

## CASE STUDY MEDICAL APPLICATION



### INTRODUCTION

In Early 2005, the Technical University in Freiburg, Germany, IMTEK, decided to evaluate the use of the Micro EDM Milling method to manufacture insert cavities for prototyping micro-fluidic chips. The aim of this evaluation was to assess the quality and economic feasibility that can be achieved through micro-erosion technology.

### REQUIREMENTS

Microfluidic chips are used for blood treatment and analysis purposes. They integrate very small micro-channels with an average height of 100  $\mu\text{m}$  and width of 10  $\mu\text{m}$ .

Four main requirements regarding for the mould inserts were formulated.

- Material: hardened steel
- Average geometry accuracy within 1  $\mu\text{m}$
- Surface roughness < 80 nanometers
- Burrs free machining

### APPROACH / SOLUTION

One of the most critical issues was the particularly high surface finish quality required on all sides of the channels. Another key issue was maintaining geometry consistency of the channels within 1  $\mu\text{m}$ . SARIX accepted the challenge to carry this machining to demonstrate and confirm its Micro EDM Milling capabilities.

SARIX applied various technologies for identifying the best suitable machining conditions to meet IMTEK requirements.

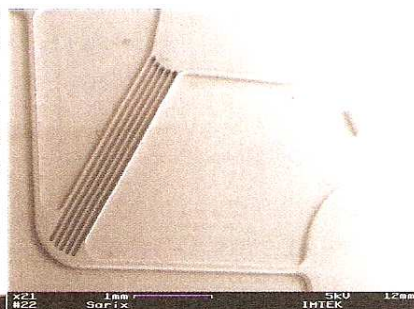
### EDM-AN ATTRACTIVE WAY

IMTEK conducted a thorough evaluation of the various alternative methods such as mechanical milling, laser structuring, electrochemical milling and UV-LIGA, in order to determine feasibility and costs. The Sarix  $\mu\text{EDM}$  milling results demonstrated to IMTEK that Micro erosion milling was an attractive way to manufacture the insert cavities. IMTEK's work showed that SARIX  $\mu\text{EDM}$  provided the means of manufacturing high precision micro-shapes while overcoming the problems of burrs and material modifications and, at the same time, achieving superior surface finishes without any additional machining operations.

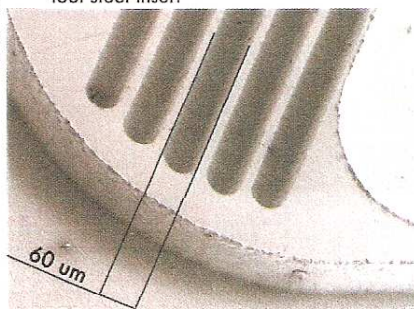
### CONCLUSION

$\mu\text{EDM}$  milling has evolved into a micro machining solution that overcomes many problems associated with conventional and other alternative technologies.

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Disposable chip made by injection moulding with an Micro EDM-milled tool steel insert



## INDUSTRY-RELATED RESEARCH



SARIX is continuously involved in current industry-related research and projects with Universities and Laboratories specialising in machine tools and Production Engineering in the field of micromachining.

SARIX is an active affiliate member of the "4M Network of Excellence in Multi-Material Micro Manufacture". SARIX's machines with full 3D Micro EDM Milling options have been installed WORLDWIDE in many research institutes.

In 2005, no less than 5 technical Universities have purchased SARIX equipment taking the benefit of an evolutive solution:

DTU-Uni (Denmark), KU-Leuven (Belgium), Atilim University (Turkey), University of Strathclyde (Scotland) and Memorial University of Newfoundland (Canada).

All these projects combining with our consolidate experience and know-how constitute an excellent tool to develop the newest technologies and realise technological optimisation for converting into the industrial production.

### ABOUT SARIX SA

SARIX designs, manufactures and markets highly efficient Micro-EDM equipment typically used in many industries such as: die-making, micro-electronics, medical, watchmaking, automotive, and aerospace as well as research centres and universities. The SARIX SX-100 and SX-200 product line is designed for use in various Micro EDM Machining modes offering users the highest level of flexibility including Micro Drilling, Micro Milling and Micro Sinking.

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