

# SMD @ NTC

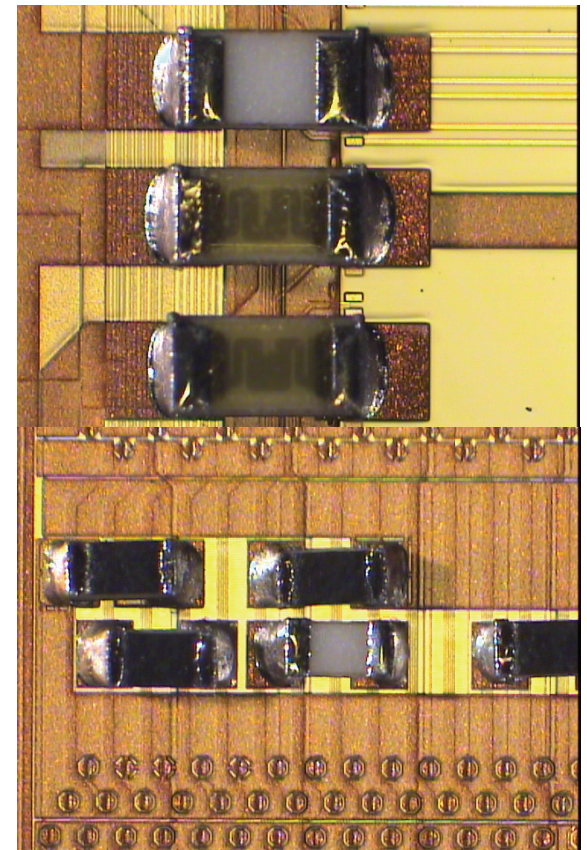
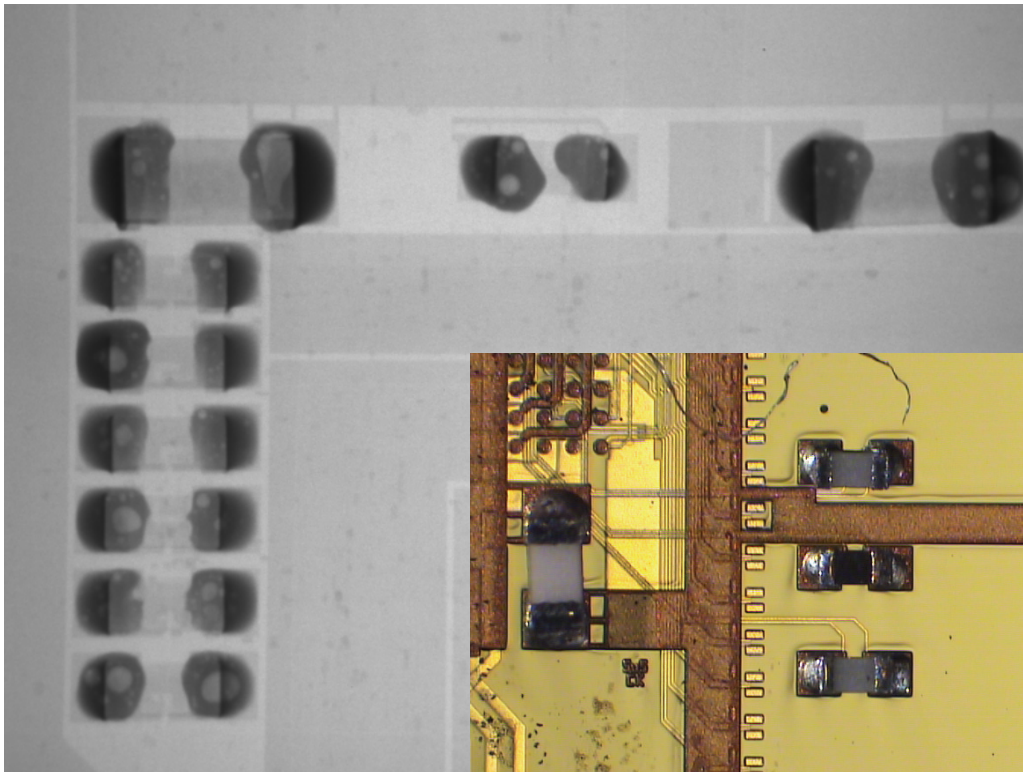
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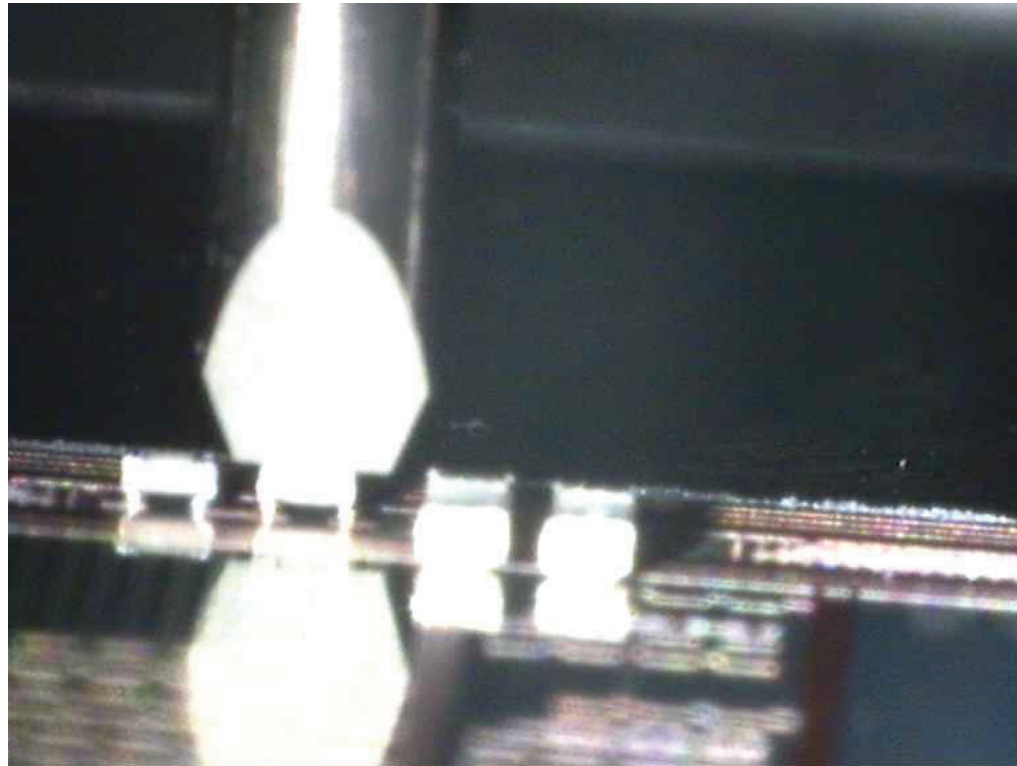
# The situation at Pisa... (October 2014)

- ✓ Two e-mcm populated with SMDs
- ✓ Using SAC (SnAgCu) 150  $\mu\text{m}$  solder balls
- ✓ Result not bad but still quite “artisanal”. Production needs something faster and less human-dependent...



# New developments

- ✓ Change to lead-tin solder with smaller melting temperature than bump bond at ASICs
- ✓ New tooling to place small components in between DCDs and DHPs
- ✓ All regions “accessible” to the FineTech pick & place machine.

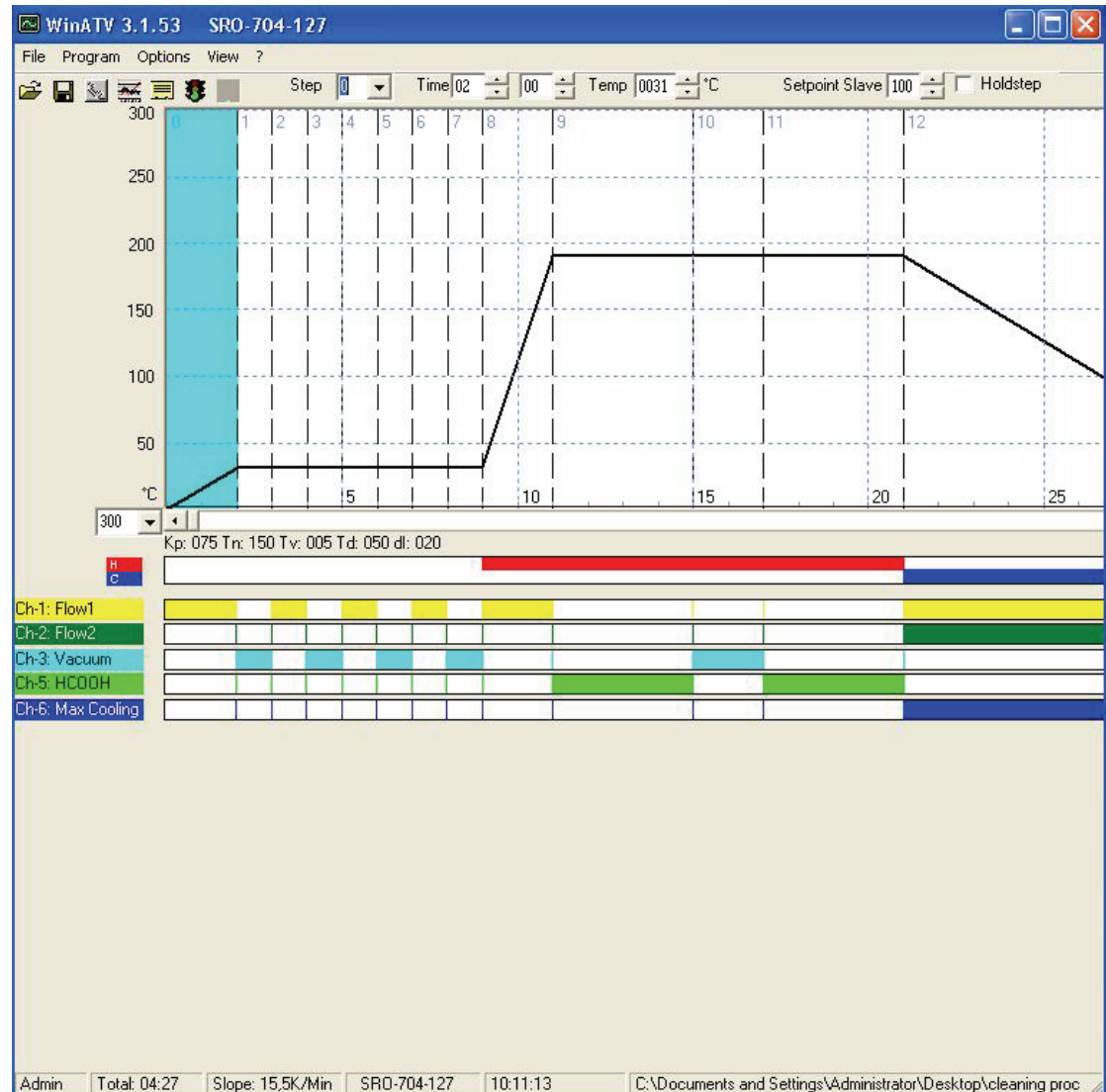


# Preparing for production

- ✓ Found difficulties placing the solder balls with the PachTech
- ✓ Most of the times the ball does not stay on the pad and
  - Hinders the procedure and makes us look towards production with worries...
  - The balls may end up anywhere in the module... which we do not want
- ✓ We first suspected the cleanliness of the pads
  - Tried with different e-mcm with different degrees of oxidation
  - Results were inconclusive and did not follow any pattern
- ✓ Decided to revisit the main parameters of the PacTech

# Preparation of the modules

- ✓ Modules are first cleaned in an oven with formic acid to reduce the oxide
- ✓ Dummy samples are also put together with the e-mcm to monitor the process



# Settings

## Laser Current 54 A Laser Pulse Width 20 ms

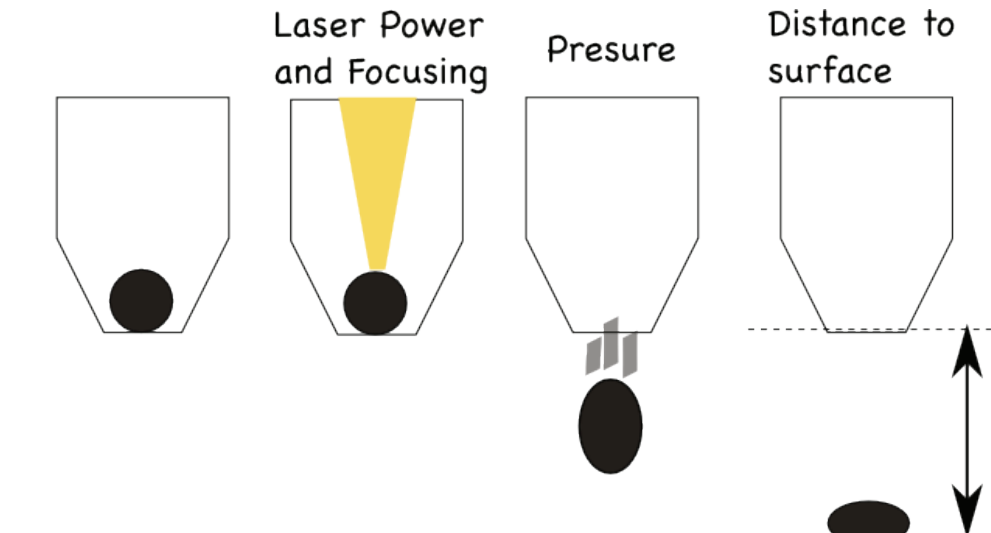
These values are at maximum. Lower values do not allow a decent ball placement. ...first indication that we do not have enough power to completely and perfectly melt the ball on the copper surface.

## Feed Station Pressure 20 mbar

This parameter gives the nitrogen pressure that allows the spitting of the melted solder. A too high value may cool down the balls and a too low value prevents the balls from coming out...

## Bond level Z axis & Substrate Height

Distance to surface. This is a critical parameter as well. If too long, balls do not stay on the pad. Another indication of lack of power to meld the solder balls.



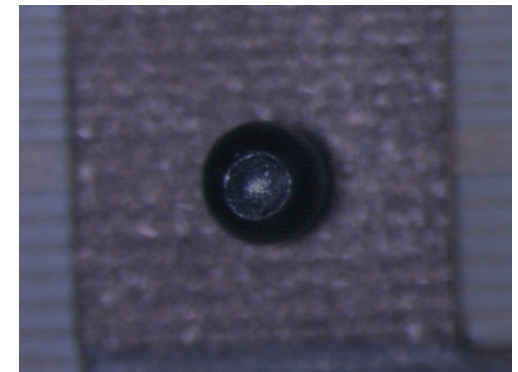
# Results

Wafer	No. of balls	Placed at 1 <sup>st</sup> try	Placed at 2 <sup>nd</sup> try	Not placed
30-2	20	18	2	
31-2	20	19	1	
17	20	20		
Ex	40	14	20	6
31-P1	20	18	2	
18-P1	20	17	3	

Almost there.

However, balls are just tacked on the pads.

NTC's PacTech is at the edge of performance



# Conclusions

- ✓ Need to find a solution to meld the solder balls properly.
- ✓ Machine (laser power) is at the edge of performance
- ✓ Possible solutions:
  - Heat slightly the substrate unless oxidation kills us...
  - Use smaller balls
    - ↳ Have to change again the head of the Pactech
  - Find a solder with lower melting temperature