

## INVESTIGATION INTO THE EFFECT OF STEAM STERILISATION ON THE PROPERTIES OF PEEK-OPTIMA®

### Introduction

An investigation was carried out into the effect of Steam Sterilisation on the properties of PEEK-OPTIMA®.

A number of injection moulded ISO test samples were taken from Batch Number VPB1127 (PEEK-OPTIMA® LT1) and subjected to three steam sterilisation cycles, each being 134°C for twenty minutes.

These samples were then subjected to a number of physical and chemical tests in accordance with standard Invibio™ test procedures to ascertain any changes in properties.

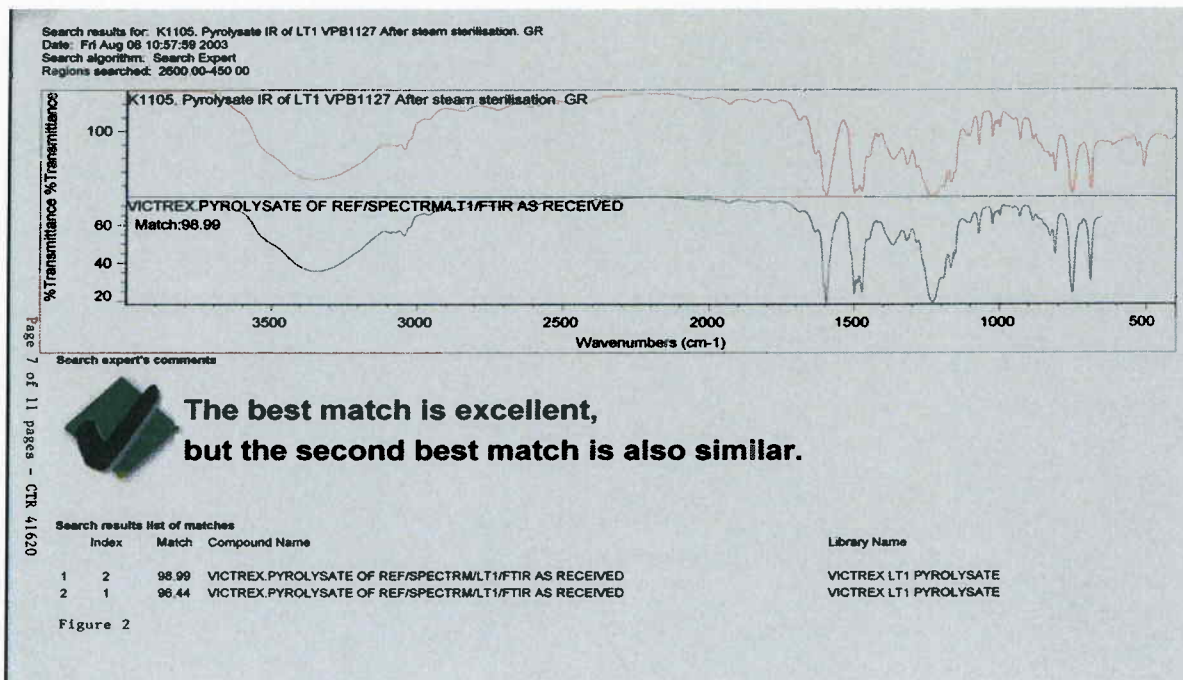
### Results

Test	Test Method	Specification S22	Results Before Sterilisation	Results After Sterilisation
Tensile Strength	ISO 527	90MPa Min	99.16 MPa	103.78 MPa
Tensile Elongation	ISO 527	15% Min	31.32%	28.58 %
Flexural Strength	ISI 178	110 Mpa Min	157.53 MPa	168.13 MPa
Flexural Modulus	ISO 178	3.0 Mpa Min	3.90GPa	4.14GPa
Impact Strength (Notched Izod)	ISO 180	5.0 kJ/m <sup>2</sup> Min	7.1 kJ/m <sup>2</sup>	6.7 kJ/m <sup>2</sup>
Density	ASTM D792	1.28-1.30 g/cc	1.29 g/cc	1.29 g/cc
DSC	(20°C/min)			
Tg(onset)		135-155 °C	148.22°C	144.89°C
Melt Temperature		330-350 °C	345.43°C	339.60°C
Re-crystallisation Temperature		270-310 °C	287.36°C	288.08°C

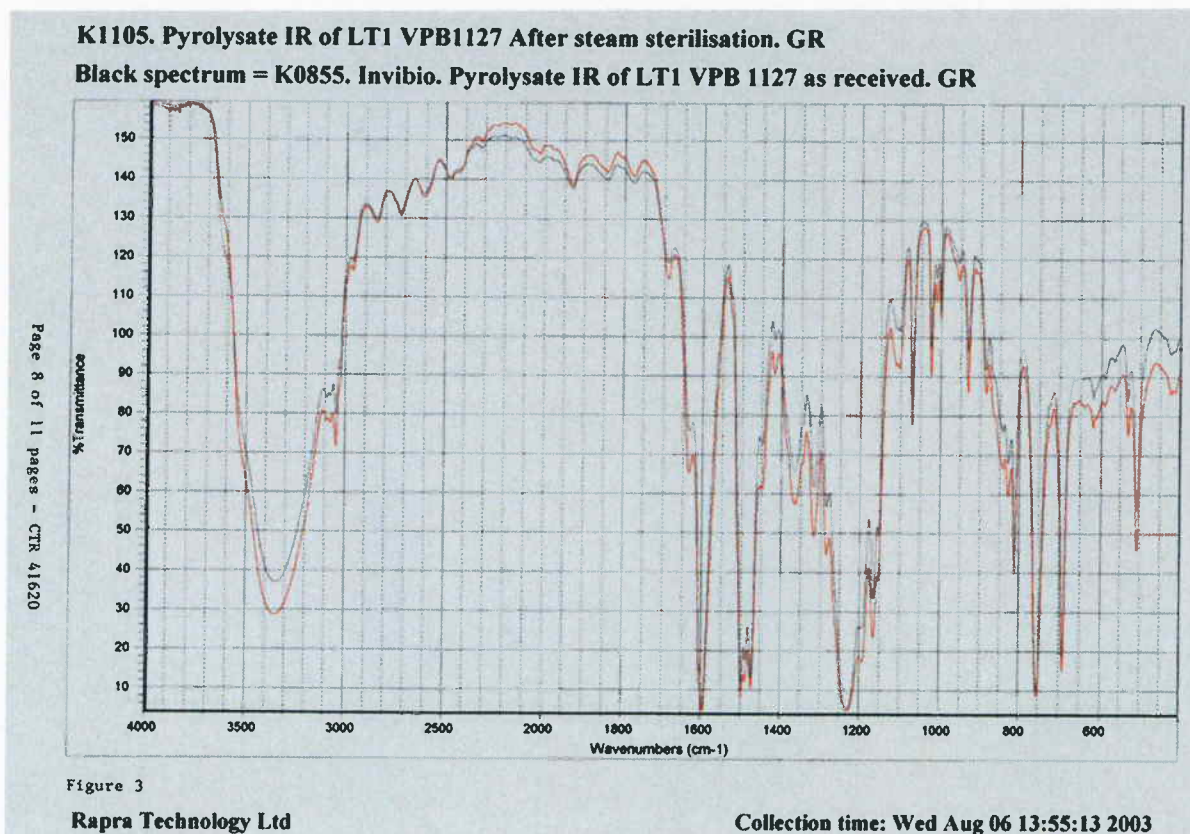
**Figure 1. Mechanical Properties and DSC Results Table**

Sample	Mw	Mn	Polydispersity
VPB 0001 (Reference)	103,000	36,600	2.8
	104,000	36,100	2.9
VPB1127 (Before Steam Sterilisation)	104,000	35,700	2.9
	105,000	36,700	2.9
VPB1127 (After Steam Sterilisation)	102,000	35,000	2.9
	103,000	35,300	2.9

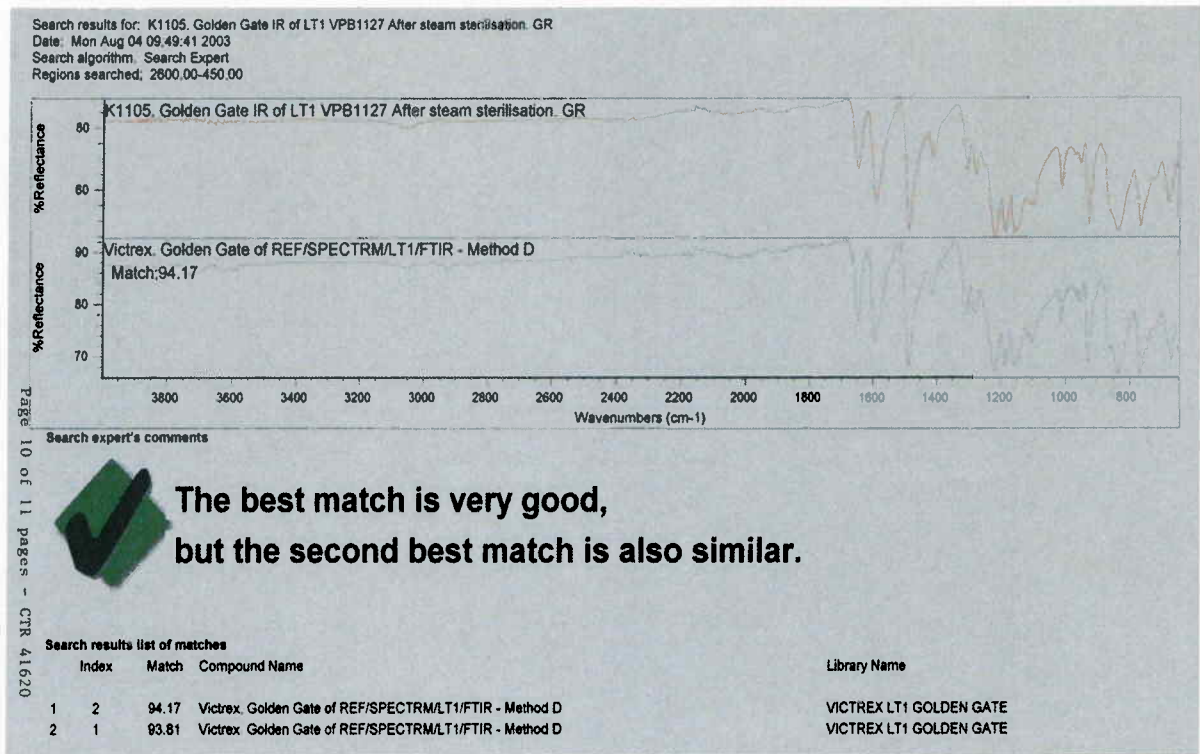
**Figure 2. GPC Test Results**



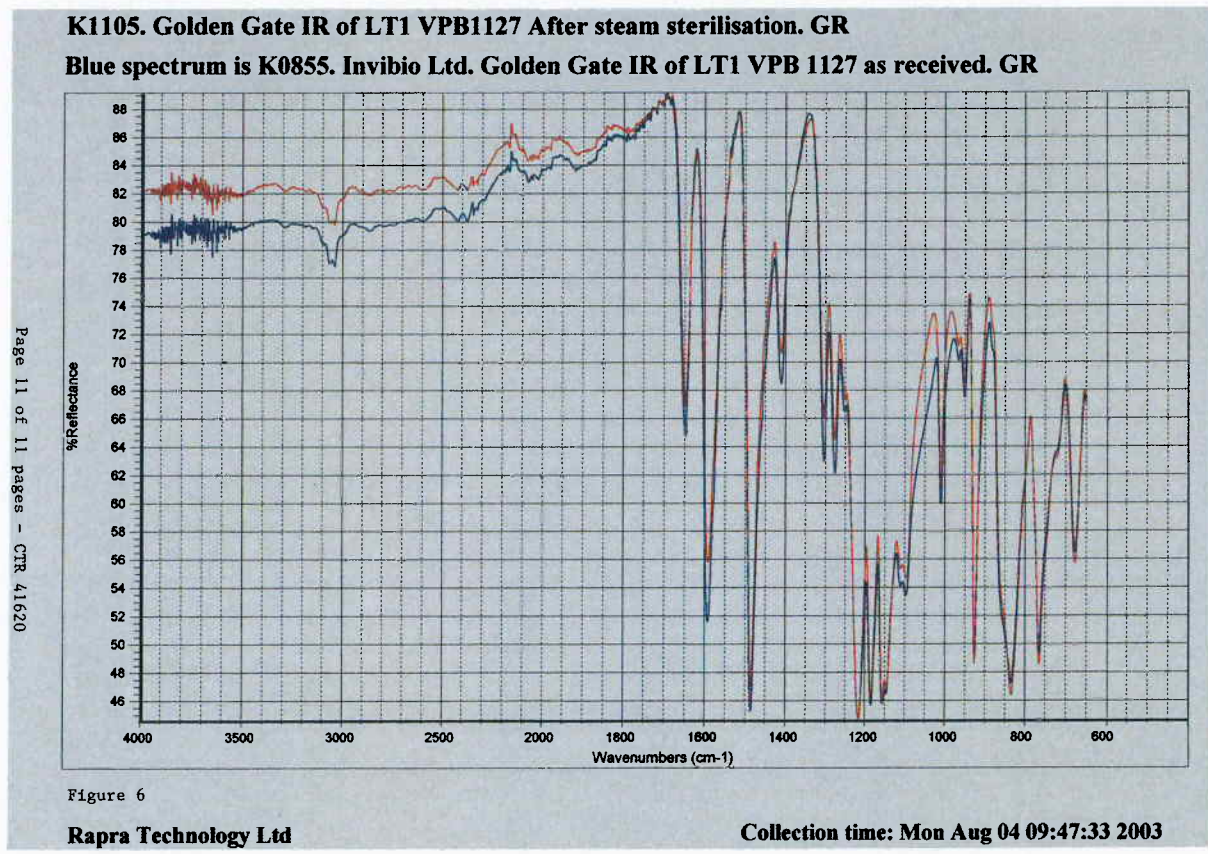
**Figure 3. Pyrolysate IR Traces**



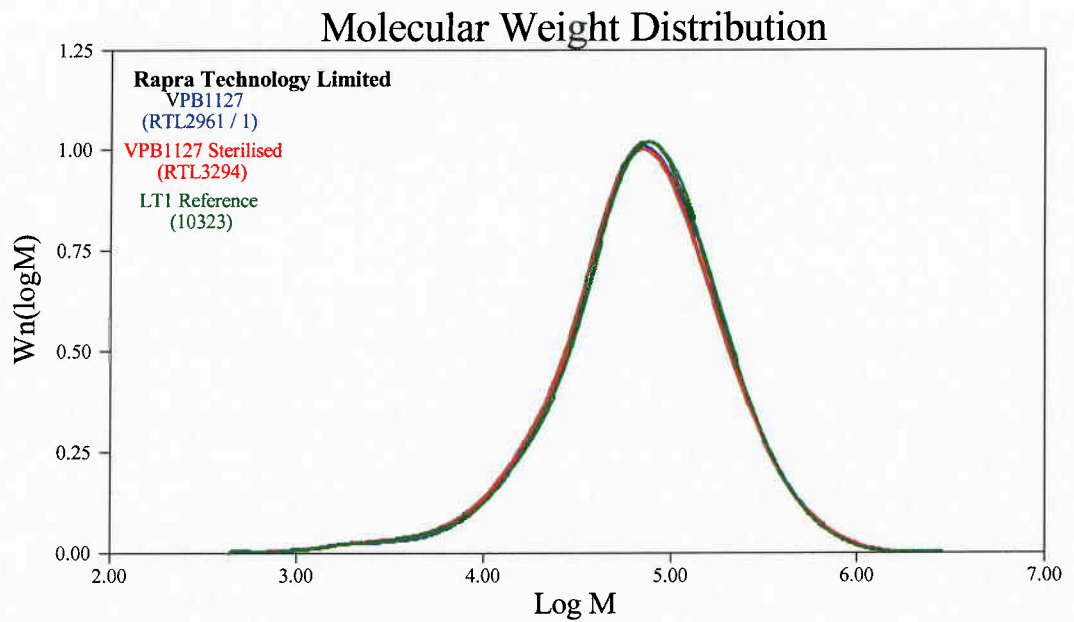
**Figure 4. Pyrolysate IR Traces**



**Figure 5. Golden Gate IR Traces**



**Figure 6. Golden Gate IR Trace**



**Figure 7. Molecular Weight Distribution Curves**

### **Conclusion**

As can be seen from the above results there is very little difference in mechanical properties and FTIR analysis between the standard and Steam sterilised PEEK-OPTIMA<sup>®</sup>.

**Appendix**

<b>Figure</b>	<b>Title</b>
Figure 1	Mechanical Properties and DSC Results Table
Figure 2	GPC Results
Figures 3 and 4	Pyrolystate IR Traces
Figures 5 and 6	Golden Gate IR Traces
Figure 7	Molecular Weight Distribution Curves