REPORT: Wafer dicing by Laser-MicroJet®

for Anonymous

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TASK

The Laser-MicroJet® technology has been tested for dicing of specific wafer (Si: 230um + Black material: 100µm).
The goal of this study was to demonstrate the capabilities of an IR laser for dicing of "black material".

SAMPLE DESCRIPTION AND PREPARATION

SAMPLE	Material	Silicon and black material
	Dimension	Ø 300 *mm*
	Thickness	330 *µm*
	Quantity	2 *pcs*

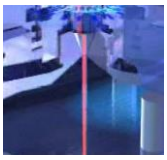
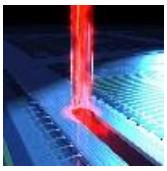
2 wafers were available for this new set of tests.

Release of application report			
Project Leader		Responsible Application Group	
Name:	Mr Stephane Delahaye	Name:	Dr Benjamin Carron
Date:	19.05.2013	Date:	19.05.2013
Visum:	SDE	Visum:	

PROCESS: INSTRUMENT & TEST PARAMETERS

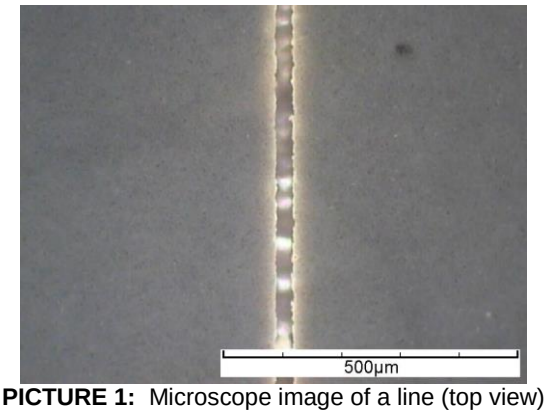
For these experiments, the LDS 200M equipped with an IR Laser has been used as the machine configuration in our lab.

In the table below, the optimized processing parameters used in the experiments are summarized:

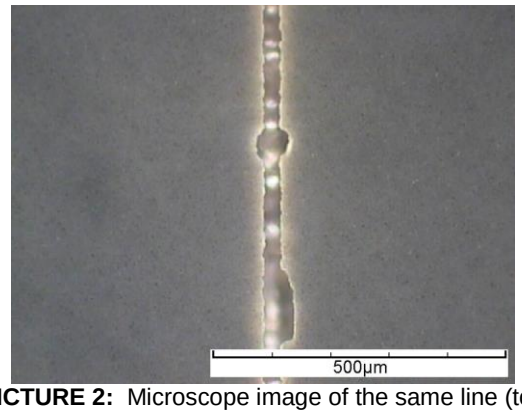
	**SYSTEM**	Machine type	LCS 300
	**MICROJET® PARAMETER**	Nozzle diameter	40 *µm*
		MicroJet® diameter	~32 *µm*
		Water pressure	150 *bar*
		Assist gas	He
	**LASER PARAMETER**	Laser type	L101IR
		Wavelength	1024 *nm*
		Pulse frequency	50 *kHz*
		Average power	~30 *W*
		Pulse width	~400 *ns*
	**CUTTING PARAMETER**	Cutting speed	100 *mm/s*
		Number of passes	6

RESULTS

The highest priority was to optimize the process to get the best cutting quality.
The following microscope pictures give an overview on the quality obtained with the Laser-Microjet® technology.

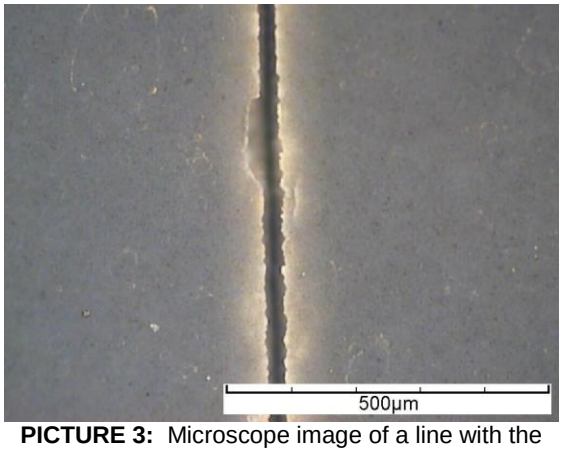


PICTURE 1: Microscope image of a line (top view)



PICTURE 2: Microscope image of the same line (top view). Some delamination is visible.

You can find below the result obtained with a 50µm nozzle and a short pulse green laser (G60)



PICTURE 3: Microscope image of a line with the highest magnification (bright field illumination; top view)

Note: Only grooving trials were tried with the IR laser as the main priority was to focus on cutting mold with high quality.

CONCLUSION

These tests show that:

- Laser wavelength does not have any real impact on mold cutting
- Low Pressure and low fluence are very important to limit the chipping and delamination of the mold compound.
- 100 mm/s seems to be the optimal cutting speed
- Mold bounding quality may be critical for delamination

Next step:
Additionnal tests are going to be performed with the first laser source (G30 laser) used for cutting silicon. This laser has a shorter pulse width (~15ns) and this may has an impact on the cutting quality.