miles west of the SERFR is probably going to have a very similar profile to the SERFR.” (See video <https://www.youtube.com/watch?v=n41owUTvB-c&start=201&width=420&height=315> around 45:13).

The reality is that the FAA simply does not have the technology to sequence SFO arrivals far from the airport. As indicated by Glen Martin, sequencing occurs “fairly close to the airport” and “they [air traffic controllers] may have 2 or 3, 4 arrival streams of aircraft coming in that they are trying to line up on that final. So there’s always going to be that last fine tuning that’s done.” (See video <https://www.youtube.com/watch?v=g2ZJCpSvc-8> around 43:00). Glen Martin also believes that “Time-based flow management... is the biggest thing that would eliminate some of that vectoring.” (Same video around 43:35).

Systems to Support True OPDs are Years Out

It appears that the FAA put the cart before the horse by deploying OPDs without the appropriate tools needed by Air Traffic Control. In our case, the hasty SERFR OPD implementation at lower altitudes combined with a high traffic concentration over SERFR has resulted in a tremendous increase in the noise on the ground for the last 18 months or so. Without an effective Time-Based Flow Management system that allows sequencing far from the airport, smoother OPD STAR designs, and advanced controller tools and training, the majority of SFO arrivals will never glide at flight idle towards their final approach as promised by NextGen.

The Office of Inspector General (OIG) points out that the FAA’s TBM system is not meeting the needs of air traffic controllers, even though the requirements were identified in multiple reports and as early as 2001. OIG states that the “FAA is several years away from deploying a new controller automated Tool for managing airport arrivals. The FAA has not yet deployed a much needed tool to help controllers manage aircraft arrivals in the airspace closest to the busiest airports” and that “to date [and since 2009] none of FAA’s attempts to deploy or implement changes to TBFM have produced a reliable tool for controllers”. OIG also indicates that “To address this problem, FAA is currently working on a new tool to help controllers merge and sequence aircraft in terminal airspace called Terminal Spacing and Sequencing (TSS).” OIG remains skeptical, however, of the FAA’s ability to deploy the new tool given that two previous, similar FAA efforts failed after years of development and millions of dollars. In fact, by the time of the OIG report, the FAA had already pushed the TSS planned deployment by one year to 2019. Others, such as the National Academies, have called the date into question, and described NextGen as “not recognizable” from its original commitments. (See [A Review of the Next Generation Air Transportation System, National Academies Press, May 2015.](#))

The sad reality is that OPDs cannot be successfully implemented in high-traffic environments. Locally, the SERFR OPD has been a noisy failure from the start. Replacing the SERFR OPD with a DAVYJ OPD route over the BIG SUR tracks will not solve the noise problem. Instead, a DAVYJ OPD will shift the current SERFR noise to other communities, namely the ones living under the BIG SUR tracks. In the Santa Cruz area, different towns will be affected; after waypoint EDDYY, different neighborhoods of the same town will be affected; and closer to waypoint MENLO, the same neighborhoods that were affected by SERFR will continue to be affected. In a nutshell, DAVYJ simply moves the noise to other residents, and does not reduce it.

Noise Reduction Requires Simple and Locally Designed Solutions that ATC Can Operate

In 2009, the airlines faced a similar situation. They had had enough of the FAA's inability to deliver the advanced technical solutions promised for NextGen, and forced the FAA into a NextGen Mid-Term Plan written by the airline industry. This plan was inserted verbatim into the 2012 FAA legislation and called for immediate benefits (to the airlines) without new technology. We now face the same situation. We need an end to FAA promises of solutions based on technology futures and content-free spin words like OPD and "Net Noise Reduction".

As described above, rolling out OPD procedures without proper aircraft sequencing does not save time or fuel and inflicts increased noise on the many residents living under the new flight paths. Until effective systems usable by Air Traffic Controllers are in place to sequence aircraft in the terminal airspace, we recommend that the FAA concentrate on achievable noise reduction goals. We need a commitment to establishing a task force (similar to the "tiger teams" the airlines were provided in the Mid-Term Plan) that would include local air traffic controllers. This taskforce would develop local, workable solutions that actually reduce noise, and not just move it to other neighborhoods.