

# THE PRICE GLOBAL MODELLING CONCEPT

The background of the slide is a photograph of the Eiffel Tower in Paris at night. The tower is illuminated with a vibrant red light, creating a striking contrast against the dark sky. The base of the tower is visible, with the arches framing a view of the city lights and the illuminated buildings of the Champs-Élysées in the distance. The overall atmosphere is festive and iconic.

The 25th PRICE EUROPEAN USERS SYMPOSIUM  
PARIS, OCTOBER 26th-28th

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# AGENDA

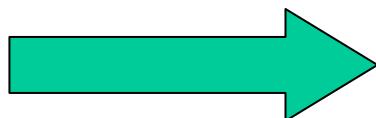
- **PERFORMANCE DRIVEN MODELLING**
  - REFERENCE DATA COLLECTION: TYPE OF DATA
  - REFERENCE DATA COLLECTION: COST NORMALISATION
  - BUDGETARY COST ESTIMATING: BUILDING A MODEL
  - BUILDING A COST MODEL IN CCOSTAT
  - OPERATING THE CCOSTAT MODEL
- **DESIGN DRIVEN MODELLING**
  - CALIBRATION OF REFERENCE AIRCRAFTS
  - BUDGETARY ESTIMATION
  - DETAILED ESTIMATION

# PERFORMANCE DRIVEN MODELLING

**PRINCIPLE:** Estimate cost from performances through specific Cost Model.

## REFERENCE DATA COLLECTION

- **DEPENDENT VARIABLES (OUTPUTS):** Cost, characteristics.
- **INDEPENDENT VARIABLES (INPUTS):** Characteristics, performances, etc.
  - **Select according to following criteria:**
    - Potential output drivers
    - Easy collection
    - Available at early phase of project.



**REGRESSION ANALYSIS**

# PERFORMANCE DRIVEN MODELLING

## REFERENCE DATA COLLECTION

- EXAMPLE FOR AIRLINERS**

**INPUTS**

**OUTPUT \***

PROJECT	NB PASS	ISD	Thrust (KN)	NB ENG	TYPE	Length (m)	Cross Section (m)	Wing Span (m)	EW (t)	MTOW (t)	Range (km)	PRICE	1	Cur	EC
A318	107	2002	47.6	2	SA	31.45	3.96	34.1	38.4	59	6000	40	\$M		401
A319	124	1995	54	2	SA	33.84	3.96	34.1	40.1	64	6800	43.5	\$M		798
A320	150	1987	54	2	SA	37.57	3.96	34.1	41	73.5	5700	47.5	\$M		798
A321	185	1993	66	2	SA	44.51	3.96	34.1	47.7	83	5600	57.5	\$M		798
A330-200	253	1997	144	2	DA	59	5.64	60.3	120	230	12500	115	\$M		798
A330-300	295	1992	144	2	DA	63.6	5.64	60.3	122.2	230	10500	128	\$M		798
A340-300	295	1991	136	4	DA	63.6	5.64	60.3	129	271	13700				
A340-600	380	2000	224	4	DA	75.3	5.64	63.45	177	365	13900	145	\$M		697
737-800	162	2000	54.6	2	SA	39.5	3.76	34.3	41.4	79	5425				
737-700	128	1997	48	2	SA	33.6	3.76	34.3	38	70	5917	42.5	\$M		
767-400ER	245	1999	127	2	DA	61.4	5.03	51.9	103	204	10500	120	\$M		799

**Qualitative variable:  
Single Aisle, Double Aisle**

**Economic  
conditions**

**\* Cost data is List Price**

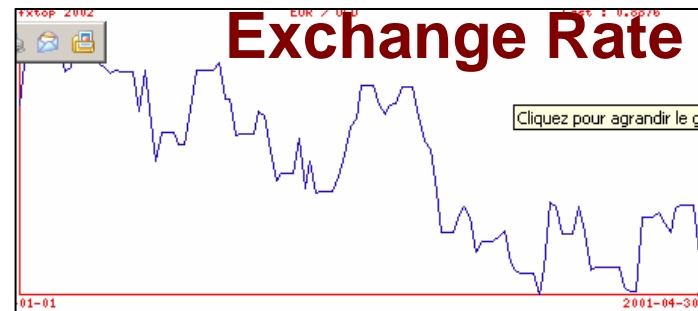
# PERFORMANCE DRIVEN MODELLING

## REFERENCE DATA COLLECTION

- **THE COST NORMALISATION : Bring all costs to same conditions (ex: 07/2005 US\$)**

PROJECT	Range (m)	PRICE 1	Cur	EC
A318	6000	40	\$M	401
A319	6800	43.5	\$M	798
A320	5700	47.5	\$M	798
A321	5600	57.5	\$M	798
A330-200	12500	115	\$M	798
A330-300	10500	128	\$M	798
A340-300	13700			
A340-600	13900	145	\$M	697
737-800	5425			
737-700	5917	42.5	\$M	
767-400ER	10500	120	\$M	799

Produced in Europe: In €



Mois	Moyenne
4/2001	0.891877
3/2001	0.910016
2/2001	0.921296
1/2001	0.939235

**E.R= 0.9**

1. Convert into 04/01 € through E.R
2. Update to 07/05 € through inflation
3. Convert into 07/05 \$ through E.R.

$$40 \div 0.9 = 44.4 \text{M€} \times 1.09 = 48.4 \text{M€} \times 1.20 = \$58 \text{M}$$

(1)                      (2)                      (3)

# PERFORMANCE DRIVEN MODELLING

## REFERENCE DATA COLLECTION

- **THE COST NORMALISATION: Normalise against quantity, date and Production Rate.**

Set Production quantity and related period  
(ex: 1200 from 07/1992 to 06/2012.

### • THEN 2 OPTIONS:

- **A. No normalisation:**
  - 3 inputs in the data set:
    - Quantity: 1200
    - ISD (In Service Date): 07/1992
    - Production Rate: 5/month
- **A. Normalisation:**
  - Calculate OPC (Only Piece Cost = Cost for Quantity One) or T-1 (First Piece Cost).
  - 1 input in the data set:
    - ISD (In Service Date): 07/1992

  
**3 potential Cost Drivers**

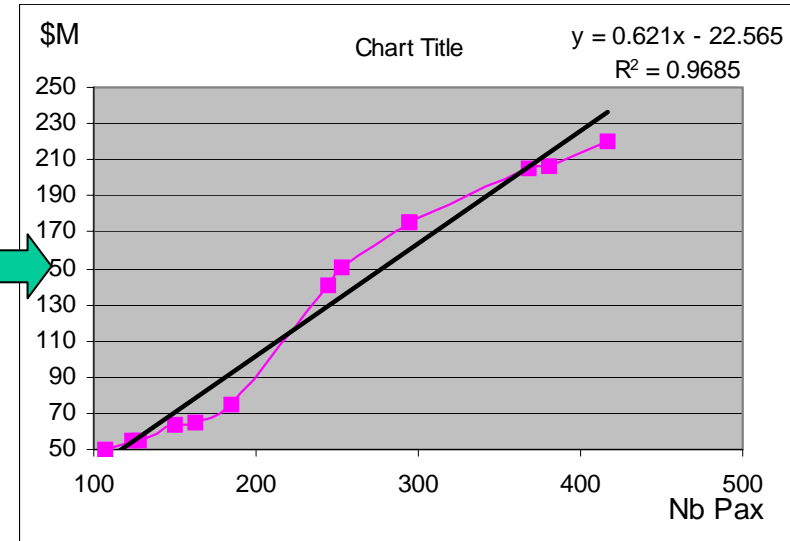
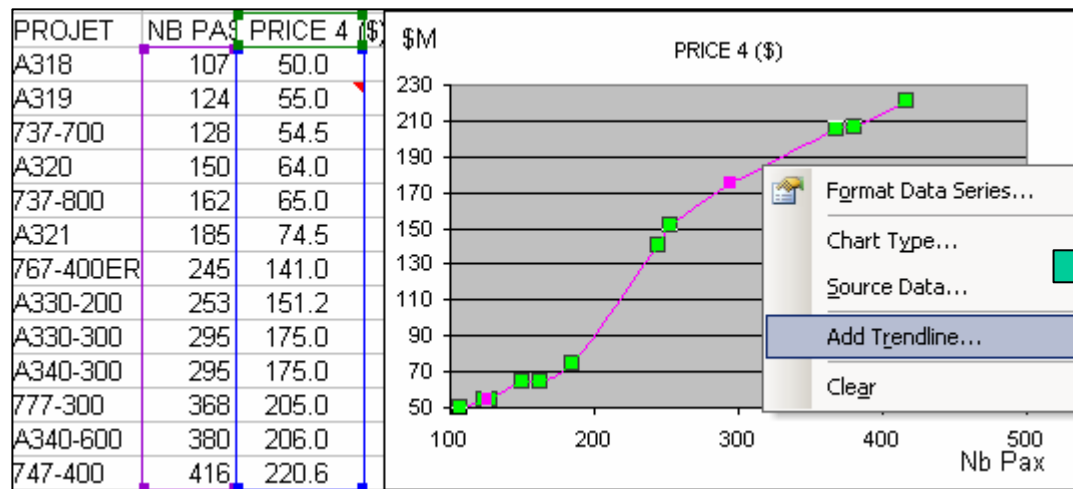
  
**1 potential Cost Driver**

# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

### 1. BUILDING A MODEL

#### i. REGRESSION ANALYSIS: IN EXCEL, Trend Line



Cost is function of # of passengers

$$\text{Cost} = 0.621 * (\# \text{ Pax} - 22.565)$$

**PROBLEM:**

- Single Quantitative variable

# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

### 1. BUILDING A MODEL

#### ii. REGRESSION ANALYSIS: IN EXCEL, LINEST/LOGEST functions

B16		=LOGEST(J2:J14,,B2:I14,,TRUE)									
	A	B	C	D	E	F	G	H	I	J	
1	PROJECT	NB PASS	ISD	Thrust	NB ENG	Length	EW	MTOW	Range	PRICE	
2	A318	107	2002	47.6	2	31.45	38.4	59	6000	50	
3	A319	124	1995	54	2	33.84	40.1	64	6800	57	
4	A320	150	1987	54	2	37.57	41	73.5	5700	64	
14	747-400	416	1988	281	4	70.7	179	397	13450	218	
15		m8	m7	m6	m5	m4	m3	m2	m1	b	
16	LOGEST	1.000075894	1.004486	0.991259	1.011635	0.836551	0.996611	0.996953	1.004237	11,025	
17		2.74135E-05	0.002594	0.003235	0.006953	0.04198	0.001662	0.003618	0.001945	7	
18		0.998678135	0.036737	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
19		377.7535746	4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
20		4.078515604	0.005398	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
21											
22	LINEST	0.002188417	0.382595	0.33842	-0.230003	-13.56434	-0.440415	-0.36312	0.360447	740	
23		0.004897219	0.46347	0.577961	1.242033	7.49949	0.296824	0.646342	0.347381	1,303	
24		0.996756083	6.562759	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
25		153.6346239	4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
26		52936.11075	172.2792	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	

**Multivariable  
regression**

**PROBLEMS:** - LINEST not effective (linear only)  
- LOGEST effective but complex

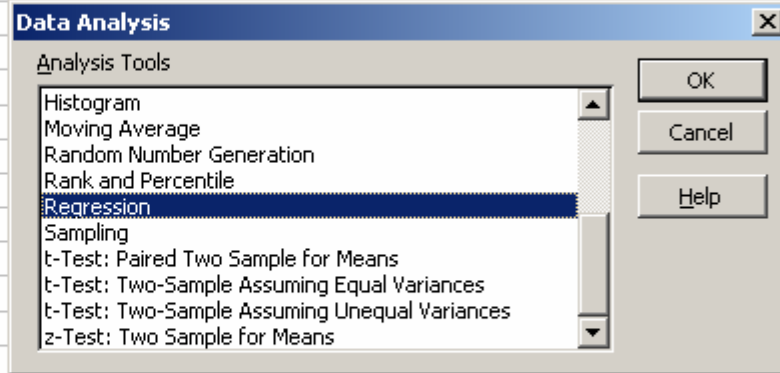
# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

### 1. BUILDING A MODEL

#### iii. REGRESSION ANALYSIS: IN EXCEL, Data Analysis

A	B	C	D	E	F	G	H	I
PROJECT	NB PASS	ISD	Thrust	NB ENG	Length	EW	MTOW	Range
737-700	128	1997	48	2	33.6	38	70	5917
767-400ER	245	1999	127	2	61.4	103	204	10500
777-300	368	1997	196	2	73.9	160	297	11030
747-400	416	1988	281	4	70.7	179	397	13450
SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.99868932							
R Square	0.997380358							
Adjusted R Square	0.990394648							
Standard Error	6.386047151							
Observations	12							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	8	46580.53	5822.566	142.7744	0.000876			
Residual	3	122.3448	40.7816					
Total	11	46702.88						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	872.5478463	1273.715	0.685042	0.542501	-3180.985	4926.081	-3180.985	4926.081



**Multivariable regression**

**-Powerful but limited to linear functions  
- Complex**

# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

### 1. BUILDING A MODEL

#### iv. REGRESSION ANALYSIS: IN XLSTATS

The screenshot shows the 'Nonlinear Regression' dialog box in XLSTATS. The 'Dependent variable' is set to 'Data!\$C:\$C'. The 'Explanatory variables' are set to 'Data!\$A:\$B'. The 'Column labels' checkbox is checked. The 'Residuals' and 'Charts' checkboxes are also checked. The 'Starting point' is set to 'Data!\$F\$12:\$F\$16'. The 'Number of rows' is set to 0. The 'Next' button is highlighted.

### Multivariable regression

- Powerful but not (non-linear and qualitative variable)
- For statisticians

# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

### 1. BUILDING A MODEL

#### v. REGRESSION ANALYSIS: IN CCOSTAT

avions

$$C=0.005734 * P1^{0.9023} * P2^{-0.2228} * P3^{0.5724}$$

C=PRICE (\$M)|P1=NB PASS|P2=NB ENG|P3=Range|

**Statistics :**

	Obs. cost	Est. cost	Obs.-Est.	(Obs.-Est.) en %
A318	50	48	+2	+3.11%
A319	57	59	-2	-4.29%
A320	64	64		
A321	74	76		
A330-200	151	160		
A330-300	175	167		
A340-300	175	166		
A340-600	206	211		
737-800	67	66		
737-700	56	56		
767-400ER	145	141		
777-300	210	209		
747-400	218	224		

Statistics Indicators Correlations Coefficients Parameters

**Multivariable regression**

- Does everything
- Easy to use

CCOSTAT - [Estimation - C:\Documents and Settings\barrault1\Mes documents\Didier\CCOSTAT\A...

Database: avions

Model: Cost-NP/NE/R, (multiplicative)

Project: A350-900

Estimated value: 189.66

Minimum cost: 179.93  
-5.13%

Maximum cost: 199.93  
+5.41%

Project risk: 0.1  
Model risk: 0.1

NB PASS 285  
 NB ENG 2  
 Range 13900

# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

### 1. BUILDING A COST MODEL IN CCOSTAT

#### 1. FILLING THE GAPS IN THE REFERENCE DATA

CCOSTAT - [Tableur - C:\Documents and Settings\barrault1\Mes documents\Didier\CCOSTAT\Avlign2.cco]

File Edit Modules Report Language Window Help

avions

### Range of Boeing 777-300 missing

	A	B	C	D	E	F	G	H	I	J	L	M	N
1		NB PASS	ISD	NB ENG	ORD TYPE	Span	MTOW	Section	Length	Thrust	EW	PRICE	Range
2	A318	107	2002	2	1	34.1	59	3.96	31.5	48	38	50	6000
3	A319	124	1995	2	1	34.1	64	3.96	33.8	54	40	57	6800
4	A320	150	1987	2	1	34.1	74	3.96	37.6	54	41	64	5700
5	A321	185	1993	2	1	34.1	83	3.96	44.5	66	48	75	5600
6	A330-200	253	1997	2	2	60.3	230	5.64	59.0	144	120	151	12500
7	A330-300	295	1992	2	2	60.3	230	5.64	63.6	144	122	175	10500
8	A340-300	295	1991	4	2	60.3	271	5.64	63.6	136	129	175	13700
9	A340-600	380	2000	4	2	63.5	365	5.64	75.3	224	177	206	13900
10	737-800	162	2000	2	1	34.3	79	3.76	39.5	55	41	67	5425
11	737-700	128	1997	2	1	34.3	70	3.76	33.6	55	38	56	5917
12	767-400ER	245	1999	2	2	51.9	204	5.03	61.4	127	103	145	10500
13	777-300	368	1997	2	2	60.9	297	6.20	73.9	196	160	200	0
14	747-400	416	1988	4	2	64.4	397	5.38	70.7	281	179	218	13450
15	A380	555	2005	4	2	79.8	560	7.14	73.0	280	277	0	15000
16	A350-900	285	2010	2	2	60.3	242	5.64	63.7	140	0	0	13900

Spreadsheet operations :

Open  
New  
Save  
Save as...  
Close  
Help  
Compute >>

→ Build a model to estimate Range

# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

1. BUILDING A COST MODEL IN CCOSTAT
  1. FILLING THE GAPS IN THE REFERENCE DATA

### REGRESSION

avions

### Equation

$$C = 85.9 * P1^{-0.2894} * P2^{0.2402} * P3^{1.5564}$$
$$C = \text{Range} | P1 = \text{NB PASS} | P2 = \text{NB ENG} | P3 = \text{Span} |$$

Confidence interval of coefficients for the level of risk :  
- Risk = 0.1

### Significance

P1="NB PASS" seems to be significant.  
P2="NB ENG" seems to be significant.  
P3="Span" seems to be significant.

Coefficients	Parameters	Option
Statistics	Indicators	Correlations

Buttons: Open, Parameters, Projects, less coherent, Close, Help, Estimation >>, << Spreadsheet, To report

### ESTIMATION

Database : avions

Model : Range.(multiplicative)

Project : 77

### Output

Estimated value	11002	Minimum cost :	9905.3
NB PASS	368		-9.97%
NB ENG	2	Maximum cost :	12220
Span	60.9		+11.1%
		Project risk :	0.1
		Model risk :	0.1

(Actual Range=11030, error is 0.25%)

# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

1. BUILDING A COST MODEL IN CCOSTAT
2. CREATE COST MODEL

### First equation

```
C=0.1209 * P1^0.6654 * P2^-0.1792 * P3^0.2982 * P4^-0.0149 * P5^-0.0449 * P6^-0.3168 * P7^0.3468 * P8^0.2  
C=PRICE ($M)|P1=NB PASS|P2=NB ENG|P3=MTOW|P4=Section|P5=Length|P6=Thrust|P7=EW|P8=Range|
```

Too many parameters for a budgetary estimation

Pairwise autocorrelations of parameters :

NB PASS	&	NB ENG	+0.672
NB PASS	&	MTOW	+0.982
NB PASS	&	Section	+0.884
NB PASS	&	Length	+0.971
NB PASS	&	Thrust	+0.973
NB PASS	&	EW	+0.983
NB PASS	&	Range	+0.885
NB ENG	&	MTOW	+0.736
NB ENG	&	Section	+0.461
NB ENG	&	Length	+0.584
NB ENG	&	Thrust	+0.689
NB ENG	&	EW	+0.673
NB ENG	&	Range	+0.720
MTOW	&	Section	+0.889
MTOW	&	Length	+0.957
MTOW	&	Thrust	+0.981
MTOW	&	EW	+0.993
MTOW	&	Range	+0.943

less coherent  
Risk  
Models  
Close  
Help  
Estimate  
<< Spreadsheet  
To report

Eliminate parameters tightly correlated with others: EW (Empty Weight), ...  
- Main Criteria : availability

Correlation analysis

# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

1. BUILDING A COST MODEL IN CCOSTAT
2. CREATE COST MODEL

**Significance analysis**

$$C = 0.03293 * P1^{0.7327} * P2^{-0.2179} * P3^{0.3957} * P4^{-0.2253} * P5^{0.37}$$

C=PRICE (\$M)|P1=NB PASS|P2=NB ENG|P3=MTOW|P4=Thrust|P5=Ra

Confidence interval of coefficients for the level of risk :  
Risk = 0.1

P1="NB PASS" seems to be significant.  
P2="NB ENG" seems to be significant.  
P3="MTOW" not significant.  
P4="Thrust" seems to be significant.  
P5="Range" seems to be significant.

**Eliminate parameters not significant for a given level of risk**

Projects: less coherent

## Less coherent project

Less coherent project : A330-200.  
the difference with the other projects in the database permits to advise to :  
disable it temporarily to increase the statistical accuracy of the model.

**advise to :  
disable it temporarily**

analysis of less coherent project Close

- Data validation
- → A330-200 left in database

# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

### 2. OPERATING THE CCOSTAT MODEL

1. SAVE MODEL → ESTIMATE COST

The screenshot displays the CCOSTAT software interface. On the left, the 'Models' window shows a list of models with 'Cost-NP/NE/MT/T/R' selected. The 'Models characteristics' window for this model lists 5 parameters (NB PASS, NB ENG, MTOW, Thrust, Range) and 13 projects (A318). On the right, the 'CCOSTAT - [Estimation - C:\Documents and Settings\barrault1\...]' window shows the 'Database' set to 'avions' and the 'Model' set to 'Cost-NP/NE/MT/T/R.(multiplicative)'. The 'Project' is 'A350-900'. The 'Estimated value' is 186.67, which is circled in red. Other parameters are set to: NB PASS (285), NB ENG (2), MTOW (242), Thrust (140), and Range (13900). The 'Minimum cost' is 173.3 (-7.16%), the 'Maximum cost' is 201.07 (+7.72%), the 'Project risk' is 0.1, and the 'Model risk' is 0.1.

Parameter	Value
Estimated value	186.67
NB PASS	285
NB ENG	2
MTOW	242
Thrust	140
Range	13900

Characteristic	Value
Minimum cost	173.3
	-7.16%
Maximum cost	201.07
	+7.72%
Project risk	0.1
Model risk	0.1

Then estimate other characteristics  
(Empty Weight, ...)

# PERFORMANCE DRIVEN MODELLING

## BUDGETARY COST ESTIMATING

### 2. OPERATING THE CCOSTAT MODEL

#### 2. ESTIMATE OTHER CHARACTERISTICS (Ex: Empty Weight)

The image displays two overlapping screenshots of the CCOSTAT software interface. The left screenshot shows the 'Equation' window with the following content:

**Equation**  
 $C = 0.7525 * P1^{0.7005} * P2^{0.7431}$   
 $C = EW | P1 = MTOW | P2 = Section$

Confidence interval of coefficients for the level of risk :  
- Risk = 0.1  
P1="MTOW" seems to be significant.  
P2="Section" seems to be significant.

The right screenshot shows the 'Estimation' window with the following settings:

Database : avions  
Model : EW-M/S.(mul)  
Project : A350-900

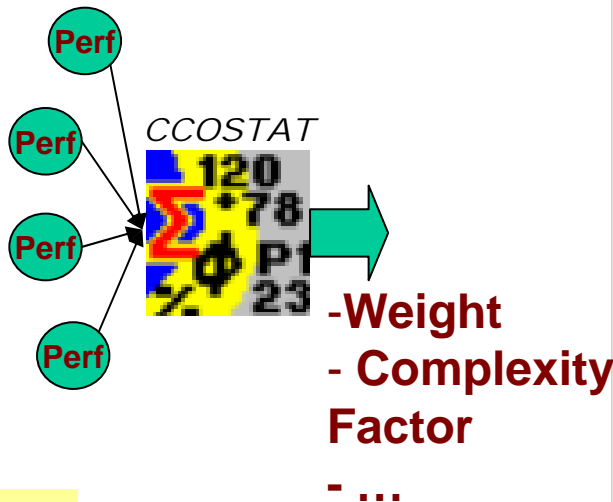
The 'Estimated value' field is highlighted with a red circle and contains the value 127.25. A green arrow points from the 'Equation' window to the 'Estimation' window.

<input checked="" type="radio"/> Estimated value :	127.25	Minimum cost :	123.31
<input type="radio"/> MTOW	242		-3.1%
<input type="radio"/> Section	5.64	Maximum cost :	131.32
			+3.2%
		Project risk :	0.1
		Model risk :	0.1

# DESIGN DRIVEN MODELLING

**PRINCIPLE: Estimate cost from design characteristics in PRICE H.**

- **BUILD A PRICE H CALIBRATION MODEL AT AIRCRAFT LEVEL**
  1. **CALIBRATE REFERENCE AIRCRAFTS**, from quantity and schedule, get Complexity Factor.
  2. **ESTIMATE NEW AIRCRAFT**, from Weight and Complexity factor



**Calibration**

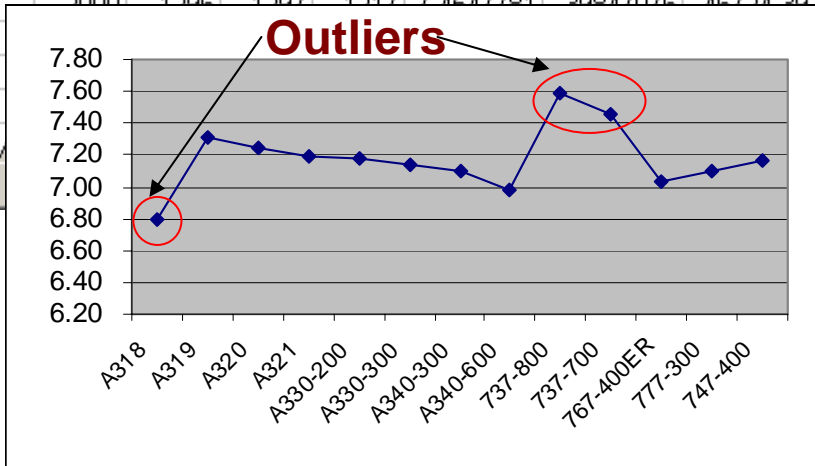
**Estimation**

# DESIGN DRIVEN ESTIMATING

## CALIBRATION OF REFERENCE AIRCRAFTS

2	Elements Title	H Inputs QTY	H Inputs PSTART	H Inputs PFAD	H Inputs PEND	H Outputs CALCULATE D_MCPLXS	H Inputs AUCOST	H Outputs AMORTIZED_ UNIT_COST			
3	SYSTEM	0	0	0	0		0				MCPLXS
4	AIRBUS	0	0	0	0		0				
5	A318	65	101	102	112		31069445	34074.084	0.863	40000000	6.79
6	A319	1500	894	895	715		35316467	37510.456	0.861	45600000	7.31
7	A320	1500	186	287	107		39446399	41921.82	0.856	51200000	7.24
8	A321	600	193	194	114		46198090	49481.029	0.861	59600000	7.20
9	A330-200	500	1297	1298	1213		94889882	99702.231	0.872	120975619	7.18
10	A330-300	260	593	594	509		109608503	116451.72	0.87	140000000	7.14
11	A340-300	350	792	793	713		108411777	116257.7	0.86	140000000	7.10
12	A340-600	220	400	401	421		128714909	139311.66	0.868	164800000	6.98
13	A350-900	1500	709	710	730		0	154283.01	0		
14	BOEING	0	0	0	0		0		#####		
15	737-800	2500	497	498	418	7.5921454	46899111	55225.566	0.775	67203000	7.59
16	737-700	2000	1296	1297	1217	7.4517791	39847076	46724.392	0.788	56173500	7.45
17	767-400ER								0.791	145435500	7.04
18	777-300								0.793	210073500	7.10
19	747-400								0.793	218025000	7.17

**Average MCPLXS = 7.15**



# DESIGN DRIVEN ESTIMATING

- ESTIMATION OF NEW AIRCRAFT
  - From Weight and Average Complexity Factor

2	Elements Title	H Inputs PSTART	H Inputs PFAD	H Inputs PEND	H Outputs CALCULATE D_MCPLXS	H Inputs AUCOST	H Outputs AMORTIZED_ UNIT_COST			H Inputs MCPLXS	
3	SYSTEM	0	0	0		0			MCPLXS	0	
4	AIRBUS	0	0	0		0				0	
5	A318	101	102	112	6.4067335	31069445	32 315	0.863	40000000	6.79	0
6	A319	894	895	715	6.9207812	35316467	35 320	0.861	45600000	7.31	0
7	A320	186	287	107	6.9126814	39446399	39 463	0.856	51200000	7.24	0
8	A321	193	194	114	6.8133751	46198090	46 678	0.861	59600000	7.20	0
9	A330-200	1297	1298	1213	6.7981923	94889882	94 041	0.872	120975619	7.18	0
10	A330-300	593	594	509	6.7679512	109608503	110 062	0.87	140000000	7.14	0
11	A340-300	792	793	713	6.7246428	108411777	109 795	0.86	140000000	7.10	0
12	A340-600	400	401	421	6.6065058	128714909	131 778	0.868	164800000	6.98	0
13	A350-900	709	710	730	7.15	0	176 208	0		7.15	0
14	BOEING	0	0	0		0					0
15	737-800	497	498	418	7.4766486	46899111	47 271	0.775	67203000	7.59	0
16	737-700	1296	1297	1217	7.3384219	30047070	31 024	0.780	50170500	7.45	0
17	767-400ER	899	800	820	6.9238269	30047070	31 024	0.780	50170500	7.04	0
18	777-300	597	598	518	6.9904061	30047070	31 024	0.780	50170500	7.10	0
19	747-400	188	189	109	7.0661302	155638058	171 428	0.793	218025000	7.17	0

**List Price = \$194M**

Builder

Ready CAPS

From weight (empty), qty, schedule, prod. Rate

# DESIGN DRIVEN ESTIMATING

- **ESTIMATION OF NEW AIRCRAFT**
  - **Complexity Factor = f (performances/characteristics)**

**Regression**

avions

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1		NB PASS	ISD	NB ENG	ORD TYPE	Span	MTOW	Section	Length	Thrust	Ra			MCPLXS	
2	A318	107	2002	2		1	65	3.6	31.5	48			50	38	6.790
3	A319	124	1995	2		1	64.1	3.4	33.8	54			57	40	7.310
4	A320														
5	A321														
6	A330-20														
7	A330-30														
8	A340-30														
9	A340-60														
10	737-800														
11	737-700														
12	767-400														
13	777-300														
14	747-400														
15	A380														
16	A350-90														

**Model**

**MCPLXS**

Database : avions

Estimated value : 7.0897

Model : MCPLXS-L/T.

Project : A350-900

Length : 63.7

Thrust : 140

Minimum cost : 7.0604  
-0.414%

Maximum cost : 7.1192  
+0.416%

Project risk : 0.2

Model risk : 0.2

**→ List Price=\$181M**

**Budgetary estimate summary:**

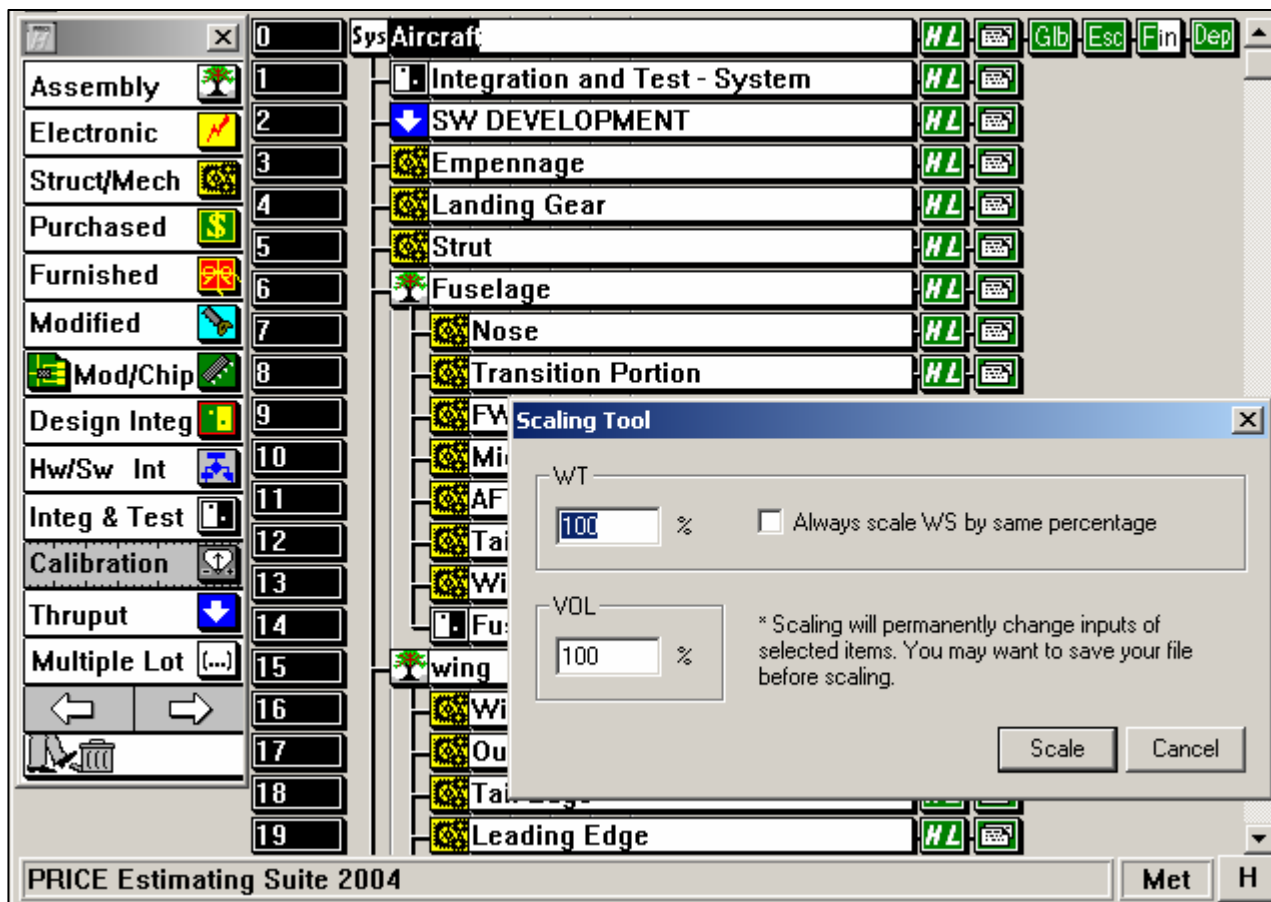
- 187 from perf.
- 194 from avg MCPLX
- 181 from modelled MCPLX

**AVG=\$187M**

**(3.4% > Actual)**

# DESIGN DRIVEN ESTIMATING

- **BUILD A PRICE H CALIBRATION MODEL AT ASSEMBLY LEVEL**
  - **START FROM EXISTING MODEL, ADJUST IT THROUGH Scaling Tool (from xxx to 127 tons)**



# DESIGN DRIVEN ESTIMATING

- **COMPARISON BETWEEN BUDGETARY ESTIMATE AND PRICE H DETAILED ESTIMATE → DATA CONSISTENCY**

**From List Price: \$ 181M**

**To List Price: 145 M€ (E.R.=1.25)**

**Assumption that Selling Price=List Price -10% discount**

**To Selling Price: 139 M€**

**To Cost Price (10% profit): 126 M€**

**To Production Cost (20% G&A): 105M€**

**To Net Prod Cost (without DEV amortization): 102M€**

**COMPARISON**  
**Budgetary estimate    Detailed estimate**

**102 ↔ 104**

# DESIGN DRIVEN ESTIMATING

- THEN TYPICAL PRICE H MODELLING

The screenshot displays the PRICE Estimating Suite 2004 interface. A dialog box titled 'Detail MCPLXS Generator' is open, showing 'Total (%) Assigned: 100.000' and 'Total (%) Remaining: 0.000'. The 'Combined MCPLXS' is 6.158831. The dialog also has 'OK', 'Cancel', and 'Help' buttons.

Overlaid on the dialog is a large white box with the word 'INPUTS' in red. Below it is a table with the following data:

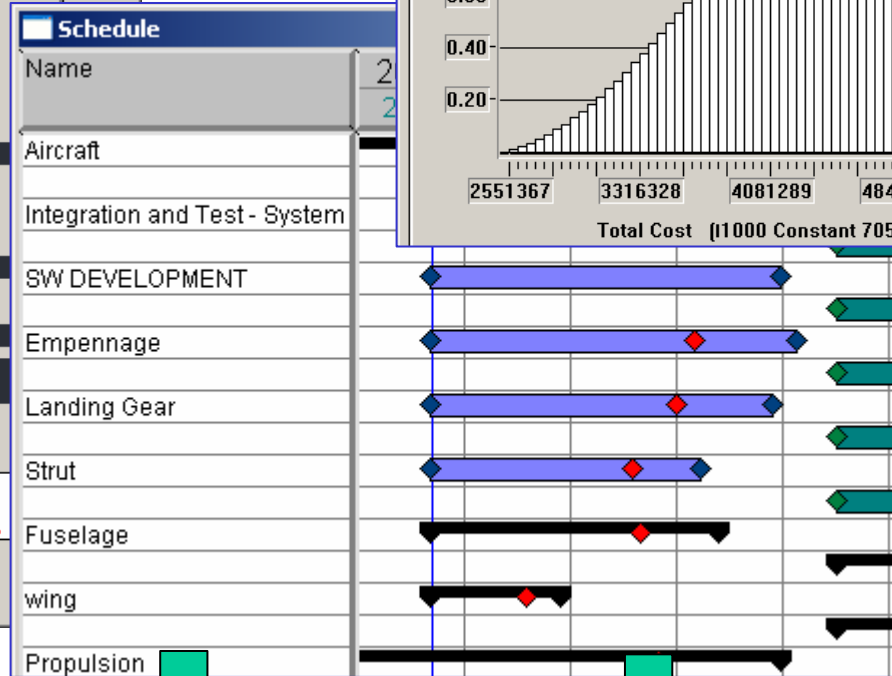
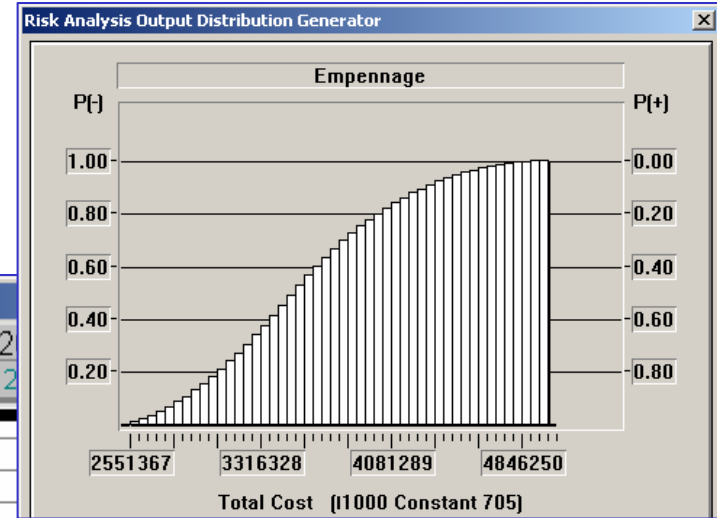
	name	Precision	Maturity	PLTFM	% of Total	Machine	# of Pa
1	Al SM	1.000000	3.000000	1.700	35.000	150	
2	Al-Li SM	0.800000	3.000000	1.700	30.000	60	
3	Ti Mach	0.170000	3.000000	1.700	5.000	24	
4	Steel Mach	0.180000	3.000000	1.700	10.000	100	
5	CFRP	1.000000	2.800000	1.700	20.000	18	

The background shows the 'STRUCTURAL / MECHANICAL' window for 'FWD Fuselage' with various input fields and buttons. At the bottom, a list of components is visible, including 'Outboard Wing Box', 'Tail Edge', and 'Leading Edge'.

# DESIGN DRIVEN ESTIMATING

## • PRICE OUTPUTS

Basic Estimate (Metric)			
Cost Summary			
	LM Totals	LM Production	LM Development
Aircraft			
Tue September 13 2005 12:16 (PRICE Estimating Suite 2004)			
System Cost Summary		Costs in (€1000 Constant 705)	
Program Cost	Development	Production	Total Cost
Engineering			
Draft	131573	47615	179188
Design	410583	160032	570615
System	60054	-	60054
Proj. Mgmt.	116348	4303055	4419403
Data	35135	1546849	1581984
<b>SubTotal(ENG)</b>	<b>753693</b>	<b>6057551</b>	<b>6811244</b>
Manufacturing			
Production	-	36618382	36618382
Prototype	1107661	-	1107661
Tool Test Eq.	64547	1254040	1318587
<b>SubTotal(MFG)</b>	<b>1172208</b>	<b>37872423</b>	<b>39044630</b>
G & A / CoM	229081	3290739	3519820
Fee / Profit	215498	4722071	4937569
<b>Total Cost</b>	<b>2370480</b>	<b>51942784</b>	<b>54313264</b>
Total (Thruput)	490340	0	490340
Total w/Thruput	2860820	51942784	54803604
Schedule Start	Sep 03 [ 55]	Jul 09 [ 13]	
First Item	Mar 08 [ 12]	Jul 10 [ 233]	
Finish	Mar 09 [ 67]	Dec 29 [ 246]	
System Weight	127624.00	System WS	126330.80
System Series MTBF Hrs	4	Unit Sys Cost	85070.90
System Quantity	500	Total Prod Cost/QTY	<b>103685.57</b>



**MAKE COST AS LOW AS POSSIBLE**



**MAKES PROFIT AS HIGH AS POSSIBLE**

**Value engineering/  
Design To Cost**

**Supply Chain  
Control**

**Project Control**