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The Jewel

A Conversation With …
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CHIP OFF THE OLD BLOCK

The untapped value of a robust block hours strategy

An optimal block hours strategy is essential to an airline's operation, leading to increased profitability and improved on-time performance.

To someone outside of the airline industry, it's a mystery how a flight arrives early despite an on-time departure. Clearly, many factors can drive when a flight arrives early, including favorable weather conditions. But behind the scenes of an airline's operations, significant efforts have been invested in planning the flight.

Block forecasting is the practice of estimating the time a given flight is going to take getting from point A to point B. Ideally, every flight should have sufficient time to complete its trip in the given time frame. The forecast should be precise because it has a direct impact on aircraft utilization and, therefore, the potential to generate revenue.

On the flipside, underestimating block times could result in operational disruptions such as propagating delays and pushing pilots to burn more fuel to make the plane arrive faster at its destination. Because block forecasting can balance the competing airline goals of profitability and on-time performance, it's a critical input to the schedule and, thus, essential to the overall success of the airline.

Block hours, which may be measured differently among carriers, basically imply the elapsed time from when the aircraft leaves (may be measured by aircraft door closed, wheel movement away from gate or even be self-reported) and when the aircraft arrives. Technically, it is defined as the sum of taxi-out time plus airborne time plus taxi-in time. This is different from ground time, which factors in the time required for turning around the aircraft (including deplaning, lavatory service, cleaning the cabin and enplaning).

Block time is one of the core elements that is taken into consideration when building reliable flight schedules. Block hours are influenced by many variables, including aircraft type, congestion, schedule design, time of day and season. Determining their efficient length is a challenging planning task. The scheduling department incorporates block hours when building the schedule. This, in turn, impacts how other resources will be managed and deployed. Aircraft, crew, gates and airport staff are all affected by the way block hours are estimated and included in the schedule.

It would be accurate to define block time as a lever that affects reliability and profitability. When an airline finds its own "sweet spot" for the positioning of this lever, efficiency and productivity will be at their highest. The sweet spot will be unique to each individual airline because every airline has different business strategies and drivers. So how can the optimal position of this critical lever be determined?

The answer is easier said than done. An airline should set a block hour strategy that maximizes its overall profitability while achieving a certain acceptable level of reliability. One of the most accepted metrics for reliability is on-time performance, but each airline must decide how it wants to define reliability.

The best way to find the sweet spot, that perfect balance between reliability and profitability, is by applying the law of diminishing returns. The law of diminishing returns reveals that at a certain point, adding more resources does not bring more benefit, so there is a certain point where adding more block time will not improve reliability.

Ideally, one would like to have a large amount of reliability with as little block time, or resources invested or needed, as possible. Therefore, the greater the reliability with the least amount of resources required would indicate that the block strategy is efficient.

But how efficient is the block strategy, and how is that determined?

The relevant key performance indicator (KPI) is the difference between arrival performance and block performance, known as block efficiency. Arrival performance, every flight that arrives within 14 minutes of its scheduled arrival time, is how every flight performs against its scheduled arrival time.

Block performance, measures how many flights flew within the scheduled block time to which they were assigned. The metric used is "block within 0" or "B:00." The fact that a flight makes it within its block time, however, does not necessarily mean that it has arrived on time. Rather, it simply means that it took off and landed within its schedule block, including buffer time and extra time for the unexpected.

High block performance indicates that a large number of flights are making it within their assigned schedule time. A low block performance indicates that many flights are missing their assigned schedule times.

The greater the difference between the arrival performance and block performance indicates that the airline is efficient in its operations and block strategy. A low or even negative spread between the two metrics would indicate that opportunities exist for operational improvements.

One reason an airline may have high block efficiency could be that the operating environment is minimally complex. For example, it could be a non-hub spoke carrier, enjoy stable weather, has no ATC delays or is a small operation. Alternatively, some carriers have a negative spread, whereby their arrival performance exceeds their block performance.

When a negative spread is present, or the spread is small, it indicates that the airline has some operational issues, or perhaps its cost structure is not heavily dependent on block hours. For instance, crews are paid by the trip flown instead of by the block hour flown. Regardless of the cost structure, it can always be argued that long block hours reduce the efficiency of the airline and limit its ability to generate revenue.

Developing An Optimal Block Strategy

Planning departments, using advanced scheduling tools, can easily model the impact of running different schedule files with different block times at different goal levels. While this scenario analysis typically provides the revenue impact of adding or removing block time, there are some additional concepts that must be considered.

High block times act as a buffer because the flights that have extra block times tend to arrive early (when operating "on time") to the ground. This translates into extra ground time that can be used to the advantage of the airline to either turn aircraft or absorb delays in the system.

But, depending on the cost structure of a carrier, this could be an expensive way to operate and perhaps a tradeoff between ground time and block time could get the same results more economically. An example of the cost of this inefficiency in high block times with flights arriving early is when the early aircraft finds itself without a gate, resulting in increased crew costs and additional fuel burn.

The most important component in developing an optimal block time strategy and driving on-time performance and profitability is the block forecast.

Forecasting Block Times

Airlines around the world use different approaches to forecasting block times — from the simple approach of using the same block time goal across all flights to a more refined and sophisticated approach that utilizes advanced tools and a variety of data inputs to develop optimal block times for each unique flight.

But regardless of the forecasting mechanic used, it is important to understand and incorporate the strategic driver and goal assumptions (extent of reliability versus profitability) while building and executing the short- , mid- and long-term block time plan.

Ongoing coordination must exist between the mid- and long-range schedule planning group(s) and the group forecasting the block times. The block forecasting department must be aware of the strategic initiatives the scheduling department is going to implement. Whatever strategic action scheduling will follow, such as depeaking, could have an impact on operations and block time performance.

Furthermore, other planning groups, especially the crew and fleet planning areas, need to be included to understand the potential impact of the proposed schedule (with the forecasted block hours) on their resources and have input into the planning process.

Tweaking of block times occurs most often as the departure date approaches. New information from recent historical data and expected changes to the future operational environment (new routes, new gates, different terminal, new competitor, etc.) are assimilated and used to update the forecasts. How airlines manage the updating cycle will depend on internal processes.

Some airlines can send ad hoc changes to the forecast and scheduling groups while others have very defined deadlines for new block time forecasts, typically linked to seasonal schedules. The ability to make a forecast change, very close to the departure date, will depend on technology integration and process flexibility.

Developing a good forecast will depend on the operation of the airline and the availability/quality of data sources. To be able to forecast, some inputs are typically required, the most common being:

- Historical flight statistics (aircraft type, departure time, taxi in, taxi out, airborne time, fuel burn, origin, destination, day of week, weather data if available, planned speed, scheduled block time, arrival performance),
- Future schedule data (OAG, internal communication with scheduling),
- Potential future changes in the environment (changes in ATC procedures, runway closures, terminal changes, etc.).

Having covered the basic framework of developing a block time forecast, which includes analysis of historical data, a good understanding of the future environment and the strategic drivers of an airline (reliability versus profitability), several elements should be understood as they can further enhance an airline's ability to fine-tune their forecast, including:

- Forecasting seasons/day of week patterns — Airlines can build their forecast based on seasons if fluctuations between them exist. The same can be said about day of the week. Some airlines have different patterns during week days versus on the weekends. For example, Saturday afternoons and Tuesdays tend to be low-demand days. Therefore, airlines tend to operate fewer flights on these days. This translates into an airline's ability to decrease block times as there is less air traffic congestion.
- Forecasted block goals — Block-level goals can vary depending on an airline's business model and strategy. Some airlines use low levels of blocks in busy seasons because the performance for that specific season will not be dramatically different with added block time. A good example would be summer in the United States. Summer is the busiest season for air travel, but it is also the most active season in terms of weather (especially thunderstorms). Therefore, adding block time could only provide a marginal benefit to the operation that limits revenue generation and most likely would not be enough of a buffer to overcome the significant weather events that often take place but are unexpected. The same logic applies for markets and segments. Not all markets and segments need to have the same block goal.
- Optimization — Airlines with advanced forecast models and tools could optimize their block forecasts. The correlation between block and on-time performance is not the same for every flight. Some flights can achieve high on-time performance with low block performance — for example, morning flights. Therefore, optimization opportunities are present to achieve an overall block-performance goal while aiming to an expected on-time performance level.
- Top-down versus bottom-up — Airlines can forecast blocks using either a top-down or bottom-up approach. The bottom-up approach is extremely detailed and requires forecasting by every segment, fleet types and time of the day. The limitation with the bottom-up approach is that it is difficult to see how every flight relates to the entire population of flights and how these relationships might affect overall on-time performance. In other words, this forecast approach can be limiting because it is done at the local level and may not produce an optimal forecast at the higher or global level. A top-down approach is a better choice when the objective is to optimize the block forecast at the global level. However, with this holistic approach, some segments may have a low performance if analyzed individually and not in the context of the overall performance; there will be outliers.

This fine tuning can take block forecasting to the next level for an airline, further increasing profitability and improving on-time performance.

Finally, all these efforts to achieve an optimal forecast are worthless if the final forecast file is not stored in a place with stringent data controls — versioning, data access, etc. Once the file is produced, it should be stored in a database where some changes can be performed if and when required. This database should produce files that are formatted for the applications used by the scheduling department and operations. It is vital that everyone in the company works from the same block file at any point in time.

Block time forecasting is similar to other airline planning functions, such as revenue management and network planning, because it can bring significant and measurable benefits to the bottom line if done thoughtfully and correctly. The benefits will increase with the level of sophistication applied to the forecasting process.

An optimized block strategy will not solve all of an airline's operational issues, but it can make a difference in on-time performance. In addition, using the block efficiency KPI can help executives push for operational improvements in other areas such as airports, maintenance and catering.

The bottom line is that the higher the spread between arrival performance and block performance, the higher the efficiency of the airline. Of course, other metrics and KPIs must be evaluated on an ongoing basis to track performance as well. The less time a flight takes getting from point A to point B translates into money or time that can be given back to other areas that need it. So the next time a flight arrives early, think about the efficiency of the airline and all the variables and considerations that were built into the scheduled flying time.

Block Hours Strategy video

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Blocks In Practice

Not all blocks are the same. Different airlines flying the same segment and the same aircraft time can have different block times. The table below shows the scheduled blocks hours for a Houston, Texas, to Miami, Florida, segment.

Both carriers fly Boeing 737-800s at different times of the day. Blocks for every carrier have different values for each of their flights. For example, Carrier A has 5 minutes more on its 10:45 flight than its 6:00 flight. Also, the 18:10 flight has the lowest scheduled block for the day with 2:20. Carrier B has its first flight at 7:30, an hour and a half later than Carrier A's first flight, but its block time is only 2 minutes less than Carrier A's blocks.

Airlines try to get the most revenue and reliability possible, so assigning the same block time to each flight will preclude achieving these objectives. Therefore, an airline needs to have specific blocks for every flight, equipment, day of the week and time of the day. To forecast the blocks, airlines need to consider:

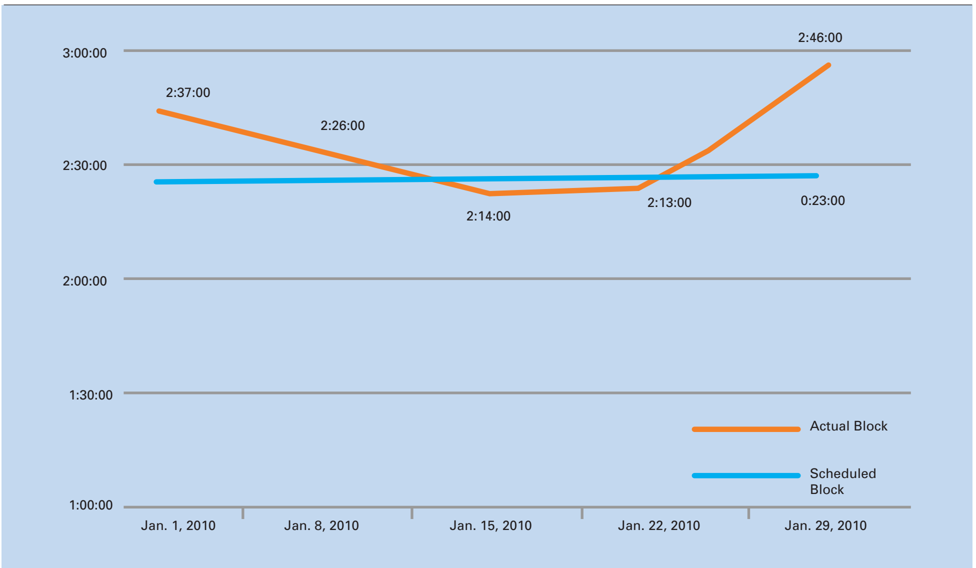
- Seasons,
- Air traffic constrains,
- Specific airport issues (for example, Houston can have heavy flight volume that increases taxi-out times, or airplanes

Block Analysis Route: IAH/MIA Fridays, January 2011

Carrier	Equipment	Departure time	Scheduled block	Flights scheduled a month (Fridays only)	Number of flights at or below scheduled time
A	737-800	6:00	2:25:00	5	4
B	737-800	7:30	2:23:00	5	2
A	737-800	10:45	2:30:00	5	2
B	737-800	13:30	2:22:00	5	2
A	737-800	18:10	2:20:00	5	3
A	737-800	19:00	2:29:00	5	5

Source: DOT Form 234-1/1/2010

Carrier B 7:30 a.m. Flight Actual Block Versus Scheduled Block



arriving in Miami might face occasional storms).

Changing 1 minute or 2 minutes from the schedule can bring additional revenue because new combinations for connections are created or passengers perceive the flight time is shorter, which could drive increased selection of this flight. In this case, all the blocks for this segment are between 2:20 and 2:30.

Blocks don't perform as planned … they vary. The top table also shows the actual block performance. For example, the 7:30 departure for carrier B had performed below or at its scheduled block time only two times during the month of January (40 percent block performance). The bottom graph shows scheduled blocks versus actual blocks. The block levers discussed above affect any of the three components of the blocks: taxi-out times, airborne time and taxi-in times.

The days where the blocks were lower than scheduled were driven by a lower taxi-out time out of Houston. On day five, an excessive taxi out drove the actual blocks to the highest level during the month. The excessive taxi out indicates that weather or a condition that generated congestion was present. It took the flight 40 minutes to take off after pushing away from the gate, which explains the difference between scheduled and actual blocks.

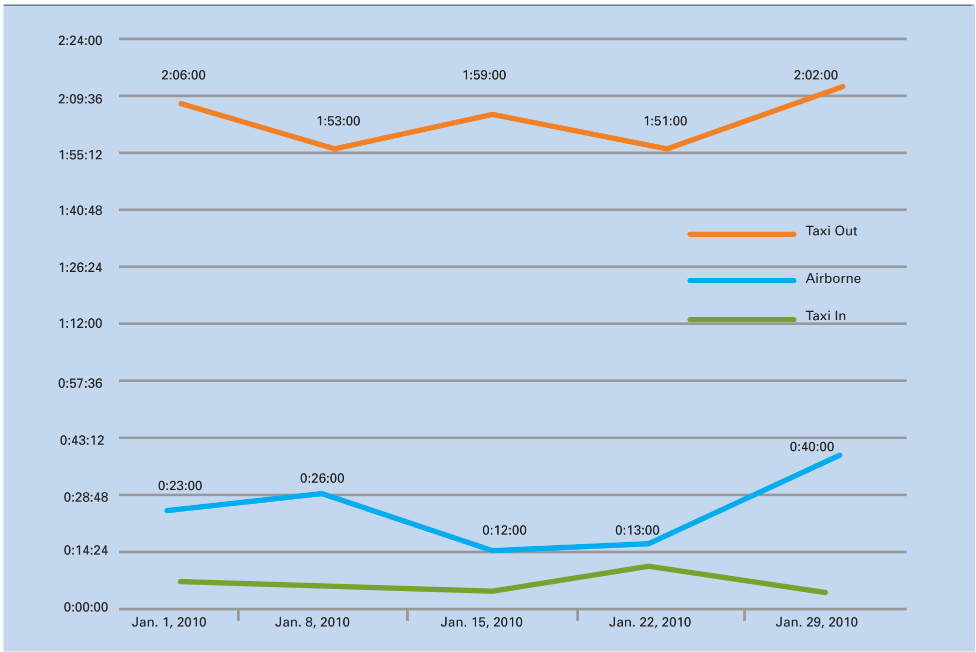
The graph shows that taxi-in and airborne times tend to be somehow stable or they have a lower variation than taxi out. Taxi in tends to be low in this case because the terminal in Miami is close to the end of the arrival runway. Therefore, carrier B aircraft landing in Miami from the west (most used airport configuration) spend just a few minutes getting to the terminal.

Airlines can improve these variances by researching the causes driving them and making necessary changes on procedures. (Of course, the weather and unexpected events will always be present.) Following this continuous process, blocks times can be reduced to reflect the gain in operational efficiency.

Airlines have different methodologies to forecast block hours. Some use a very scientific approach. Others use the same file year after year or season after season. Whatever the method, an airline should:

- Understand the value block hours can have in the reliability and profitability of the company,
- Have a continuous block forecast planning process that ties to the network planning process and includes all variables affecting the blocks (the planning process should also consider how reliability is affected),
- Have the right analysis processes to understand the results of the applied block strategy to find potential gaps and correct the future block strategy.

Carrier B-Block Components (Taxi Out, Airborne, Taxi In)



For additional information about how to develop or fine tune an airline's block strategy, please contact Manolo Centeno at manolo.centeno@sabre.com.