

**CASE STUDY
MEDICAL APPLICATION**



INTRODUCTION

Aurora Micro Machine, Inc. has been in the Micro EDMing business exclusively using SARIX Micro EDM Machines for over 7 years. Our customers are the Aerospace, Computer, Textile, Automotive, and Medical industries. When a medical company asked if this difficult Micro-mold cavity could be produced by the Micro-EDM process we knew the SARIX 3D Micro EDM Milling machine was the answer.

CAVITY REQUIREMENTS

The challenge was to 3D Micro EDM Mill the continuous radius profile, blending it with the half sphere, and the angled, flat plane on the top of the half-sphere. Also the part required five slots with perfect, sharp corners.

- Cavity diameter - 5.2 mm depth of 1.7 mm
- Half-sphere - 1.5 mm radius
- Slot widths - 0.18 mm depth 0.4 mm

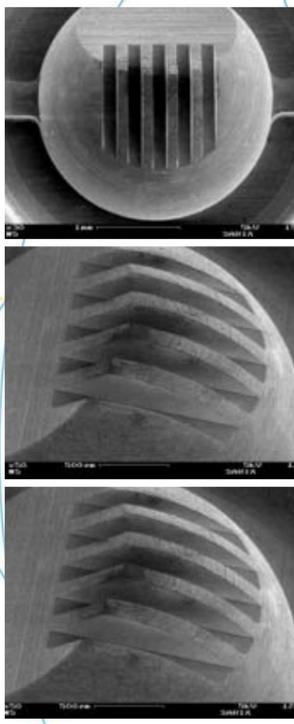
Could the Sarix machine 3D Mill all these features in one set-up without any additional polishing or secondary machining steps? The answer is YES!

ONE TURN-KEY SOLUTION

The key factor in the success of this part is the flexibility of the SARIX 3D Micro EDM Milling machine. This feature gives the machine the ability to erode the entire 3D cavity in a single set-up! Achieving the required accuracy and surface finish in an unattended operation. Using the "built-in" device as the WDress attachment and the SX-uEDM Milling CAM software, all of the electrodes needed for this job are produced on the SX-200 machine in the same set-up that the part is machined.

Electrodes diameters generated: roughing 0.87 mm, semi and finishing 0.35 mm, and slot finishing 0.16 mm.

As we all know, for every additional pick-up, and electrode change you run the risk of adding to the tolerance accumulation and possible miss-match of a continuous cavity profile. And in world of Micro EDM Machining we sometimes just don't have a tolerance to work with. The last release SARIX - Rest-Material function of the SX-uEDM Milling CAM helps us on this matter and show up the real fact on the part.



Micro-Molding for medical device.

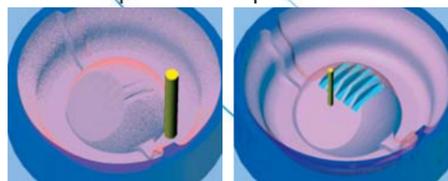
FLEXIBLE APPROACH

The reason for only having to have one set-up per cavity or on various cavities is the SARIX Machine's capability to utilize any of its several attachments to produce the required micro hole or cavity. From the initial reference point set-up you are able to switch between using the spindle of your choice to dressing the electrode on the WDress Unit to measuring the size of the dressed electrode. You even have the choice of using an A-B Indexing Unit for complex parts. All capable of being incorporated into one single machining! By being able to dress virtually any shape on an electrode the need for outside sourcing shaped electrodes is a thing of the past.

THE ONE SET-UP PROCESS IS HERE!

After seeing the result of a such cavity produced within the 3D Micro EDM Milling on the SARIX Machine it's clear that the one set-up Micro EDM process is HERE!

Aurora Micro Machines Inc.
Wade Parker and Steve Heisel
230 Capital Drive, Suite 200
Buffalo MN 55313 - USA
Tel: +1-763-682-6474
www.auroramachine.com
info@auroramachine.com



**SARIX -
AN EXPERIENCED PARTNER**

Specific requirements need specific solutions - a typical SARIX Excellence. Our service complements our modular build up machine. Our service covers consulting, carrying-out feasibility trials and definition of the right machine configuration. Practical trials are conducted to demonstrate the process feasibility and optimise the erosion parameters. Beside technical feasibility, practical test trials permit to verify cost effectiveness in many applications ensuring total transparency. The machine configuration is then established by the outcome of these practical experiments. The SARIX' approach is to provide machine users with reliable and proven solutions to meet their specific requirements. You're welcome to contact us.

ABOUT SARIX SA

SARIX designs, manufactures and markets highly efficient Micro-EDM Equipment typically used in many industries such as: die-making, microelectronics, 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.



For additional product information contact SARIX + 41 91 785 81 71 or visit us @ www.sarix.com

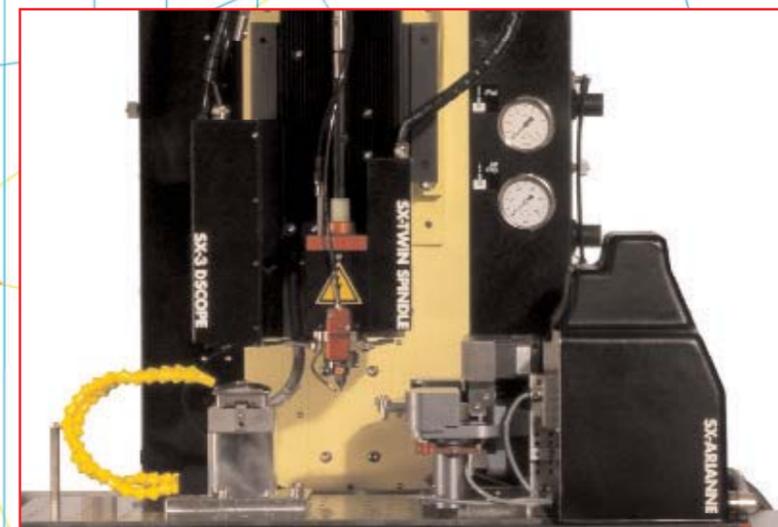
SX-NL - 02-11

Dear Readers,

In 2007, we look forward to enhancing and expanding our product line and services, providing continued innovation in the field of Micro EDM machining. Flexibility through modularity is the key to the exceptional capabilities designed into the SARIX product lines. The current issue introduces the versatility principle and how it can be used to expand machine capabilities and increase productivity.

THE BASIC PRINCIPLE IS VERSATILITY

As Micro-machining is used across a wide range of industries there are many different requirements beside precision. Machine users needs to drive down the cost per part and simultaneously open the doors to new applications in response of their own customer demand. SARIX machines are designed to meet these challenges. SARIX has developed over the years a modular machine concept that assure seamless integration of newly developed features into existing machines providing customers with greater flexibility. As a new machining operation is added or operating requirements change, the SARIX concept allows for easy upgrading. This concept design let the user to start with just the machining capabilities he needs and add additional capabilities as demand increases.



Tooling & Prototyping

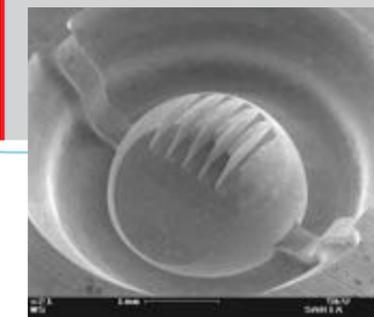
The SARIX μ EDM combines Micro Drilling, Micro Sinking and 3D Micro Milling capabilities utilizing one stand alone machine. The SARIX modularity principle is based on the idea that machine can be customised by referring to your specific application at any time. The Multi-Axis μ EDM CNC, the SX-ARIANNE unit, and a range of high precision Rotation Spindles provide toolmakers with greater flexibility offering the ability to move applications as needed. The SARIX machine can be configured initially for simple high precision hole drilling operations and at later stage be upgraded to the 3D Micro Milling machining operations.

Medium & High volume production

Configuration of the machine provides a higher flexibility and represents an effective method for cost effective production. For high volume production such as fuel injection nozzles micro drilling or multi-hole turbine blade drilling SARIX offers automated industrial turn-key μ EDM equipment. Each system can be configured to guarantee a high throughput in the manufacturing process which ensures a low cost per part. The end result is a flexible equipment, integrating features that meet your specific requirements with maximum efficiency.

**SUMMARY
OF CURRENT ISSUE**

- SARIX Versatility Principle**
- "Built-in" Wire Dress unit for more flexibility**
- Overview of rotation spindles**
- Case study Aurora Micro Machine Inc. (USA)**



SARIX μ EDM offers a wide range of machining solutions for any of these applications:

- Start hole for fine stamping tooling. Typical range Ø 0.10 - to 1.5 mm**
- High precision deep hole down to Ø 10 microns (0.01 mm)**
- High volume Micro-Drilling production**
- 2,5D & 3D Micro-Milling for fine plastic injection molding**
- Micro-Sinking capability for dies and toolmakers**

"BUILT-IN" WDRESS UNIT FOR MORE FLEXIBILITY

The SARIX unit also better known as, SX-ARIANNE, Wire Electrical Discharge Grinding device (WEDG), provides users with ability to customize electrodes during an erosion machining process. The mechanism of the Wire Dress consists of removing material from a tool electrode (workpiece) using electrical discharges between the tool electrode and a continuously running thin wire (electrode).

The higher performance of the SX-ARIANNE unit for smallest electrode sizes is guaranteed when it's coupled with the Micro Fine Pulse Shape generator SX-MFPS.

The unit is mostly used to meet specific requirements far beyond in diameter size or geometry, when standard rods electrodes are not immediately available in terms of intermediary size and especially below 50 microns. The "built-in" device enables to machine at much lower cost and with major accuracy than if done separately. It also allows the user with a flexible method of grinding any desirable diameters and a wide range of geometry shapes. In addition a measurement point guarantees the perfect size of the electrode during the whole process. The SX-ARIANNE is fully compatible with the existing SX-100 or the SX-200 machines. The electrode diameter measurement for the diameter size, profile and run out is achieved by a Laser-Micrometer, available as option.



The SX-ARIANNE as "built-in" unit is mounted on the machine table. The status monitoring of the unit appears immediately on the SX-MMI command panel. In the event of operating requirements change or another machining operation the unit can be easily removed or mounted minimizing down time.

HIGH PRECISION ROTATION SPINDLES

SARIX rotation spindles are manufactured using mass-production proven technology for high precision machining and highest reliability. They are an integral part of the SARIX μ EDM machine.

The rotating spindle offers the advantages of an uniform electrode wear, while providing an efficient flushing distribution. Both advantages contribute to achieve accurate machining and long terms process stability. SARIX offers a wide range of rotating spindles and collets, meeting all major machining requirements from single hole drilling up to high volume production drilling as well as micro-milling machining.

SX-RHP series is high precision rotation spindle, with manual electrode re-feeding, typically used for Tool and Dies makers.

The **SX-A344** series includes the SARIX automatic electrode re-feeding system especially efficient to compensate the electrode wear for High Speed Micro Drilling and Micro Milling minimizing machine downtime. It is especially suitable for medium/high volume production such as multi-hole drilling sequence and for performing the Micro Milling operations.

Rotation speed varies 0 -1000 rpm to meet high quality machining in different situations. The SARIX spindles are also available with C-axis, providing even more flexibility. The C-axis controls the angular position of the rotating spindle and increases the machining capability such as threading and spiral machining.

Users can also take advantage of the C-axis for shaping tool electrodes using the WDRESS unit. The chart below is a reference guide showing the SARIX rotation spindle series and their typical applications.

ROTATION HOLDER FLEXIBILITY

All SARIX rotating spindles are provided with 3R-Macro chuck and are designed to assure the highest level of positioning accuracy as well as trouble-free mounting and removal. As the operator move applications just few seconds are needed to remove and mount the appropriate rotation spindle. Simplicity of set-up and short setting times are the common traits found throughout all SARIX high precision spindles.



THREE MAIN APPLICATIONS

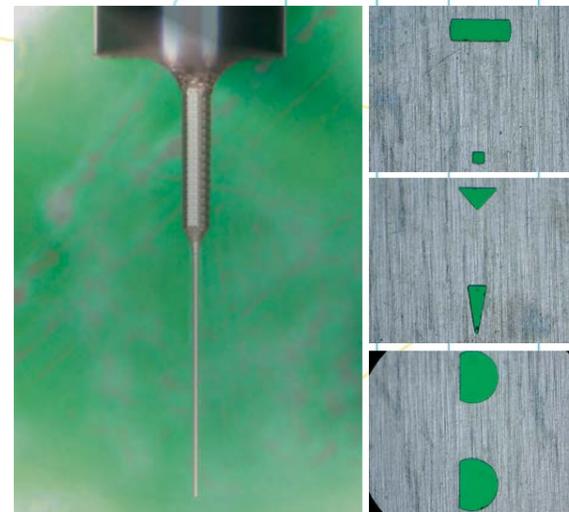
The SX-ARIANNE offers multiple capabilities and solutions for many types of machining applications:

DRILLING MICRO HOLES

It is an indispensable feature for drilling high precision micro holes below 100 microns diameters. The SX-ARIANNE unit allows to accurately grinding the tool electrode to any desirable sizes down up to 5 μ m diameter. This electrode is then used to drill holes of 10 microns diameters regardless of the material hardness.

MICRO SINKING WITH SHAPED ELECTRODES

Micro Sinking generated 2D micro-cavities using simply shaped electrodes. In this context, the ARIANNE unit is the ideal device for external electrodes shaping directly onto the machine utilizing standard rods electrodes. By using an indexable rotation spindle (C-axis) the unit can produce very accurate external shapes geometry such as square, triangle, half round or tapered electrodes for Micro-Sinking operations. It combines flexibility, simplicity and cost effectiveness during micro-sinking operation.



Micro-electrode of 5 micron created on the ARIANNE and with the SX-MFPS generator.

Typical forms using shaped electrodes produced on the SX-ARIANNE unit.

3D MICRO MILLING WITH MAJOR ACCURACY

Micro Milling is primary used for generating complex 3D Micro cavity. In this process, the ARIANNE is primary used for resizing an electrode allowing the user to machine a entire cavity from roughing to high finishing operations without changing manually the electrode. This guarantees an excellent geometry consistency and maximum accuracy of the machined forms. It also allows the user to operate the machine with major autonomy.

FEATURES & BENEFITS

Expand machine capabilities

Hole diameter down to \varnothing 10 microns

Cost efficient for shaping tool electrode

Major accuracy

Great flexibility

FEATURES & BENEFITS

Automatic electrode re-feeding

Adjustable rotation speed 0-1000 rpm

C-Indexing axis

Low and High pressure Flushing

Versatile design



SX-RHP spindle with manual electrode re-feeding



SX-A344 spindle with automatic electrode re-feeding

Model	Description	Applications	Electrode Re-feeding	C.Axis Option	Collets	Electrode range
SX-RHP-series	High Precision rotation spindle	Cost effective spindle, supporting a large range of electrode diameter. The spindle is particularly suitable for prototyping, tooling and single hole drilling.	Manually	Yes	SP02 SP03	\varnothing 0.1 – 5 mm
SX-A344-series	High Precision rotation spindle	Extremely versatile, the SX-344 series is used for Drilling and Milling operations. It is particularly efficient for medium and high volume production.	Automatic	Yes	SP06	\varnothing 0.05 – 1.6mm