An Airline's Block Time Manipulation Within A Congested Air Traffic Environment

NEXTOR
National Airspace System Performance Workshop
March 14 – 17, 2006

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Topics of Discussion

- **Building Scheduled Block Time For Reliability**
- **The Impact of Increased Congestion**
- **Modernization Efforts Which Help To Reduce Delays**
- **Reducing Scheduling Variability and Cost Through Improved Planning Processes**
- **Summary**

Building Block For Reliability

Development Of An Accurate Scheduled Block Time Is Critical For Maintaining An On-time Airline

- **Block time is the time from gate departure (brake release) to gate arrival (brake set). It is composed of:**
  - **Taxi-out time**
  - **Flight time**
  - **Taxi-in time**

- **Scheduled block times are calculated to achieve a target block on-time :00 for a season. They are based on the historical performance of a segment when data is available.**

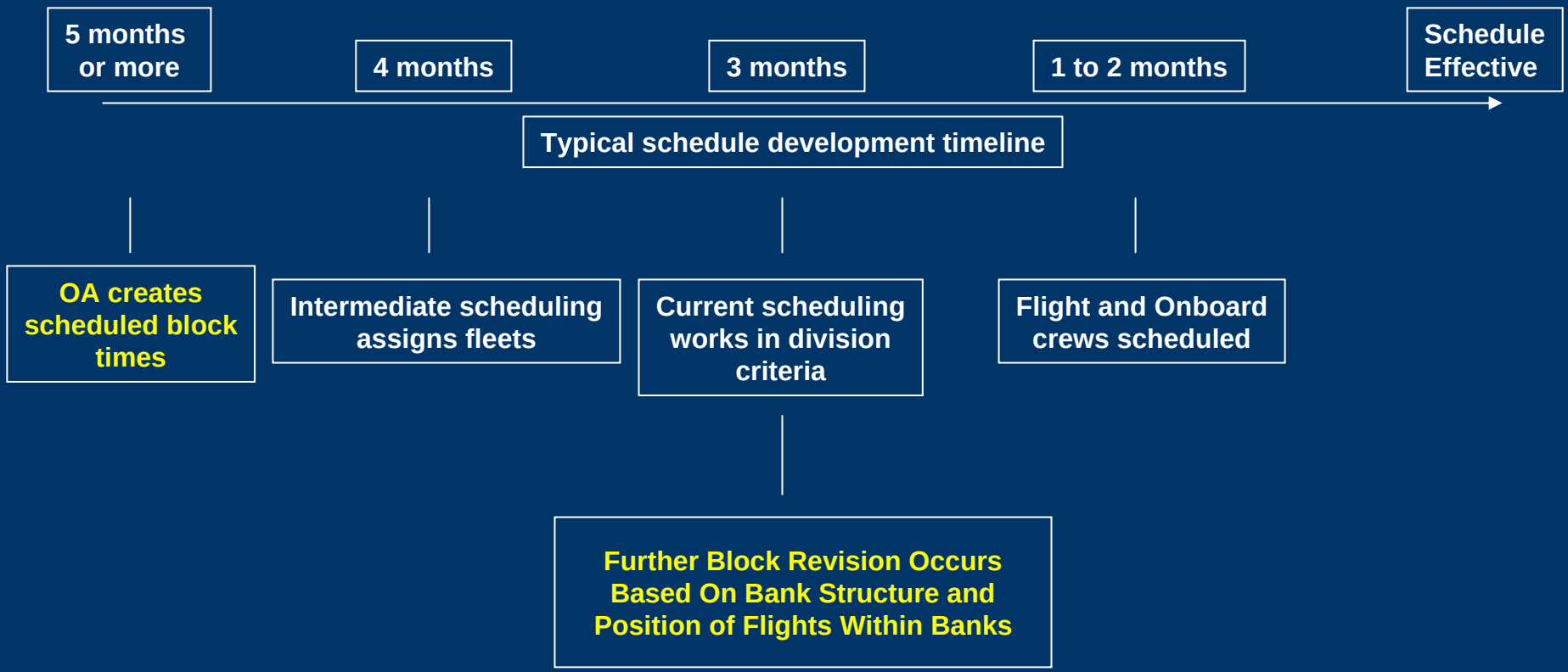
The Building “Block” of United’s Operation

Begins the long term planning process ...

Estimated Block Time Level
(Used in estimating 1 - 2 years out)

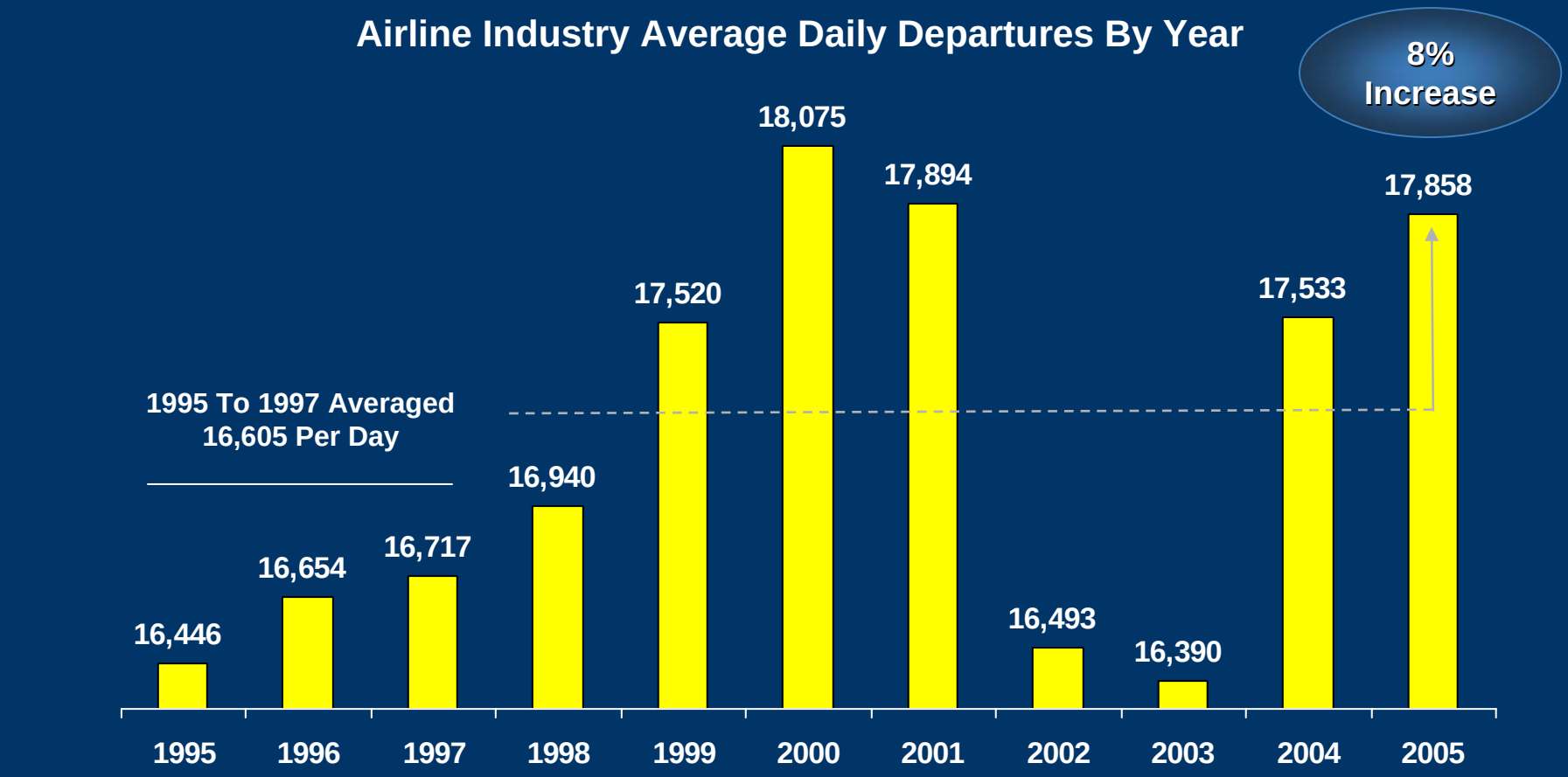
- **How many Pilots do we need?**
- **How many Flight Attendants do we need?**
- **How will the banks flow?**
- **Do we have enough aircraft to maintain the schedule?**

... And Is Managed Throughout The Aircraft Scheduling Process



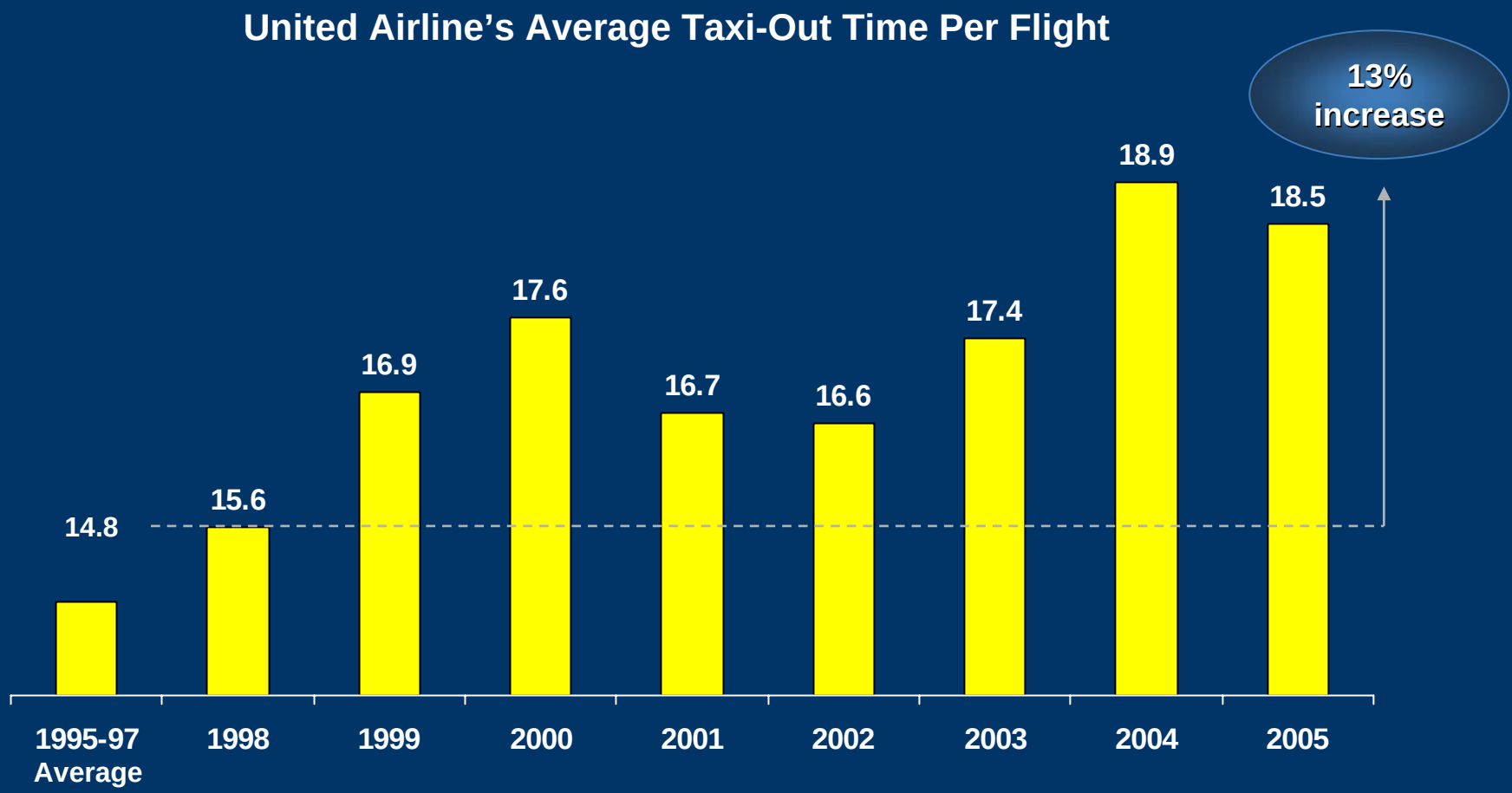
The Impact of Increased Congestion

Stronger Passenger Demand And The Industries Tendency To Answer These Demands With Smaller Aircraft Has Resulted In A Large Increase In Departures Over The Past Few Years

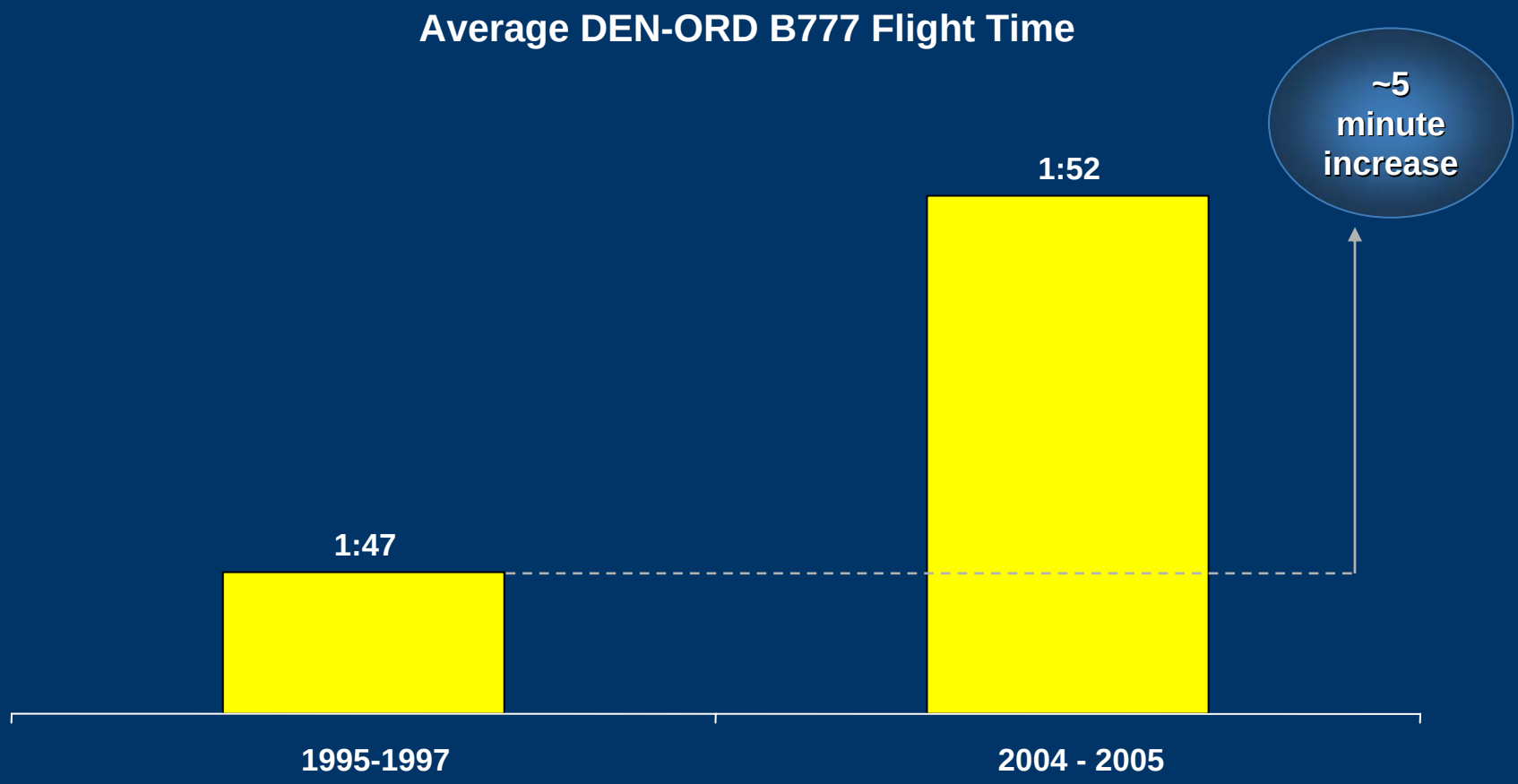


Note: Departures are from DOT 32 airports

The Increase In Departures Has Contributed To United Experiencing A Higher Level Of Taxi-Out Times

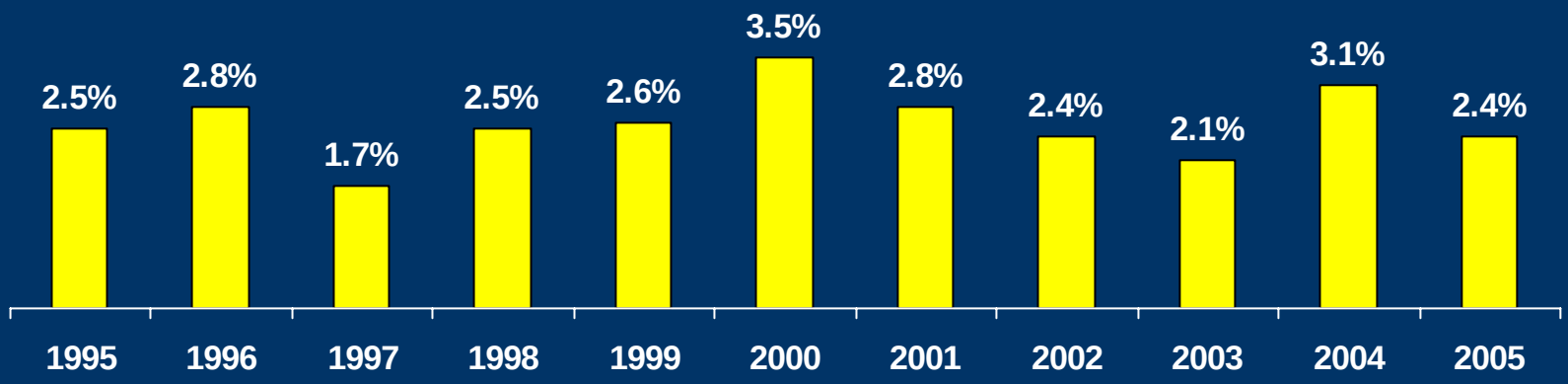


Comparing Similar City Pairs With Similar Fleet Types, United Has Experienced A :02 Minute In Increase In Flight Times. In Denver-Chicago, Flight Times Have Increased :05 Minutes

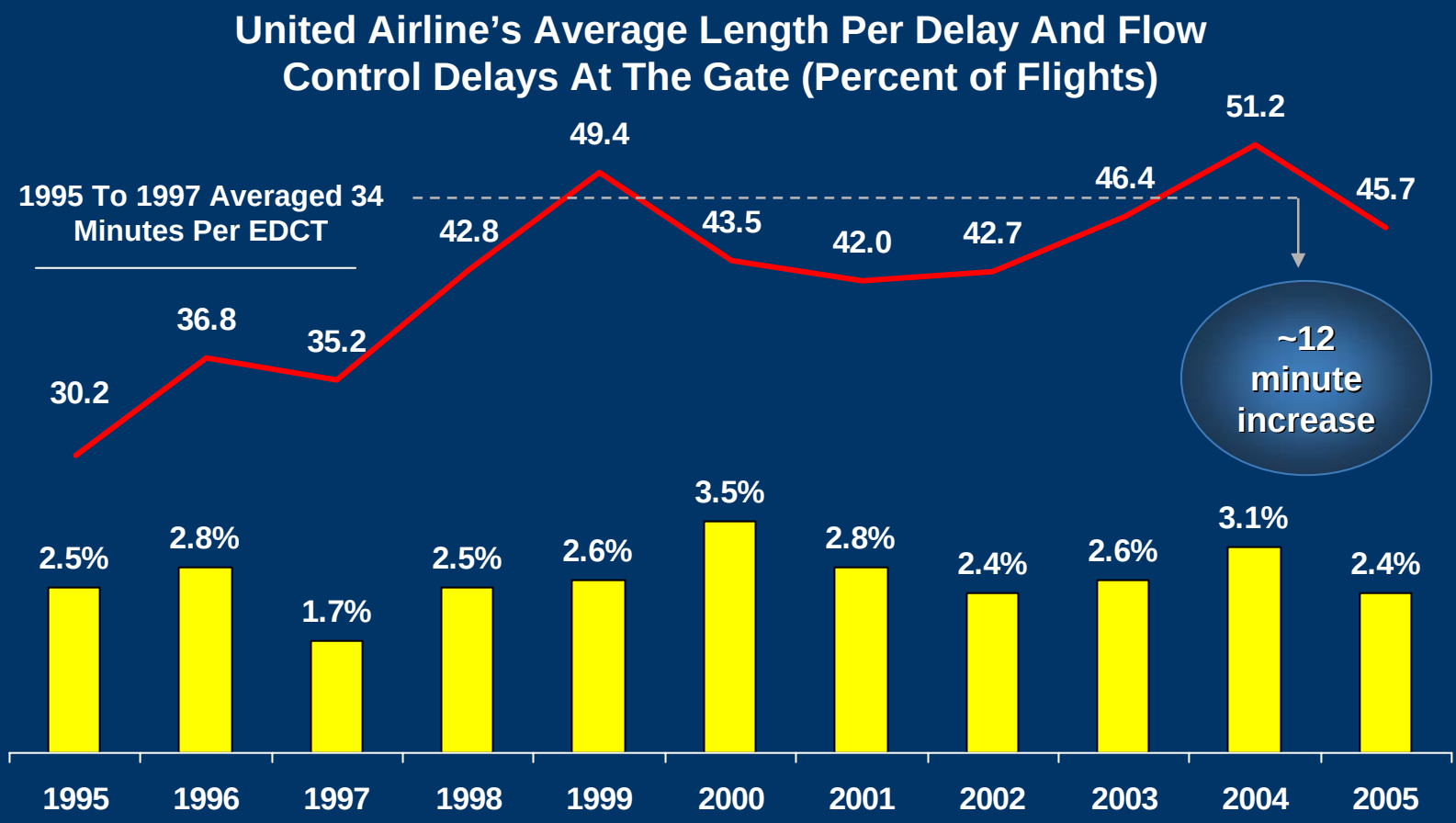


While The Percent Of United's Overall Flow Control Delays Have Remained Constant ...

United Airline's Flow Control Delays At The Gate (Percent of Flights)



. . . The Intensity Of The Average Flow Control Gate Delay Has Increased



Air Traffic Delays Have Created Significant Cost for United

Examples of Congestion Cost – Mid-1990s to present	Impact on United
3.7 Minutes of increase in taxi out time per Flight	$62.8 Million
2 minute increase in route time per flight	$52.6 Million
12 minute increase in flow control gate delay (based on 2.5% of Flights Per Day)	$4.2 Million

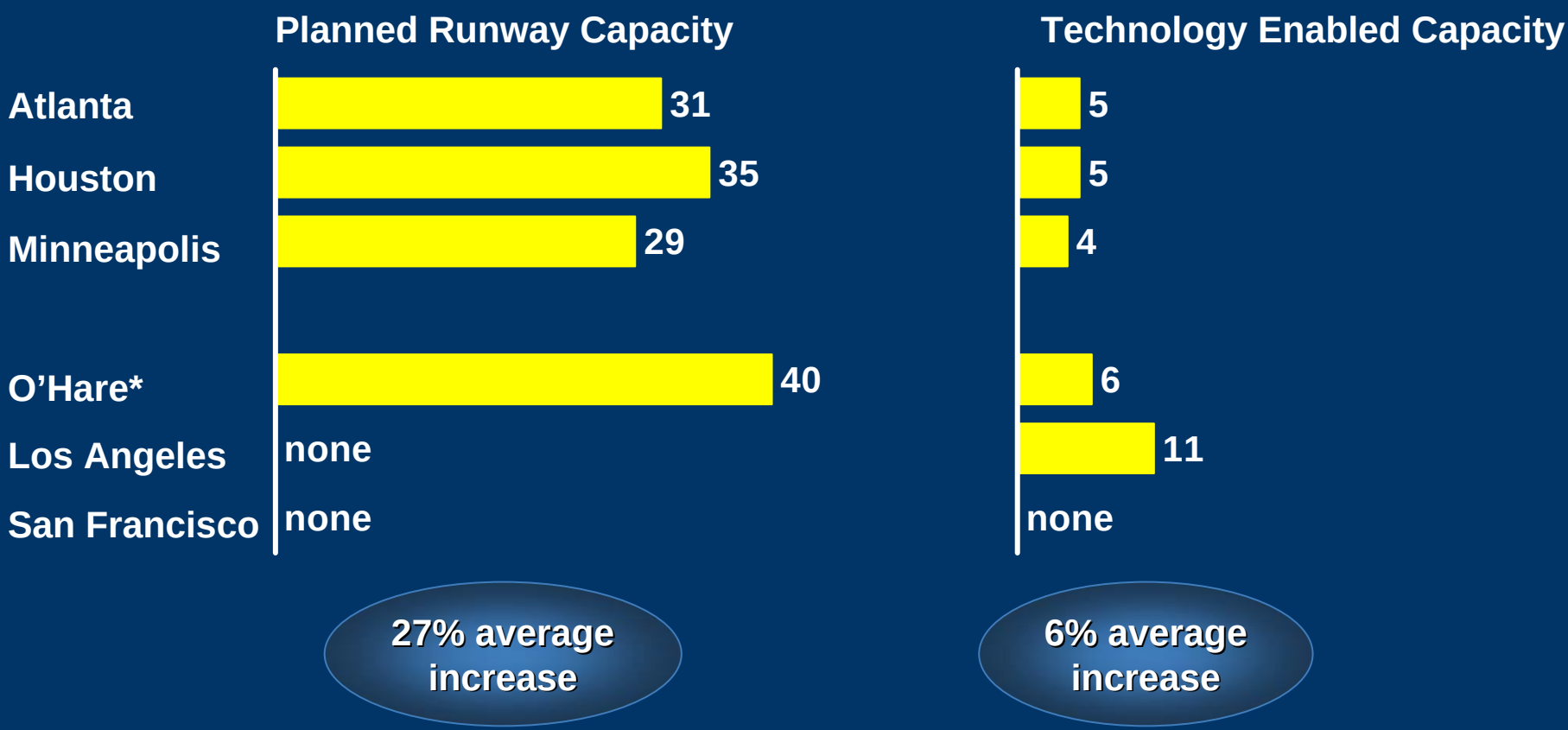
$119 million of increased costs

NOTE: Costs Based on ATA Numbers; Gate Delay = $24, Taxi-out Delay = $31 and Enroute Delay = $48

Modernization Efforts Which Helps To Reduce Delays

Although Technology Enhancements Help, Runways Remain the Most Effective Capacity Enhancement

Estimated Percent Planned Capacity Improvement (VFR Day)
Based On The FAA's Capacity Benchmark Study



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Short Term Technical and Procedural Changes Will Also Help

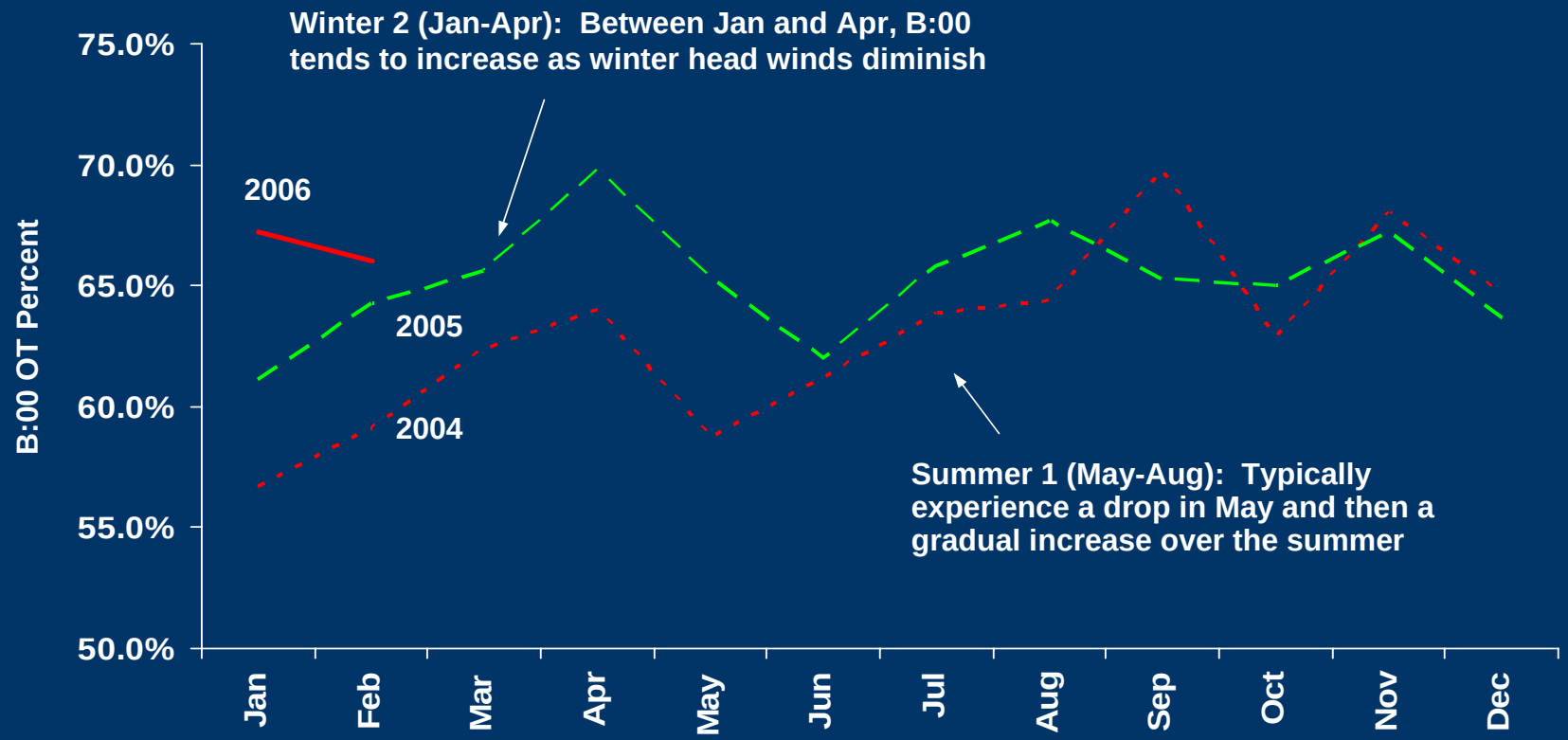
- **SOIR – Simultaneous Operations on Intersecting Runway Operations at ORD:**
  - **Increases runway arrival capacity**
- **SOIA – Simultaneous Offset Instrument Approaches at SFO*:**
  - **Allows dual runway operations in IFR conditions**
- **Idle descent - Working with DEN and ORD centers and TRACONs:**
  - **Optimal descent at flight idle saves fuel and environment**

*** 10-15% of operating days will benefit from SOIA/PRM**

Reducing Scheduling Variability And Cost Through Improved Planning Processes

Increasing The Number Of Block Seasons

Over The Past Two Years, B:00 Trends By Month Have Shown Similar Patterns During The Winter 2 And Summer 1 Seasons



Current Seasonal Breakdown:

Winter 2	Summer 1	Fall	Winter 1

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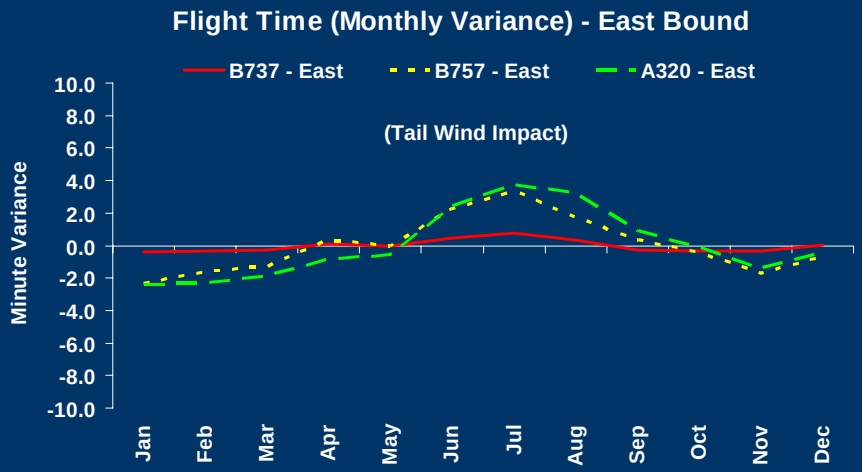
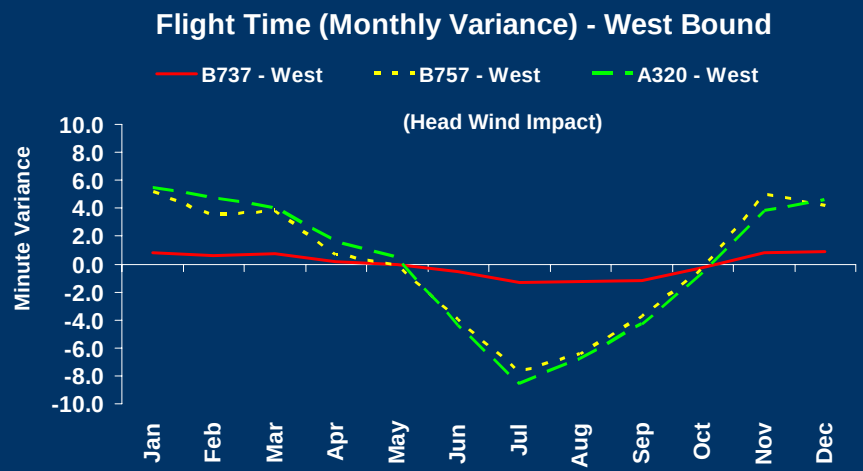
To Understand The Impact Of Block Seasons On Overall Performance, We Trended Out The Following City Pairs

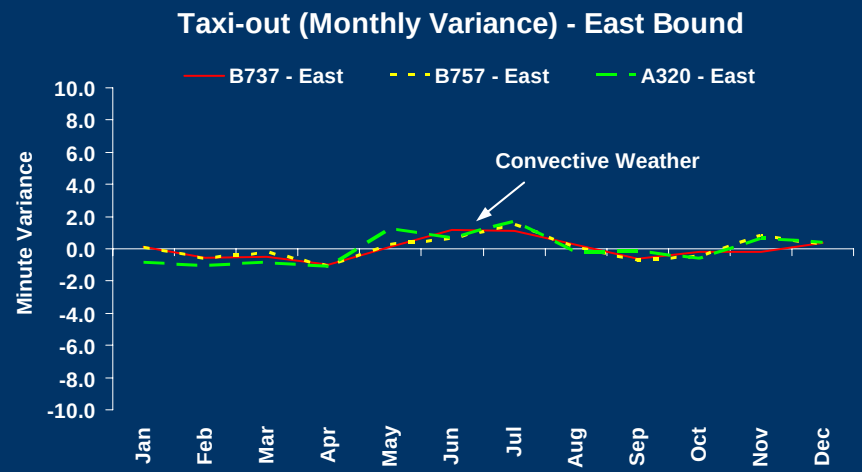
B737 – Omni Directional	A320 – Omni Directional	B757 – Omni Directional
ABQ-DEN	LAX-MCO	DEN-LGA
DEN-DFW	LAX-ORD	DEN-ORD
DEN-MCI	ORD-DCA	LAX-ORD
DEN-MSP	ORD-LGA	ORD-BWI
DEN-OMA	SAN-ORD	PDX-ORD
DFW-ORD (N/S)	SEA-ORD	SEA-ORD
MSP-ORD (N/S)	SFO-LAX (N/S)	SFO-EWR
ORD-CMH	SFO-ORD	SFO-LAX (N/S)
ORD-LGA	SFO-SAN (N/S)	SNA-ORD
SEA-SFO (N/S)		
SFO-LAX (N/S)		
SLC-DEN		

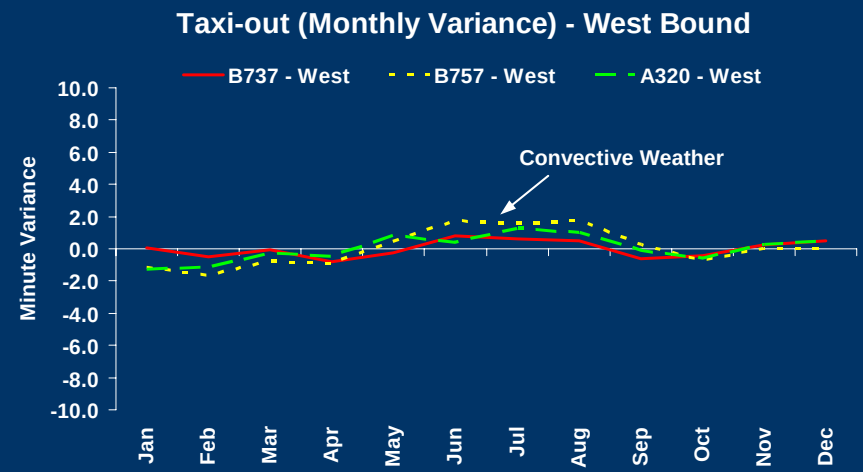
(N/S) = North/South City Pair

Based on These City Pairs, Each Month Tends To Vary From The Annual Average In Terms Of Flying Time And Taxi-out Time

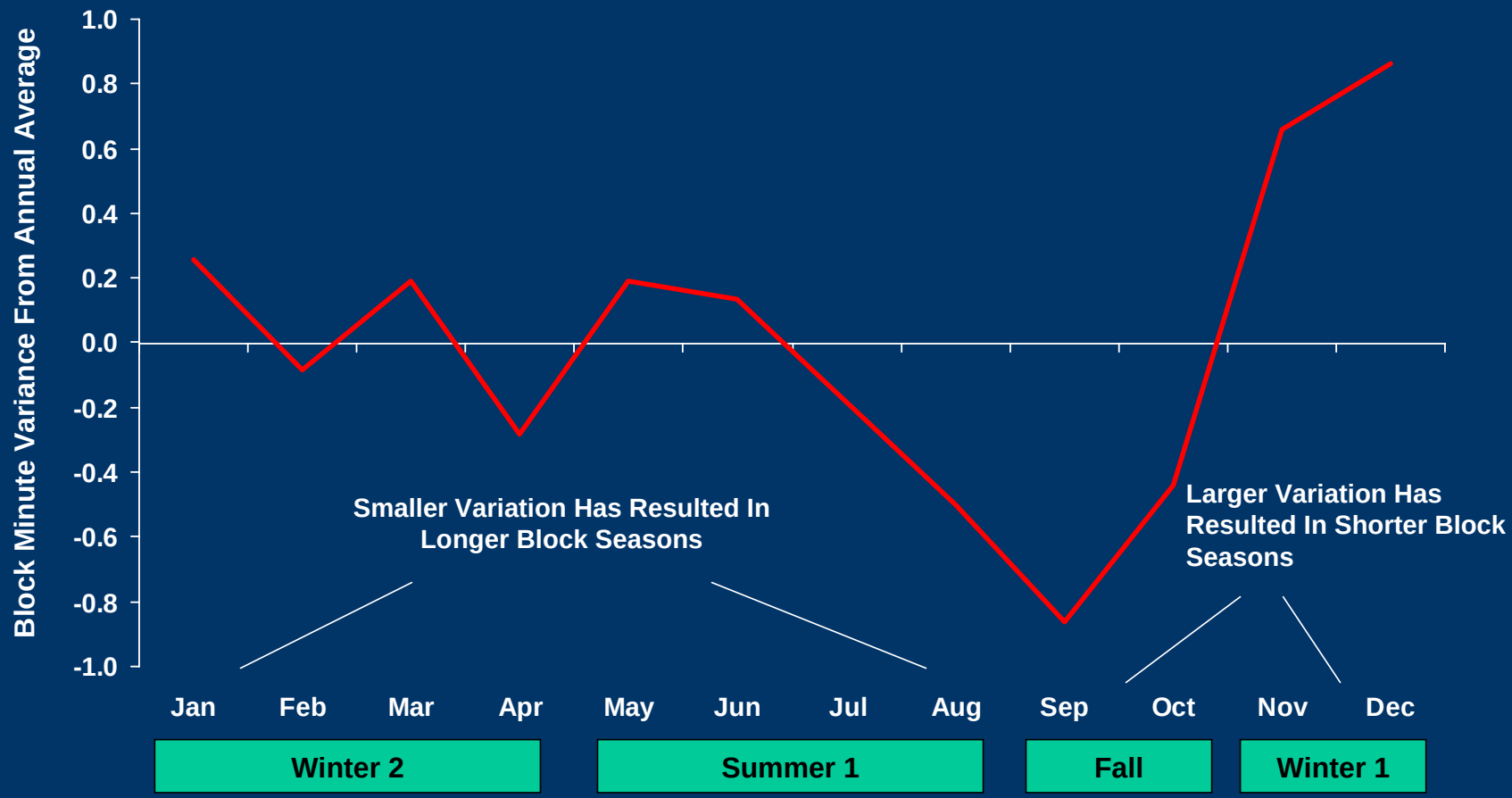




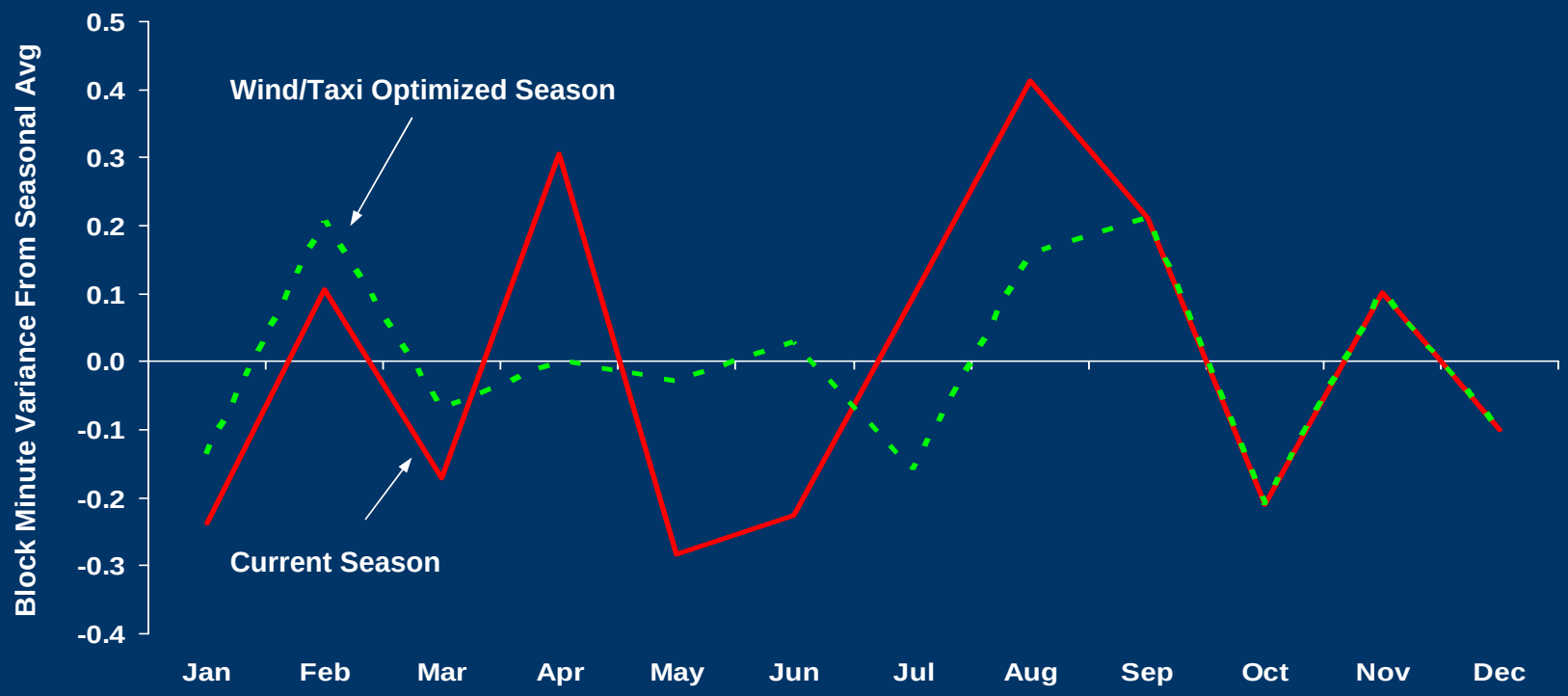




By Combining Both Directions Along With Actual Flight Time Variance and Actual Taxi-out Variance, The Trend Below Illustrates The Monthly Overall Variance From The Annual Average (Minute Variance From Annual Average)

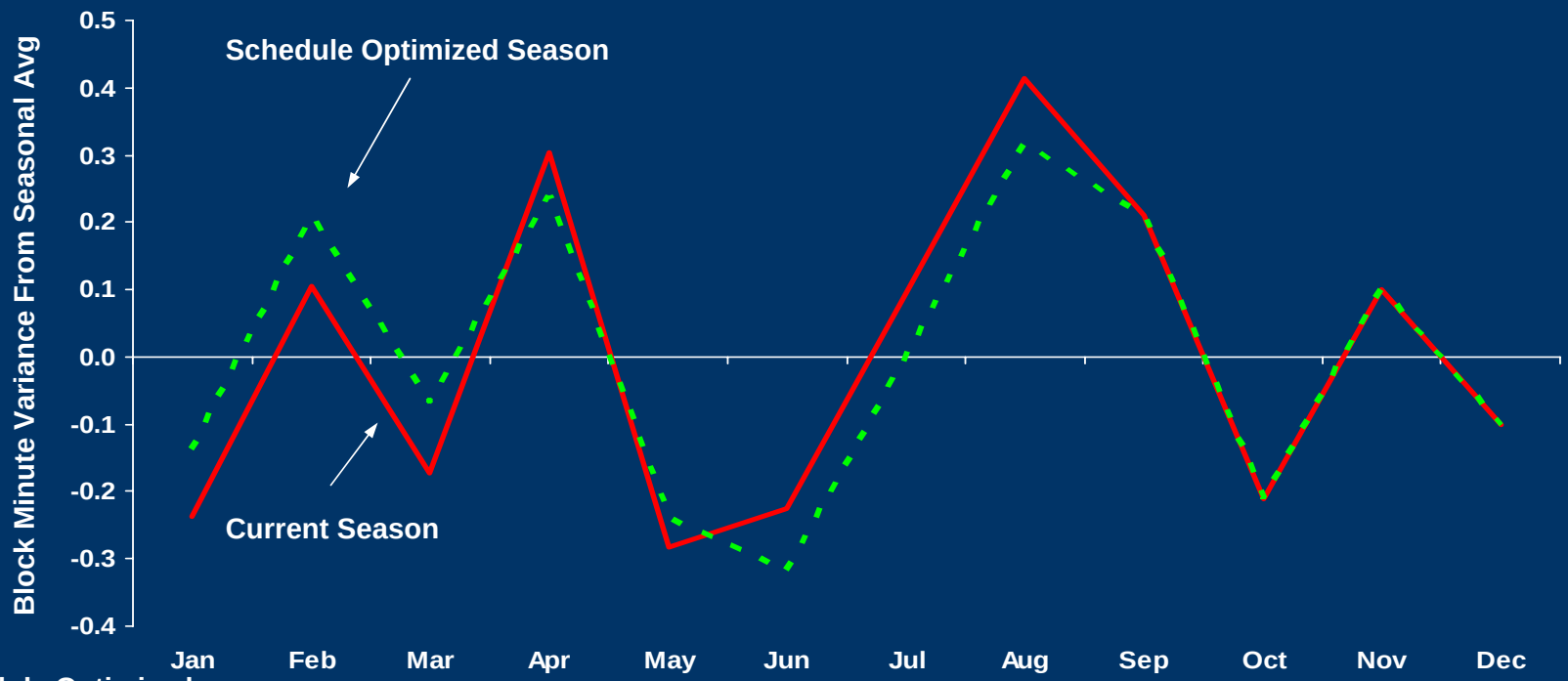


By Adjusting The Block Seasons, It Is Possible To Further Minimize The Month To Month Variation (Minute Variance From Block Season Average)



Wind/Taxi Optimized Season:	Winter 2	Spring	Summer 1	Summer 2	Fall	Winter 1
Current Season:	Winter 2		Summer 1		Fall	Winter 1

While The Wind/Taxi Optimized Seasons Will Impact The Current Aircraft Scheduling Periods, Adding A Spring Season Will Reduce Monthly Variability And Maintain The Aircraft Scheduling Periods (Minute Variance From Block Season Average)



Schedule Optimized Season:	Winter 2	Spring	Summer 1	Fall	Winter 1
Current Season:	Winter 2	Summer 1		Fall	Winter 1

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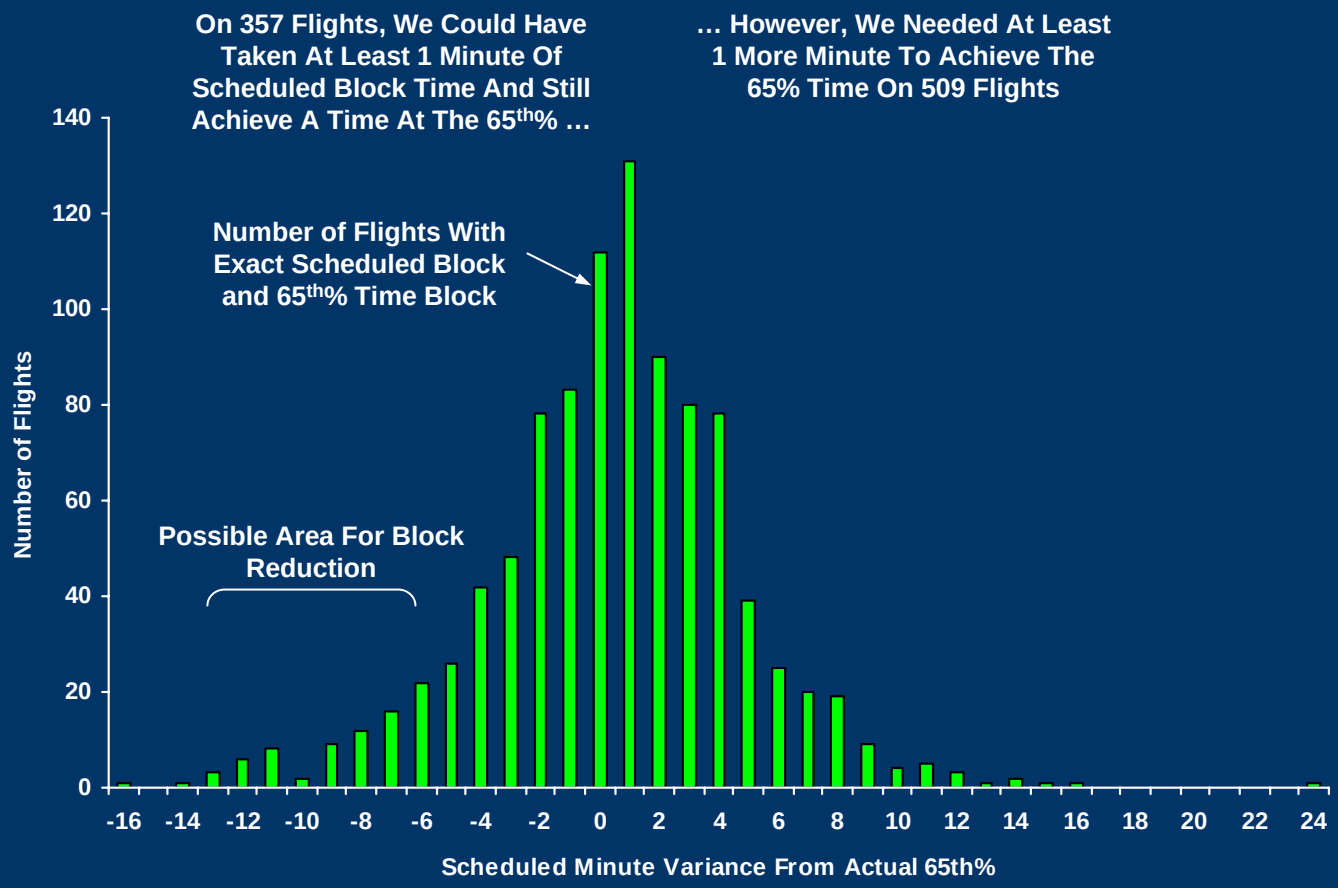
Next Steps:

- **Determine the implications of adding an April only and breaking June/July within the Aircraft Scheduling process**
- **Understand the cost of an additional schedule period**
- **Decide to use either the wind/taxi block seasons or the schedule period block seasons**
- **Implement additional seasons**

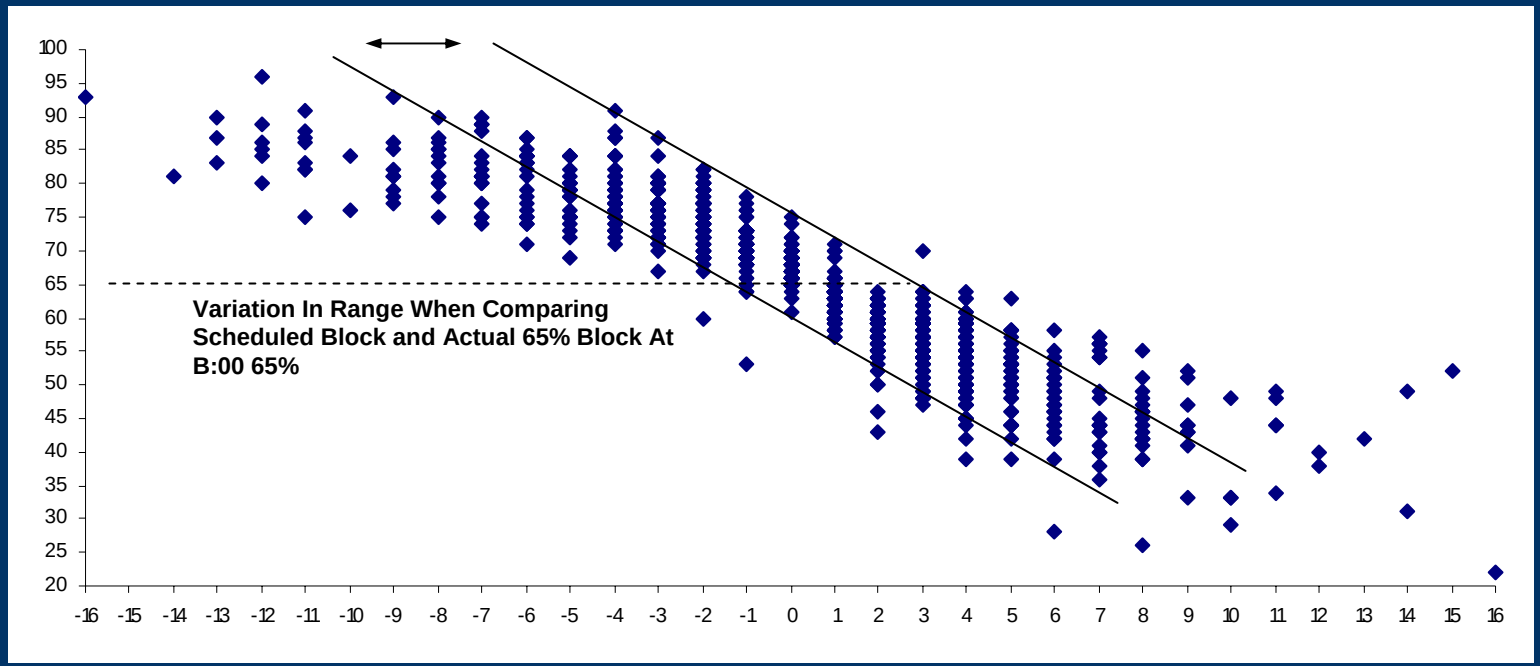
Scheduled Block Time Optimization

Based On The Summer Season (May-August), Currently 80% Of Flights Are Within +/-:05 Minutes When Comparing Scheduled And Actual Block Times



Variability Between Flights Allows For Actual Minute Variations From Scheduled While Still Maintaining A B:00 Of 65%

For A Given B:00 Performance, Difference Between Scheduled And Actual 65% Can Range Up To 3 or 4 Minutes



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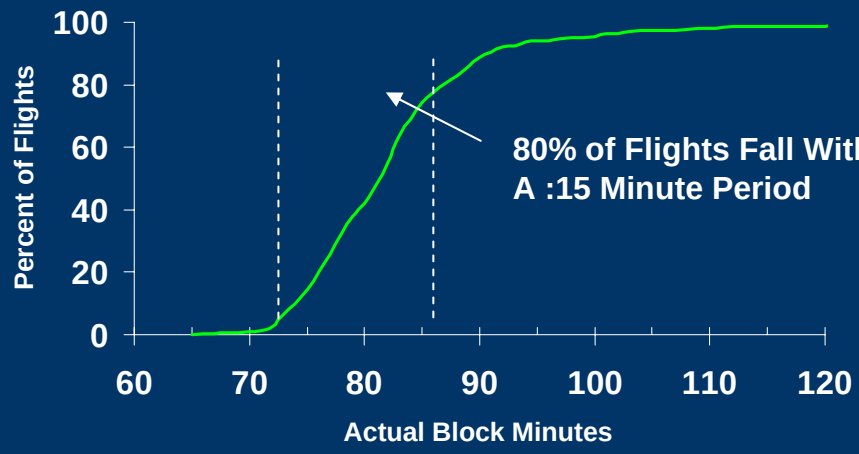
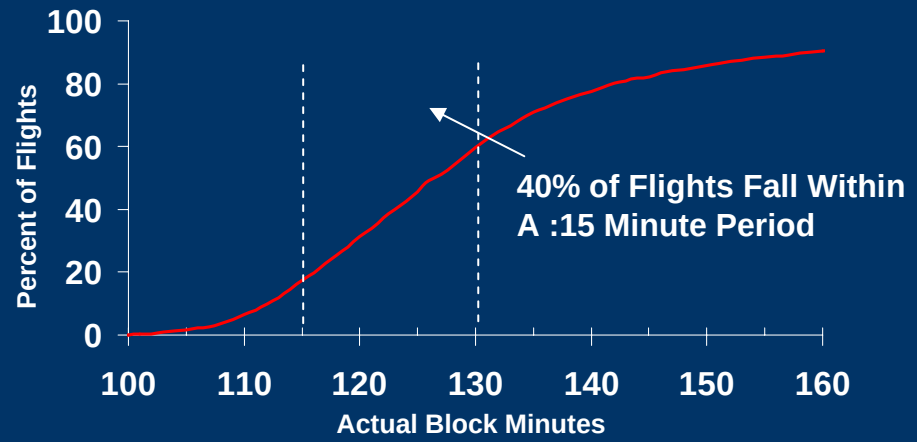
Depending On Specific City Pair Congestion, A Given Market Will Have A Completely Different Block Distribution When Compared To Other Markets

Denver To Billings – Actual 2005
Block Time Cumulative Distribution

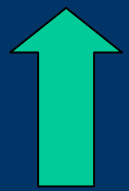


O'Hare To La Guardia – Actual 2005
Block Time Cumulative Distribution



Scheduled Block Time Optimization Became Effective With The January Schedule Change And Has Been Implemented Through The Summer Schedule Period

Jan 9 – May 3, 2006



Ted Markets Only

- O'Hare Inbound Protected
- +/-:05 Minute Change Limit

May 4 – Sep 5

All Markets Included

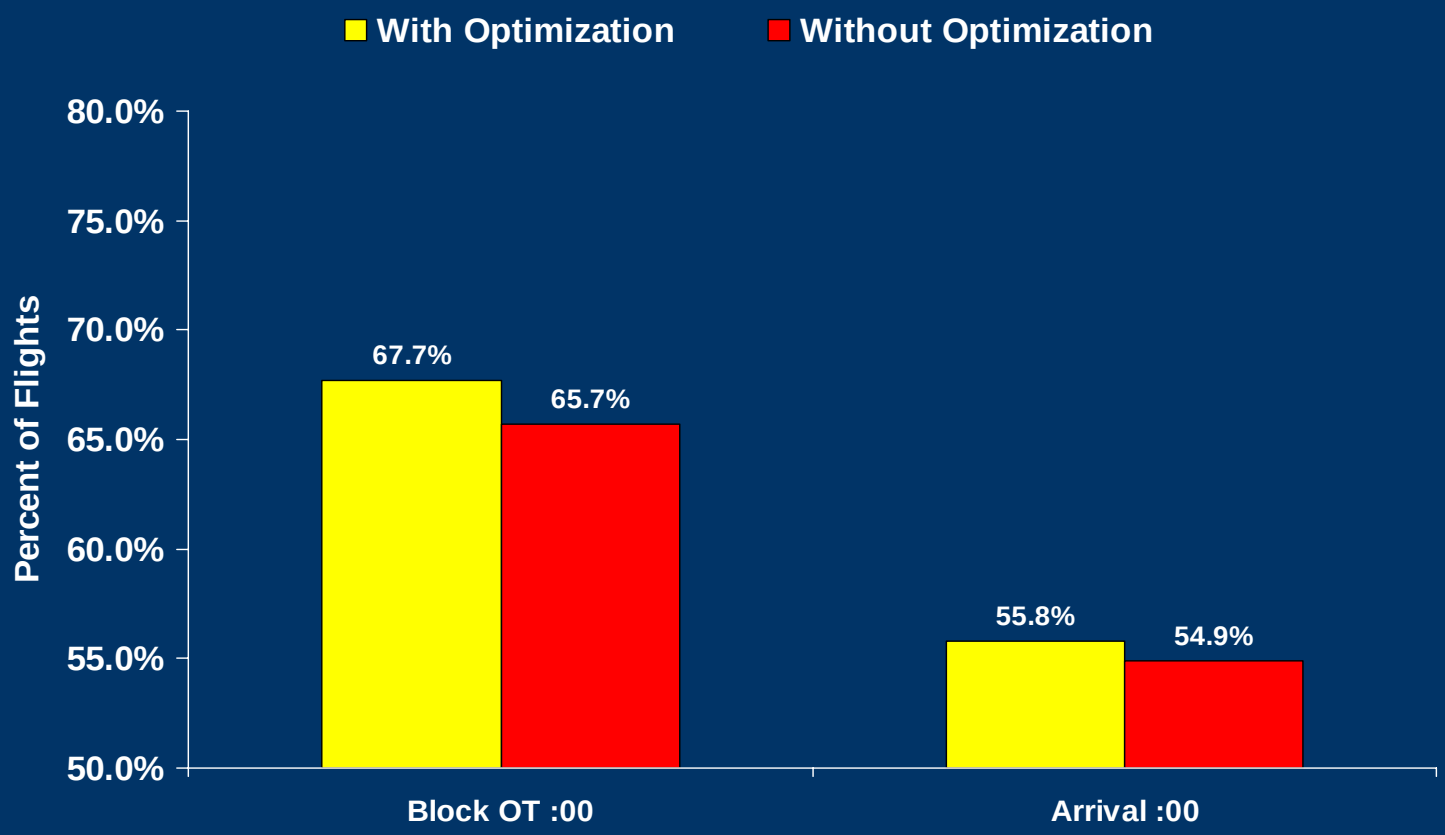
- O'Hare Inbound Protected
- +/-:03 Minute Change Limit (short haul – less than 5 hours)
- +/-:05 Minute Change Limit (long haul – 5 or more hours)
- No Change to International Tags
- 50th Percentile Lower Bound

Sep 6 – Oct 30

All Markets Included

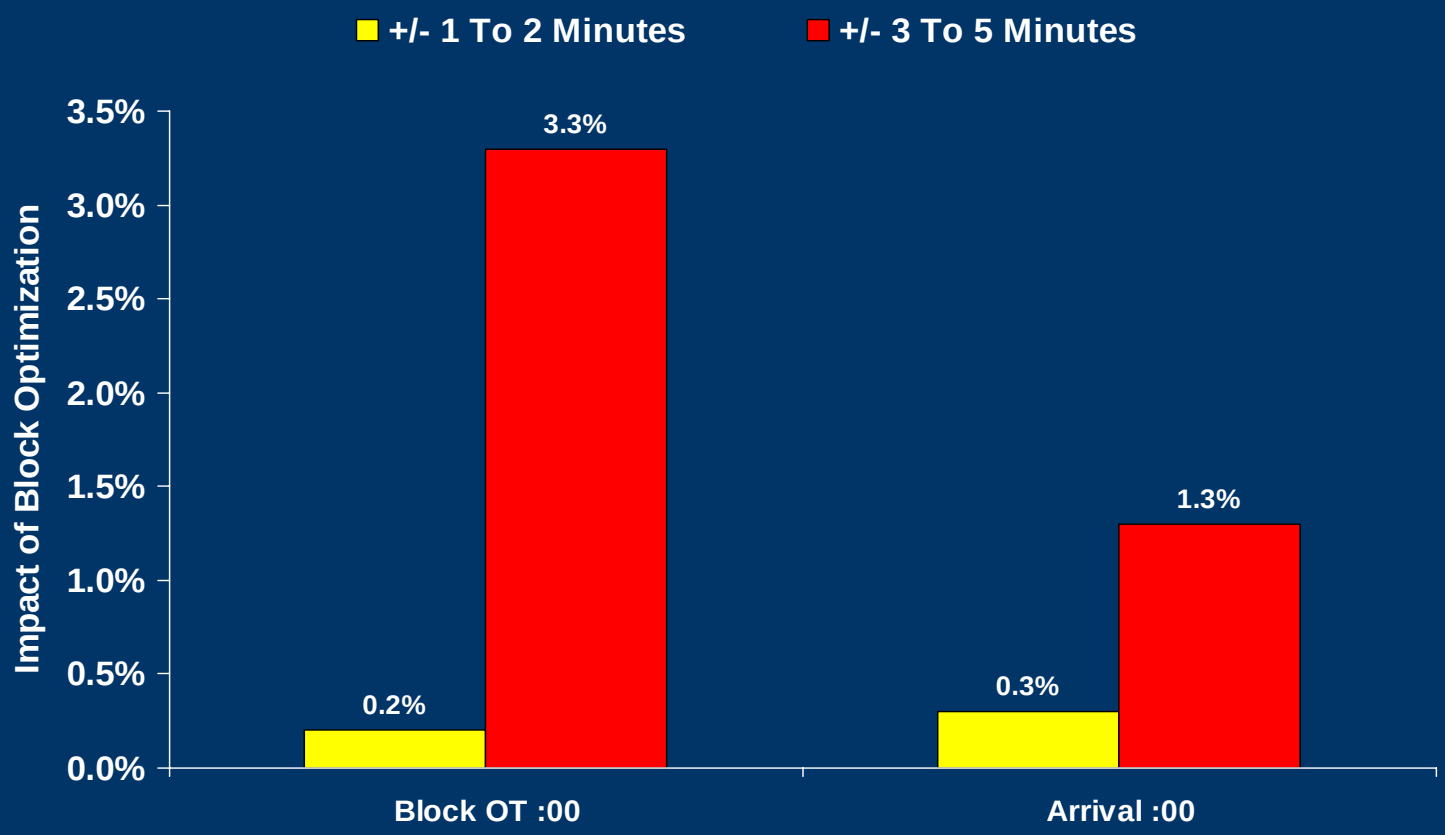
- Recommend ORD Inbound Protection
- +/-:05 Minute Change Limit (short haul – less than 5 hours)
- +/-:10 Minute Change Limit (long haul – 5 or more hours)
- No Change to International Tags
- 50th Percentile Lower Bound

Since The January 9th Schedule Change, Optimization Has Improved Actual B:00, But Has Only Made A Small Impact On Arrival Performance



NOTE: Based on actual performance between Jan 9 – Mar 5, 2006

Flights With Optimization Changes Of 3 Or More Minutes Tend To Have The Largest Impact



NOTE: Based on actual performance between Jan 9 – Mar 5, 2006

Improved Airline Management For Flights Impacted By A Ground Delay Program

Objective:

Improved EDCT Compliance By Maintaining Aircraft On The Gate

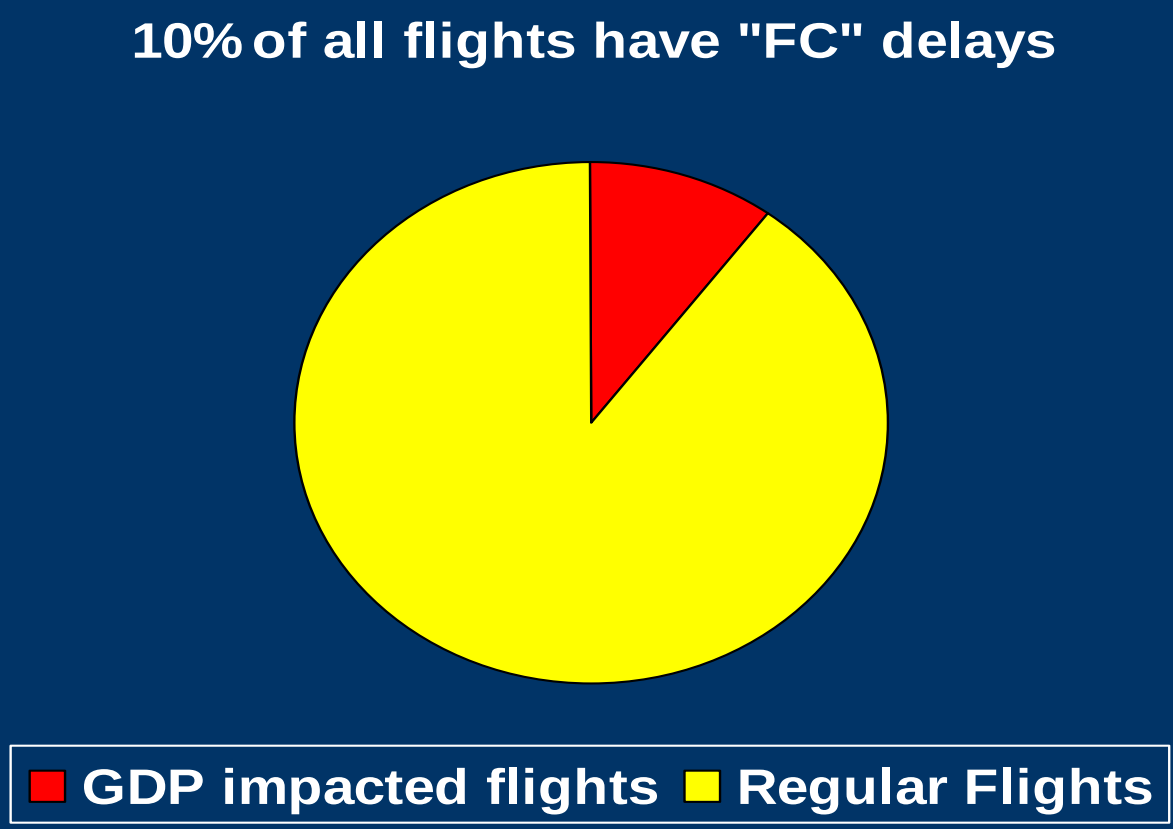
- Crews Are Paid When Brakes Released
- Reduced Fuel By Continuing To Use GPU's
- Helps To Reduce Airport Congestion

Analysis:

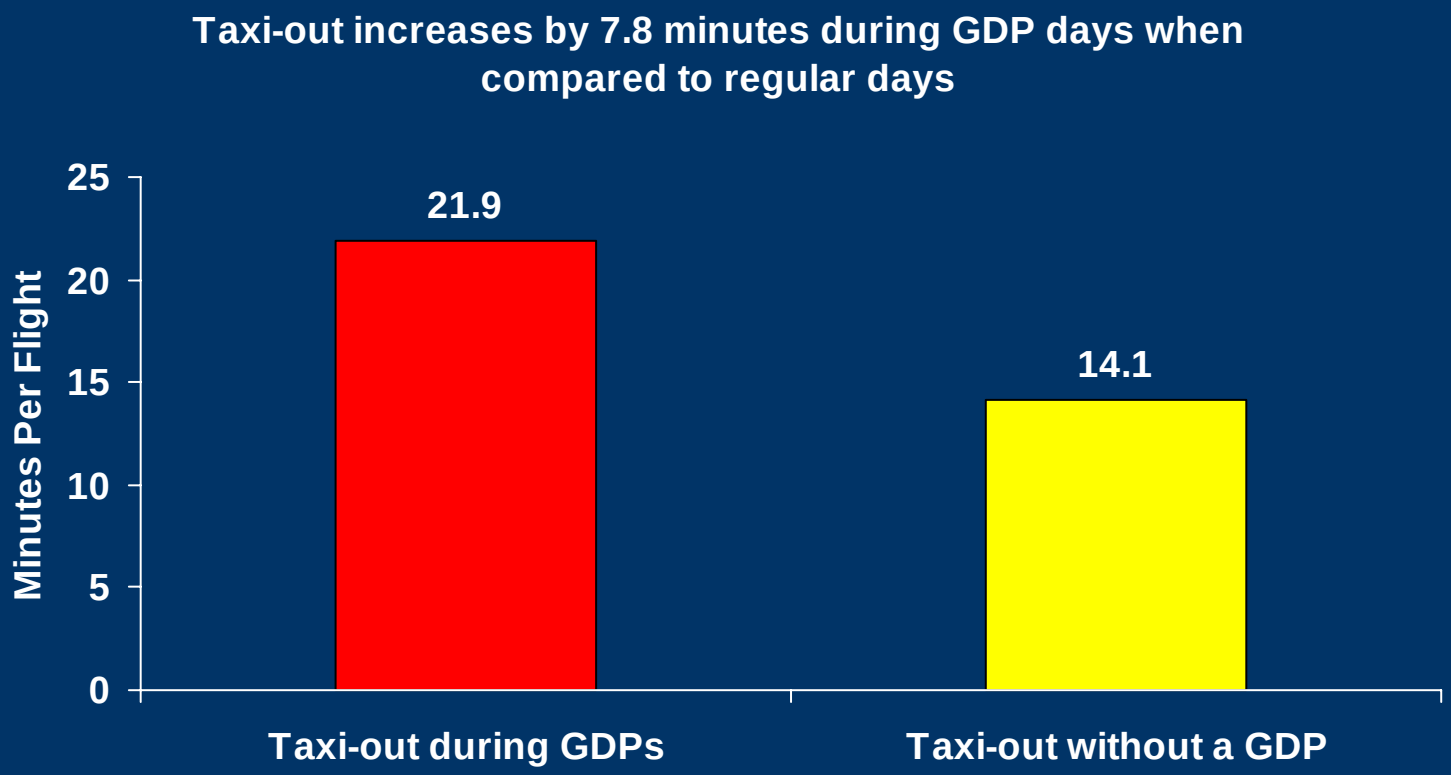
To Identify The Impact of Flow Control (FC) Delays On Taxi-out Performance

- Included All UAX Flights Arriving Into ORD Between 9/05 – 2/06
- Compared The Period Between 9/05-12/05 With 1/06-2/06

While Weather Was Better Than Average Over The Past Two Quarters, United Express Flights Still Experienced A Ground Delay Program 10% of The Time



On Days With GDP's, The Overall Taxi-out Time Increases By 55% For Flights Arriving Into O'Hare



Grouping UAX Stations Into 4 Categories Based On The Taxi-out Difference Between "FC" and "Non-FC" Flights (From Sept 1 – Dec 31, 2005)

Incremental Taxi-out Less than 5 minutes	Incremental Taxi-out Between 5 and 7.5 mins.	Incremental Taxi-out Between 7.5 and 10 mins.	Incremental Taxi-out Greater than 10 minutes
AVP	ABE	ALB	ABQ
BNA	ATW	BTV	ATL
BOI	AUS	BUF	BDL
CAE	AZO	CHS	BMI
CLE	BHM	COS	CMH
DTW	CAK	CVG	CRW
GSP	CID	DAY	CWA
JAX	CLT	DSM	GRR
LAN	FAR	GRB	GSO
LNK	FSD	ICT	HPN
MLI	FWA	LEX	IAH
OKC	MEM	MBS	IND
PIT	MSP	MCI	MDT
RAP	OMA	MSN	MHT
TVC	RSW	PIA	MKE
XNA	SAT	RIC	MSY
YWG	SAV	SBN	MYR
YYC	SDF	SPI	ORF
	SGF		PVD
	SYR		PWM, RDU, ROA
			ROC, STL, TUL
			TYS, YOW, YUL

[ORD inbounds only]

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If We Focus Only On Jan And Feb 2006 Data, We See A Clear Decrease In The Incremental Taxi-out Minutes

Incremental Taxi-out Less than 5 minutes	Incremental Taxi-out Between 5 and 7.5 mins.	Incremental Taxi-out Between 7.5 and 10 mins.	Incremental Taxi-out Greater than 10 minutes
ABE	AUS	ATL	ABQ
ATW	BHM	BMI	ALB
AVP	BUF	CHS	BDL
AZO	CAE	CID	CMH
BNA	DSM	FAR	COS
BTV	DTW	FWA	DAY
CAK	GRB	GRR	GSO
CLE	GSP	ICT	IAH
CLT	IND	MCI	MYR
CRW	JAX	MKE	ORF
CVG	LNK	MSY	SAT
CWA	MDT	PIT	SBN
FSD	MEM	RIC	SPI
HPN	MHT	STL	TVC
LAN	MSN	SYR	YOW
LEX	PVD	TUL	
MBS	RDU	TYS	
MLI	ROA		
MSP	SDF		
OKC	SGF		
OMA, PIA, PWM, ROC, SAV, XNA, YEG, YWG, YYC	YUL		

[ORD inbounds only]

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To Summarize…

- **The Industry Is Experiencing Increased Traffic And Higher Load Factors Which Limits The Options To Cancel Flights**
- **Modernization Continues To Be The Key Element In Reducing Delays By Increasing Airport Capacity**
- **In Addition, Understanding The Schedule Structure And Options Within An Airlines Control Offers Further Opportunities To Minimize Variability**