

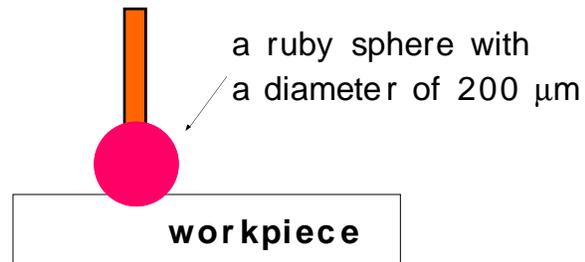
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## Surface Damage of a W-Band Muffin-Tin Structure Caused by a Coordinate Measuring Machine

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A 41-cell muffin-tin slab was machined by using a Sodick EXC100 EDM machine[1]. The machining accuracy was checked by a Leitz PMM 12-106 coordinate measuring machine[2] subsequently. Some surface damage was noticed after the part came back from the metrology department. Scan215.tif shows the surface of muffin-tin slab before the coordinate measurements. Scan216.tif depicts the damage on the surface of muffin-tin slab caused by the mechanical probe of the Leitz coordinate measuring machine(CMM), some semi-circular notches along the edge of cavity slots are shown. Scan218.tif is the blow-up view of the bottom slot shown in scan216.tif. Those notches spread over several slots along the vertical direction as shown in scan216.tif. Besides those semi-circular notches, there are some circular craters on the surface. Scan219.tif depicts those circular craters. The shiny spots on the thin irises in scan219.tif are created by the contact with the mechanical probe of CMM. Scan220.tif and scan221.tif give the close-up views of those bomb crater-like features caused by the mechanical probe of CMM. The size of those craters is about 100  $\mu\text{m}$ . The mechanical probe has a ruby sphere mounted on its tip as shown in the right figure.

It is clear that the evaluation of fabrication accuracy for W-Band structures can not be done by a touch-measuring technique. A non-contact measuring technique such as using an optical metrology equipment should be pursued.

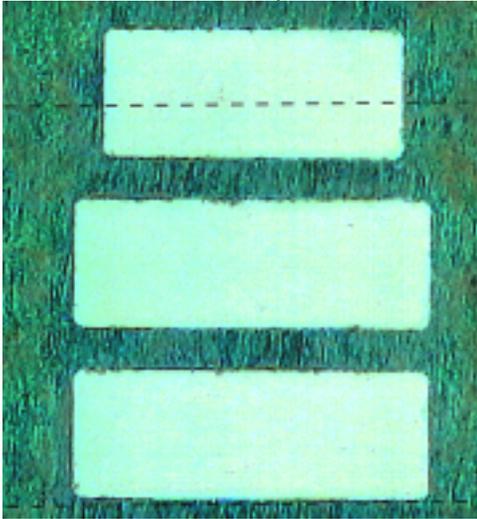


### References

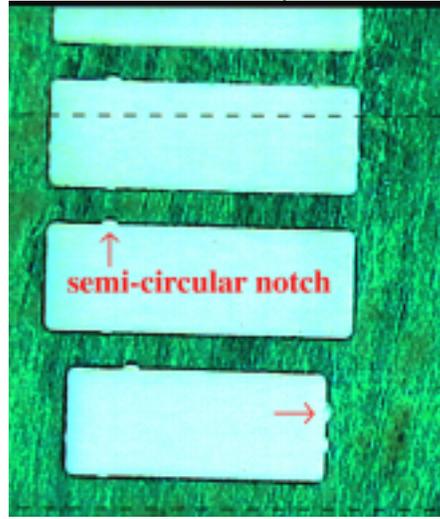
[1] Emerging Manufacturing Technology (Sodick EDM Representative) Palo Alto, California, Tel: (510) 487-5011.

[2] The lab is maintained at  $68 \pm 0.5$  ° F and a semi-clean room condition. The measurement accuracy of Leitz PMM 12-106 is  $\pm 0.5$   $\mu\text{m}$  under good lab conditions.

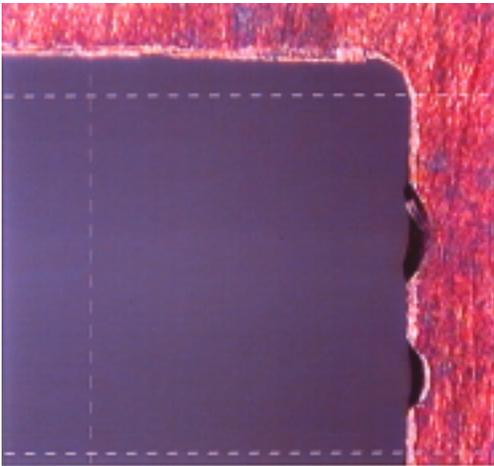
*scan215.tif*



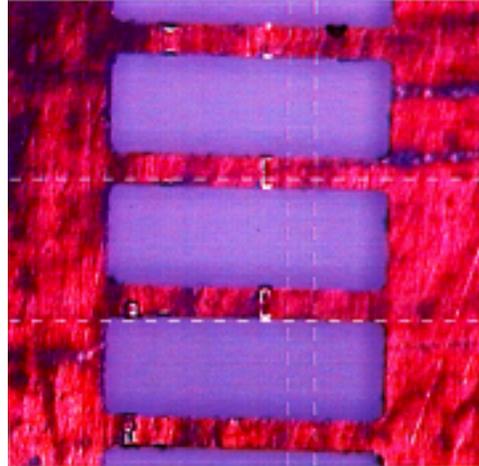
*scan216.tif*



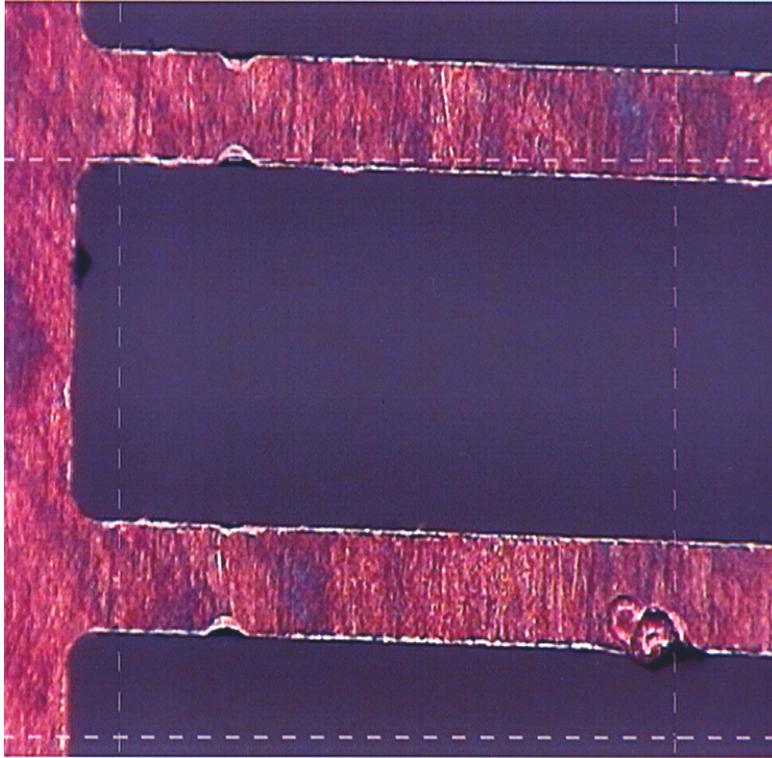
*scan218.tif*



*scan219.tif*



*scan220.tif*



*scan221.tif*

