Purchasing Material and EMS Services - NLPP Method Shows Savings Potentials in Seller Markets

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No matter how complex a purchase order: The universally applicable Non-Linear Performance Pricing (NLPP) methodology helps purchasing departments to evaluate the price/performance ratio of components or suppliers. It creates price benchmarks and identifies savings potential in seller markets. With the help of an NLPP software tool, the methodology can be quickly and easily integrated into the daily work routine.

Diverse product groupings with a high number of variants, complex EMS service contracts with or without material provision, short product life cycles, frequent delivery bottlenecks: purchaser?s in the electronics sector have to juggle with a large range of problems. Nevertheless, the procurement professional is expected to strategically make purchasing decisions and realize savings even in the most difficult market environment. At this point, a methodical approach that brings transparency into the data jungle is essential.

NLPP makes complexity manageable An effective means of evaluation is the Non-Linear Performance Pricing method (NLPP). In contrast to traditional cost analysis, it considers the appropriateness of prices and costs of a procured object in relation to its value and benefits. After all, cheapest supplier is not necessarily the best but the one with the best price/performance ratio. NLPP condenses characteristics of components and products as well as their procurement quantities and prices into a target price formula that precisely describes the relationship between price and performance/specification parameters. The target prices, which correspond to the value of the product, are then generated from this target price formula.

When the NLPP method is embedded in a software application (eg NLPP from Saphirion AG, Zug, Switzerland), not only can many thousands of individual parts be compared quickly and easily, but price analyzes of complex assemblies such as populated printed circuit boards can also be easily carried out. The NLPP software uses six multi-dimensional linear and non-linear regression methods to compare procurement objectives against their specifications and actual prices and automatically calculates the target price formula that outputs the most realistic, ie realizable, target prices in the market. In addition to market target price, the software also determines the worst-case target price as the upper price limit and the best-practice target price as the "ideal desired price". Based on these meaningful benchmarks, a target price corridor for purchasing negotiations emerges, which shows savings potential for individual products, product groups or larger EMS projects.

Practical example: What can printed circuit boards cost? The purchase price of printed circuit

boards is influenced by a large number of parameters, which are evaluated individually by each supplier. Due to the different production strategies, production machines and technologies, a comparison between the individual suppliers, even with a cost-break-down analysis, is virtually impossible. However, with the NLPP method, the buyer is able to quickly and easily compare prices or calculate benchmark prices appropriate to the job for each board.

Since NLPP considers the price/performance ratio, the parameters relevant for printed circuit boards are first noted down with their characteristics, eg.:

- number of copper layers [#]
- microvias [y / n]
- width [mm]
- length [mm]
- thickness [mm]
- panel width [mm]
- panel length [mm]
- surface [IS, IT, ENIG, LF HASL, OSP]
- Material
- Annual Quantity [m2]
- Utilization degree [%]

The type of parameters can be freely selected by the purchaser.

The NLPP method requires about 25 part numbers to calculate meaningful target price formulas. In this example, the calculation was based on 642 item numbers. Figure 1 shows the target price formula calculated with NLPP, taking into account all parameters defined by the purchaser, which show a demonstrable influence on the price.

```
targetprice = exp (
  5,248 +
  0,166 * 'surface/HASL' +
  0,151 * 'surface/IS' +
  0,623 * 'surface/IT' +
 -0,452 * 'surface/OSP' +
  0,882 * 'microvias [y/n]/y' +
  0,117 * 'number of copper layers [#]' +
  0,004 * 'utilization degree [%]' +
 -0,001 * 'panel width [mm]' +
  0,001 * 'panel length [mm]' +
 -0,001 * 'width [mm]' +
  0,055 * '1 / annual quantity [m2]'
)
```

Figure 1: Based on the data included in the analysis of the user defined characteristics, a target price formula is calculated using NLPP. When using the NLPP software, this is done at the push of a button with the aid of complex algorithms performed automatically.

The NLPP software also shows the buyer how strongly each of these parameters affects the price (Figure 2). In the present example, the annual quantity (2.751) and the number of copper layers (2.571) in particular influence the price, whereas the surface IS (0.151) has only a marginal effect on the price. These numbers can be related: The annual quantity to be procured has an approximately 18 times greater influence on the price than the surface IS (2,751 ~18 · 0,151).

ID	Type	1/PD	Use	Name	Category	Products	Coefficient	Insight into Price	Impact on Target
6	Q	●	●	annual quantity [m2]	-	642	0,055	40,914	2,751
19	PD		●	number of copper layers [#]	-	642	0,117	366,952	2,571
18	PD		●	utilization degree [%]	-	642	0,004	18,393	1,926
24	Cat.	×	●	microvias [y/n]	yes	50	0,882	100,113	0,882
14	PD		●	width [mm]	-	642	-0,001	21,332	0,802
41	Cat.	×	●	surface	IT	9	0,623	10,871	0,623
16	PD		●	panel length [mm]	-	642	0,001	0,281	0,532
41	Cat.	×	●	surface	OSP	37	-0,452	13,912	0,452
17	PD		●	panel width [mm]	-	642	-0,001	9,614	0,448
41	Cat.	×	●	surface	HASL	61	0,166	5,296	0,166
41	Cat.	×	●	surface	IS	224	0,151	9,150	0,151

Figure 2: With NLPP, the buyer can find out how much the numerical parameters (eg dimensions) and non-numerical parameters (eg the type of surface) are relevant in the analysis and their influence on the price.

After the pricing formula has been calculated, the target prices of each part is automatically calculated by the software by applying the formula to the supplied characteristics of them.

Subsequently, the actual prices can be compared with these target prices and the differences graphically displayed, so that outliers (ie prices with a clear deviation of the target price at the actual price) are immediately recognizable (Figure 3). If the result is colored according to various criteria (eg according to the parameter "Microvia y / n"), it is immediately apparent where corresponding parts are priced in relation to the benchmark or to parts without micro-vias.

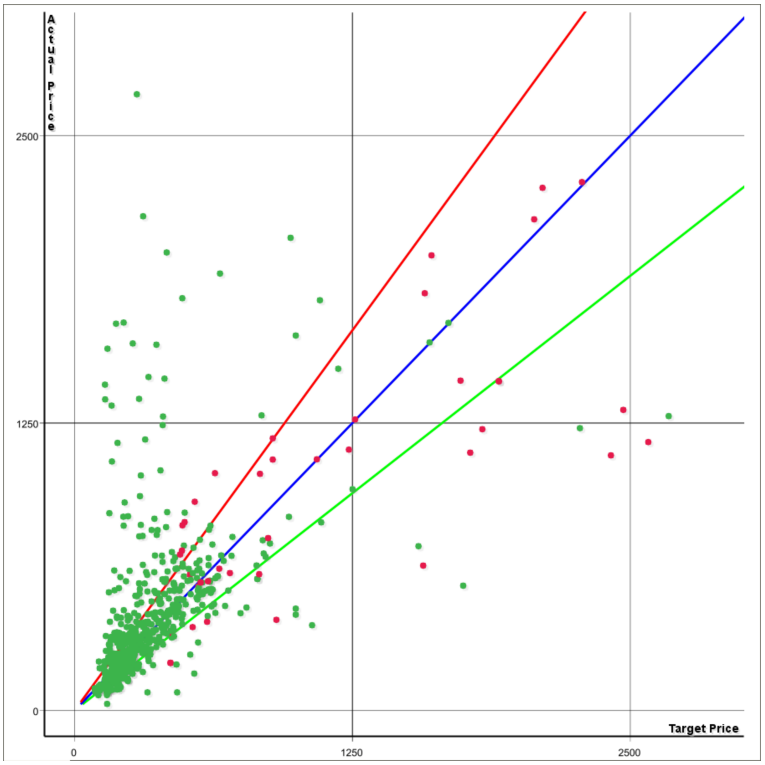

Figure 3: Representation of actual price (vertical axis) against calculated target price (horizontal axis). Each item number is symbolized by a dot. Green stands for printed circuit boards with the characteristic "Microvia no", red for "Microvia yes". With the calculated benchmark lines red (worst practice), blue (market benchmark) and green (best practice), the buyer can immediately assess how good a price is in relation to performance. If one point is above the benchmark, this is too expensive.

The similarity analysis In addition, thanks to its integrated HotSpot Advisor, the software NLPP allows the identification of identical or very similar parts with a large price difference (Fig. 4). They are highlighted based on the assumption: Objects with the same or very similar properties should cost approximately the same, ie have the same target price. Thus, NLPP helps the purchasing department in consolidating the diversity of part variants and recognizing alternative parts.

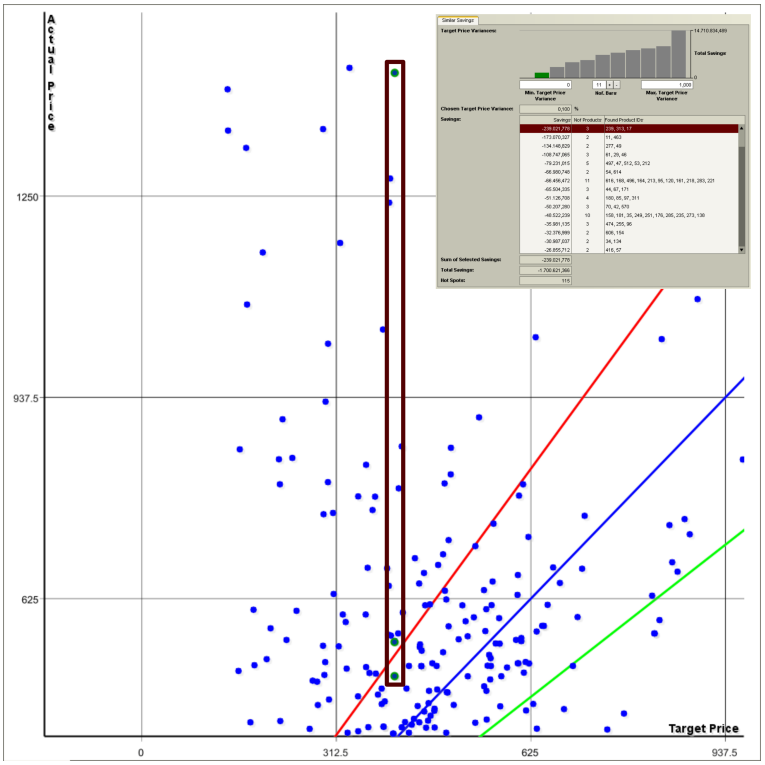

Figure 4: The NLPP software has discovered three products that differ only by 0.1% in the specification, but have a huge price difference. The large price range could be based on the fact that the expensive item numbers are obtained from a supplier who is not optimally positioned for this type of printed circuit board. The consequence would then be to check whether these too expensive PCBs can be obtained from the supplier with the low prices for very similar parts.

Prices for new parts Employing a request for quotation often proves to be a real time-waster with a large variety of parts. Again, the NLPP target price formula helps to get an indicative price, the purchaser simply inserts the parameters of the new part into the target price formulas and calculates the benchmark target prices - either by NLPP software or by integrating the target price formula into other IT systems.

Conclusion The big advantage of the NLPP method in the electronics sector is that the method can be applied very quickly to several thousand items, taking into account the many different influencing parameters of EMS part families. The quality and depth of the results are far superior to other evaluation methods. The findings are the basis for faster and more comprehensible decisions as well as better negotiation results.

For more information about NLPP or a NLPP test analysis of your data please visit our web site or get in contact with us at **info@saphirion.com**

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