TRUE PROGRAM SUCCESS '05

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Commonality Captured

A Simplified Approach to Estimating the Cost of Common Components Across Programs

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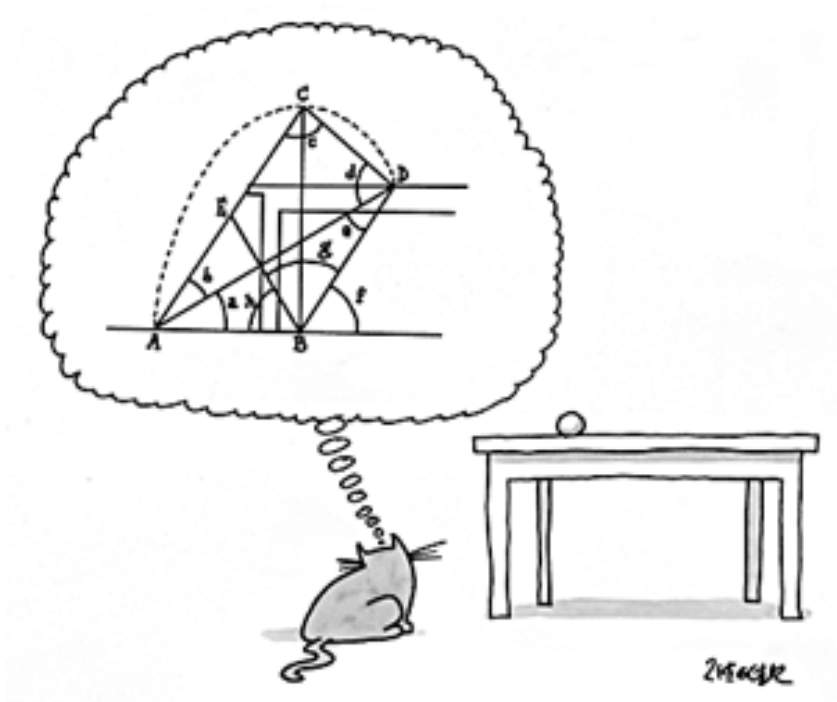
PRICE

Standard PRICE H Methodology To Estimate Common Components Across Programs Is Too Complex!

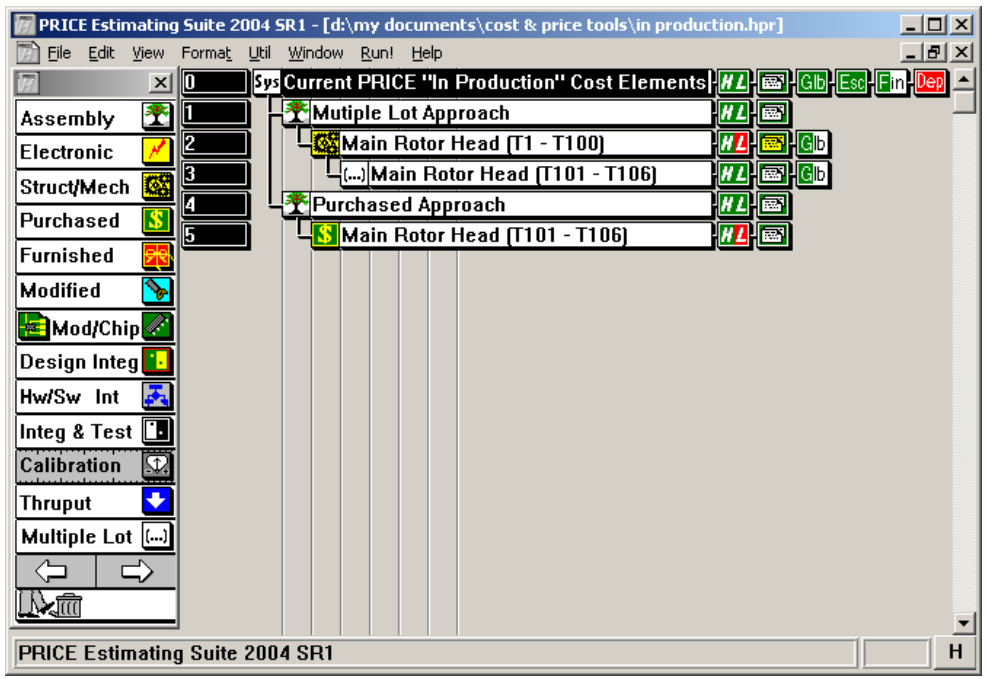


Common Components Are Often Used Across Programs

- Common components have different (lower) “T” number than new components at start of production
- Standard PRICE H methodology for common cost estimates requires complex use of “Multiple Lot” or “Purchased” EBS elements

Example:
Rotor Head with 100 prior production units before building 5 unit for new program

Uses “Multiple Lot” or “Purchased” element



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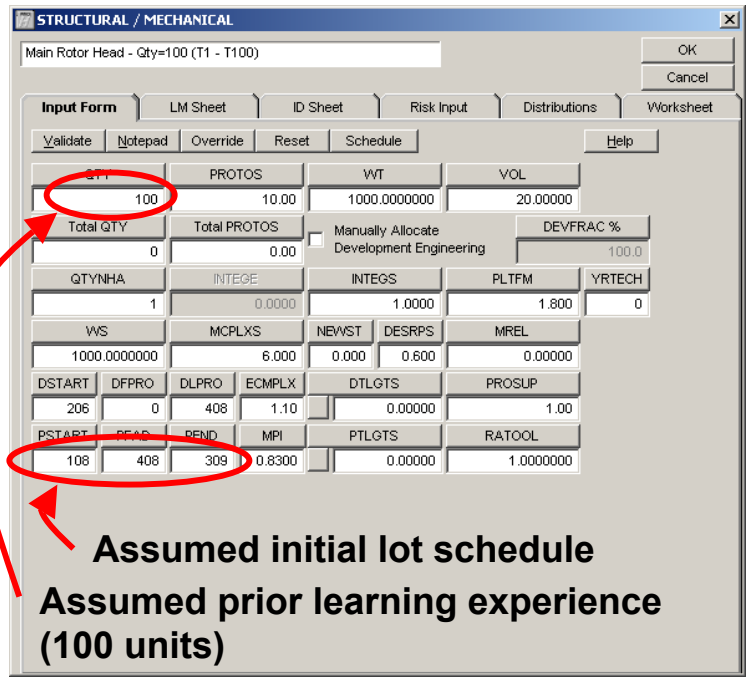
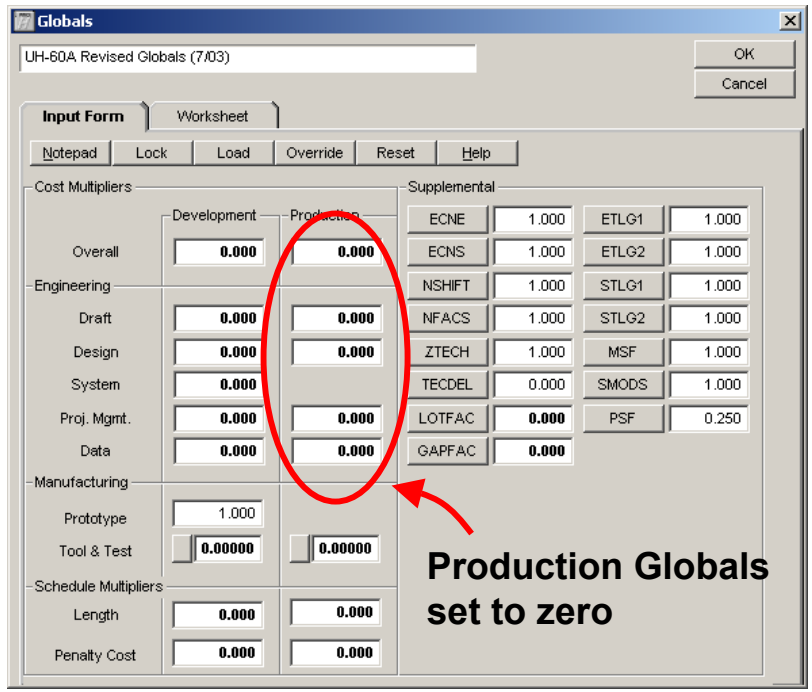
Multiple Lot EBS Elements Require Complex Actions To Capture Production Costs

- **Multiple Lot approach (initial production):**
  - Requires a “work around” by setting initial lot “local globals” to zero in order to null costs that are not part of new program
  - Creates extra records to be removed from output files
  - Requires determination of “lead-in” schedule for follow on lot production



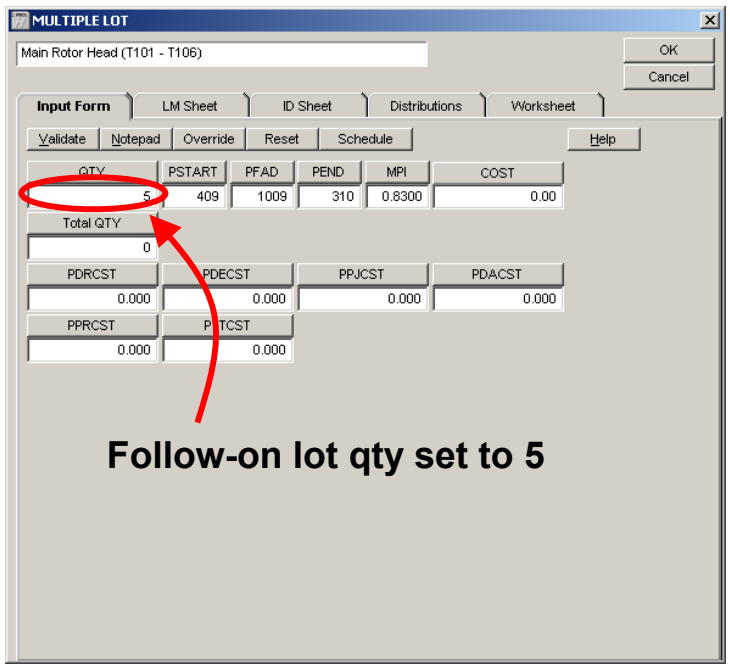
Initial Lot PRICE H Input



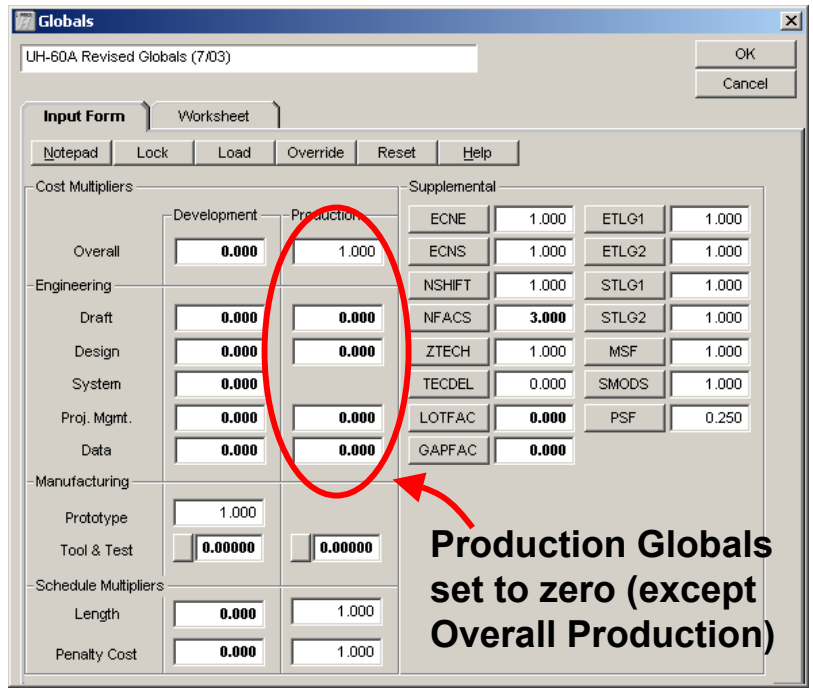
Initial Lot Global

Multiple Lot EBS Elements Require Complex Actions To Capture Production Costs (contd.)

- **Multiple Lot approach (follow-on lot):**
  - Cannot translate to PRICE HL input using “Fill from H” function thus requiring manual input for Life Cycle Cost analysis
  - Requires second Local Global to reset production cost from initial lot
  - Complicates use of “spread” function to view costs over time



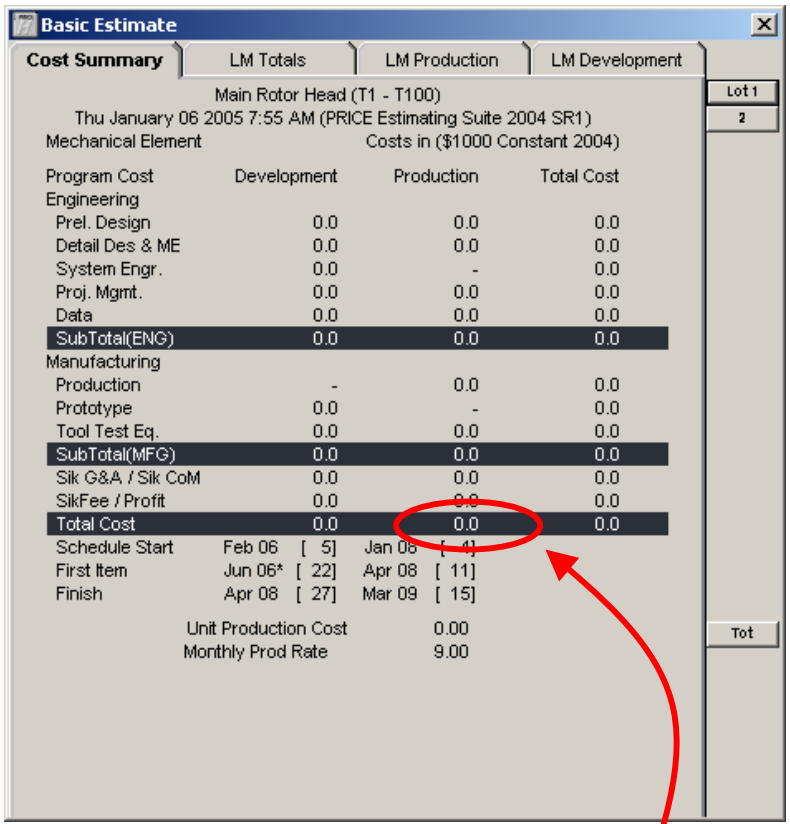
Multiple Lot PRICE H Input



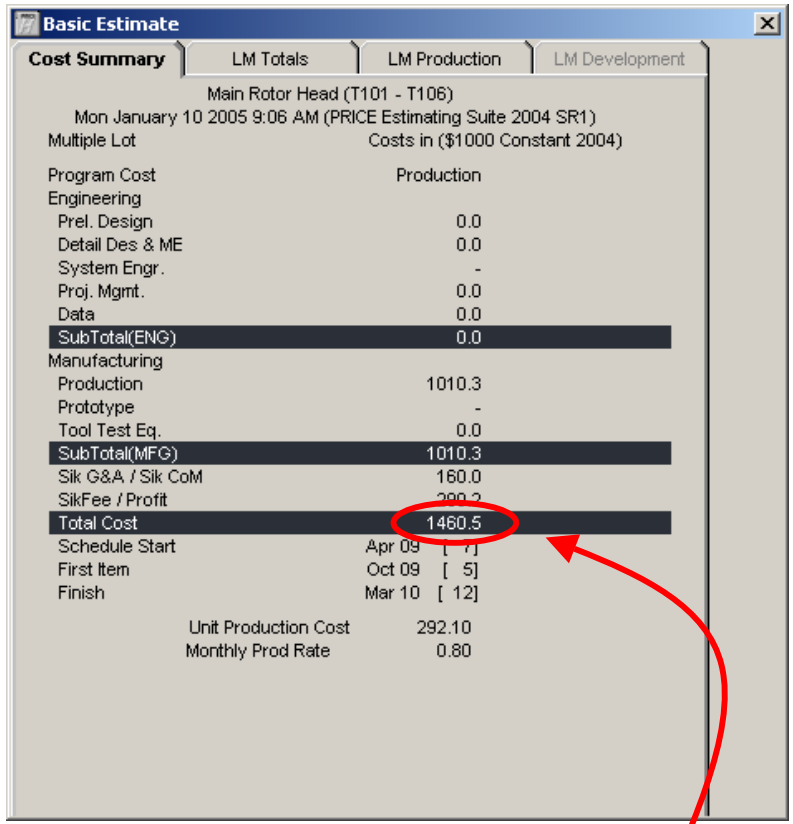
Multiple Lot Local Global

Multiple Lot EBS Element Results in Two Output Records

- **Multiple Lot approach (initial and follow-on lot output):**



Initial Lot PRICE H Output



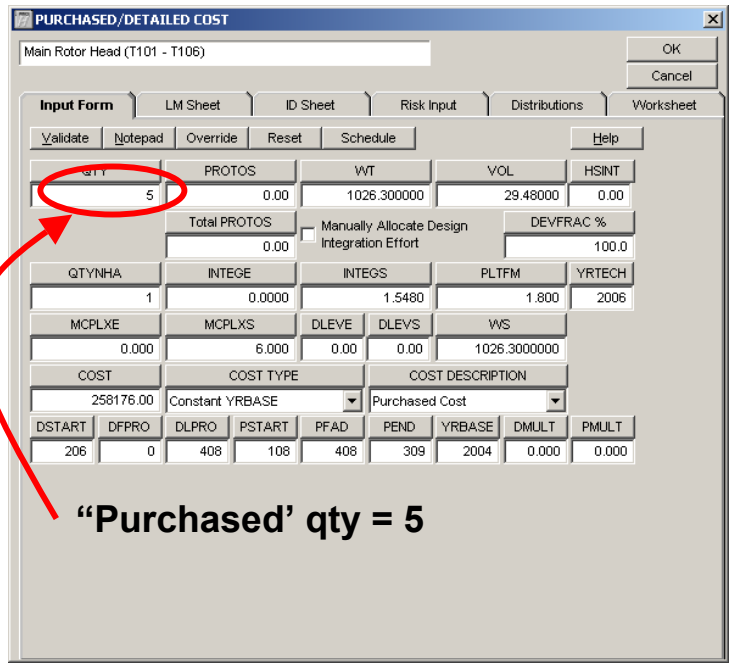
Multiple Lot PRICE H Output

Initial lot production costs set to zero using local globals

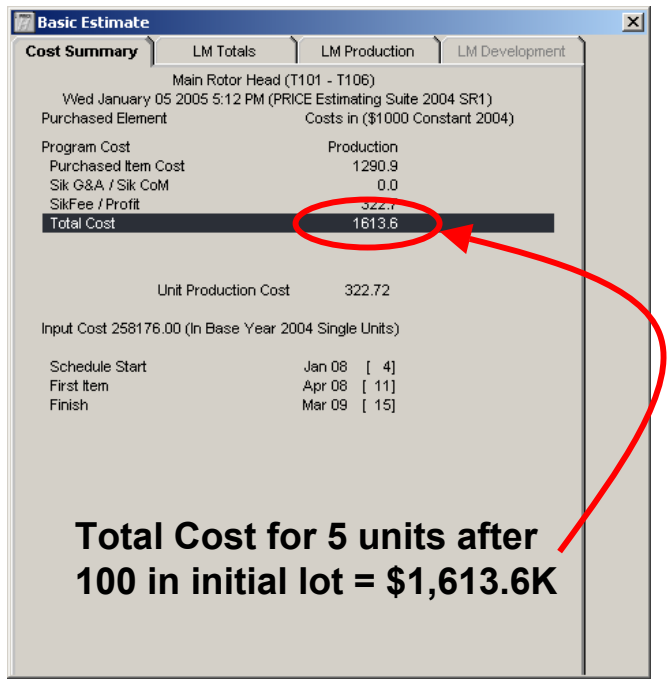
Total Production Cost for 5 units after 100 in initial lot = $1,460.5K

Purchased Elements Require Only One EBS, But Must Be Pre-determined For PRICE Model Entry

- **Purchased Element approach**
  - Requires pre-calculation of target lot cost using Multiple Lot, supplier input or internal bottoms up pricing then entered as a Purchased Unit (less profit)
  - Does not easily support correct allocation of G&A and profit as compared to PRICE
  - Supports “Fill from H to HL” function



Purchased Element Input

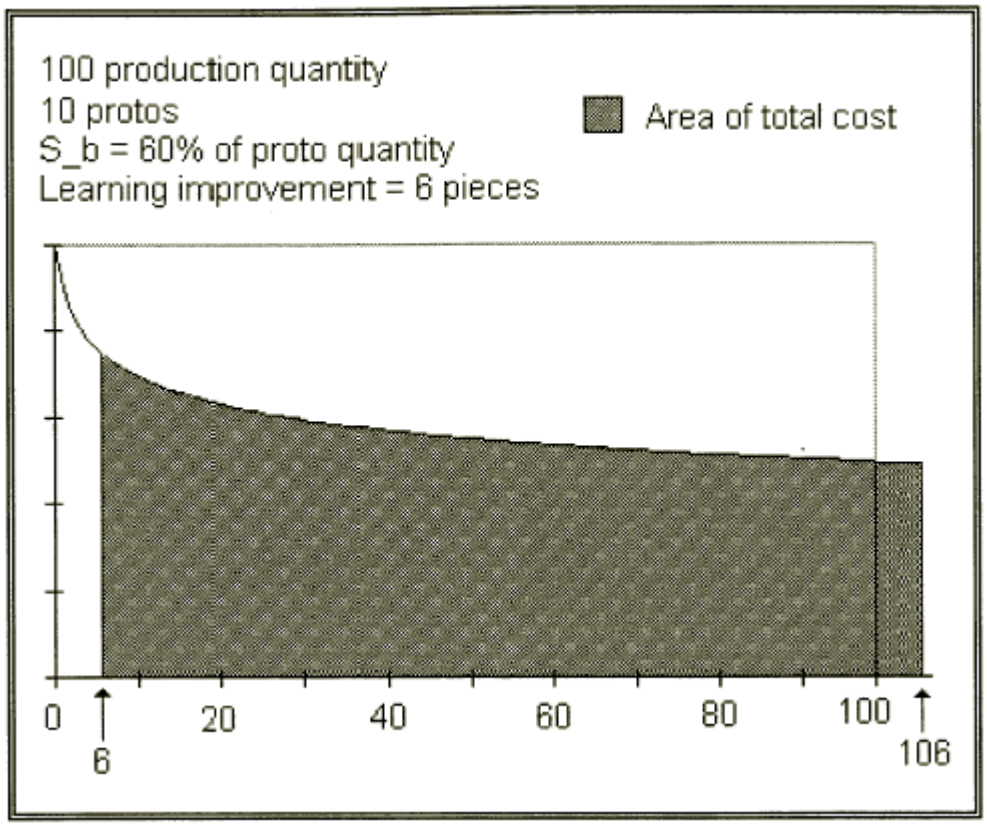


Purchased Element Output

Alternate Concept – The Stanford-B Methodology

I like the concept, but does it work?

What Is The Stanford-B Factor?



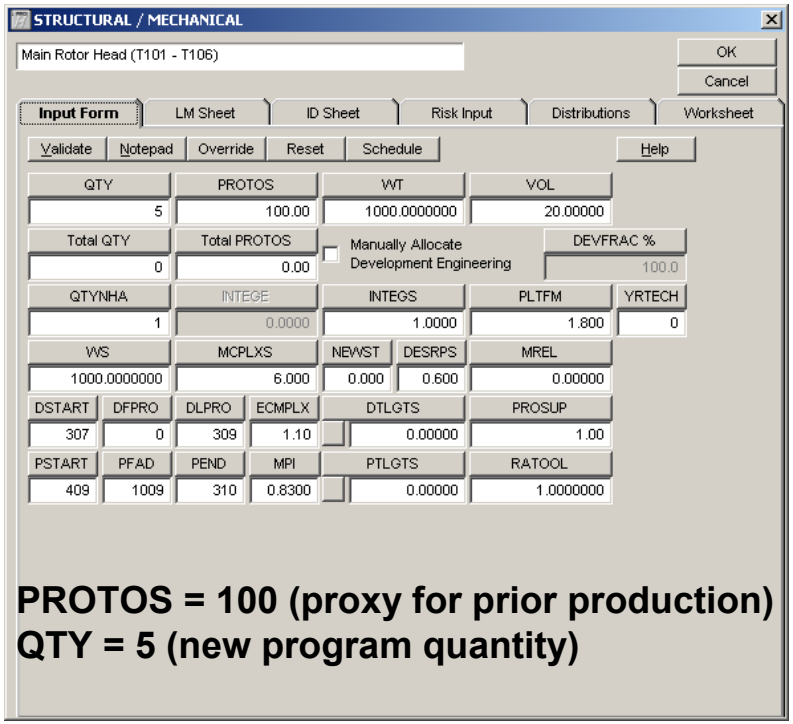
When Stanford-b is greater than zero in the first lot, the block quantities of each subsequent lot are shifted by the number of prototypes influencing the first lot. Using our example with Lot 1 consisting of 100 units with 10 prototypes and Stanford-b of 60%, the first production lot runs from unit 7 through unit 106.

Benefits – The "B" Factor Approach

- The "B" factor process can substitute for the Multiple Lot element that generates later lot costs
  - The "B" Factor may be any value from 0 (no learning transfer) to 100 (100% prototype learning transfer), but is preset to 0
- "B" Factor results production costs that are virtually the same as Multiple Lot for a defined production lot ("T" value)
- Only one EBS is needed for each common cost element, simplifying PRICE Output including extracts to Clipboard, Excel Solutions or spread
- PRICE HL "Fill from H" is enabled

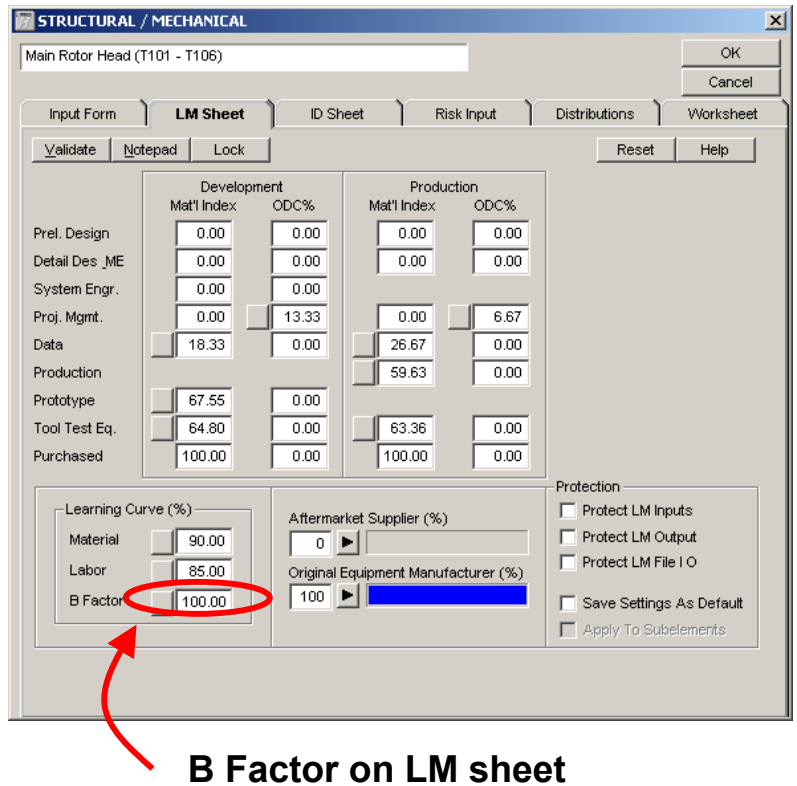
Input Form and LM Sheet using “B” Factor

- The PRICE “B Factor” was intended to transfer cost improvement experience from prototype to production manufacturing
- The B Factor can also be used to simulate prior production experience using a single “make” (structural/mechanical or electronic) EBS element



PROTOS = 100 (proxy for prior production)
QTY = 5 (new program quantity)

Structural/Mechanical Input Form



B Factor on LM sheet

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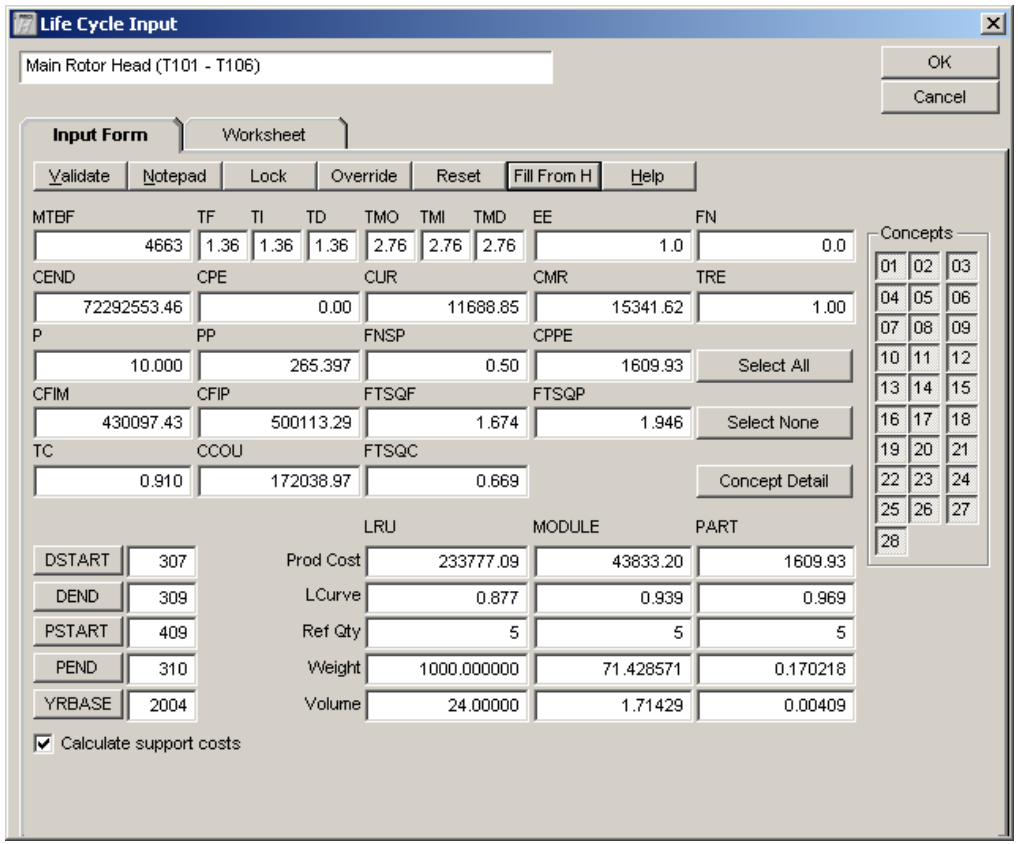
Output to HL Using “B” Factor Method

- “Fill From H” function is operational using B Factor approach



Results – The "B" Factor Approach

- **Results show very close correlation to Manufacturing/Production costs (within 1% of Multiple Lot)**
- **Note:**
  - **Cost for Sustaining Engineering and Tooling did not track closely with B Factor method**
  - **However most program and tooling costs for common components are borne by the "parent" program and can be "zeroed" out using the local globals (Draft, Design, Proj Mgmt, Data and Tooling)**

Production Only

Multiple Lot — **Input Parameters** — **Sustaining Engineering** — **Manufacturing**

Title	Mode	QTY	PROTOS	WT	WS	Drafting	Design	Prog Mgmt	Data	Engineering Total	Production	Tool Test	Manufacturing Total	Production Total
Main Rotor Head (T1 - T100)	STRUCTURAL	100	1	1000	1000	$0	$0	$0	$0	**$0**	$0	$0	**$0**	**$0**
Main Rotor Head (T101 - T106	MULTIPLE LO	5	0	0	0	$0	$0	$0	$0	**$0**	$1,187,004	$0	**$1,187,004**	**$1,187,004**

B- Factor

Title	Mode	QTY	PROTOS	WT	WS	Drafting	Design	Prog Mgmt	Data	Engineering Total	Production	Tool Test	Manufacturing Total	Production Total
Main Rotor Head (T101 - T106	STRUCTURAL	5	100	1000	1000	$0	$0	$0	$0	**$0**	$1,175,799	$0	**$1,175,799**	**$1,175,799**
					Delta Cost	$0	$0	$0	$0	**$0**	-$11,205	$0	**-$11,205**	**-$11,205**
					Percent Different						-1.0%		**-1.0%**	**-1.0%**

Production cost for B Factor within 1% of Multiple Lot

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Methodology

- **PROTO count is used as 'proxy' for prior production experience**
- **Development manufacturing costs for "in-production" components can be captured with Development Global adjustment**
  - **Enter the ratio of "actual" Prototypes needed for test to the number of Protos entered for "prior learning" (actual protos / entered protos)**
- **Preliminary Steps include:**
  1) **Identify EBS elements that require no new design and are in production at start of new program**
     - **Electronic or Struct/Mech Items only**
  2) **Determine units of production credit (prior learning) to be taken for identified EBS elements prior to start of new production**
  3) **Determine number of prototypes needed for the development program**
  4) **Determine if additional tooling is needed to support production**

Process Details

For each identified EBS element:

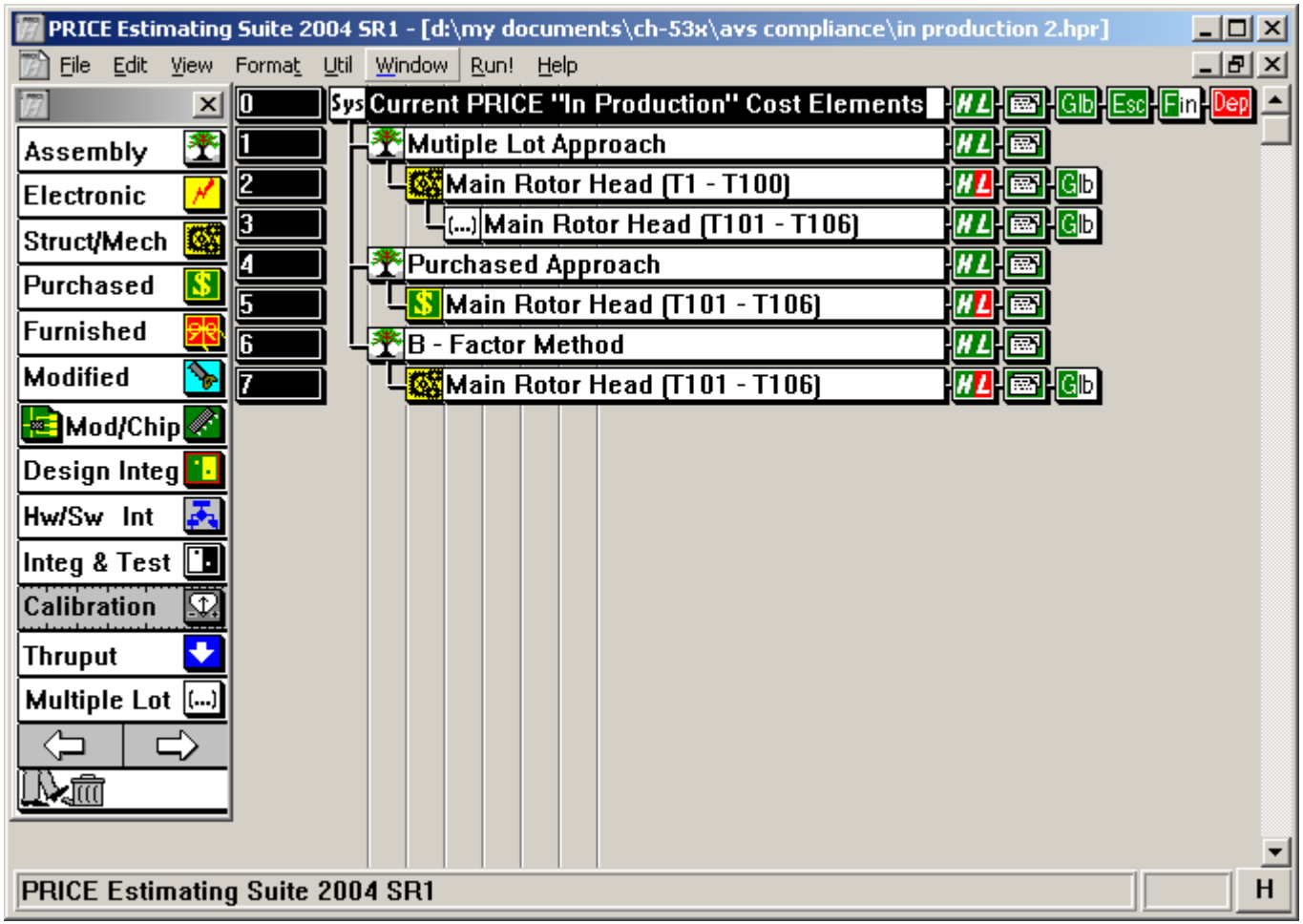
- Set the B Factor on the LM sheet to 100 indicating 100% unit learning transfer from prototype count
- Determine the number of prior learning units to be credited before production of new system begins from program schedules
- Determine the number of manufactured prototypes required for new system test
- Enter the number of production units for the new system in the QTY field
- Enter the number of prior learning units to be credited before production in the PROTOS field
- Calculate the ratio of the “number of prototypes required for new system test” to the “prototypes entered in the PROTOS field” (required PROTOS/entered PROTOS)
- Create a “local” Global and enter the calculated ratio (required PROTOS/entered PROTOS) in the “Overall Development” multiplier

Process Details (contd.)

For each identified EBS element:

- Set all Engineering and Manufacturing globals (except Prototype if development cost needed) to zero
- Leave Overall Development and Production Globals at 1.000 or calibrated value
- Set DTGLTS or PTGLTS to zero to remove tooling costs
- Adjust Overall Production cost globals if NSHIFT or NFACS > 1
    - If NSHIFT or NFACS = 2 enter 1.153
    - If NSHIFT or NFACS = 3 enter 1.249

PRICE Example



Questions/Contacts

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