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E02. Improving the tensile strength of solders by stabilizing them with coatings and using statistics

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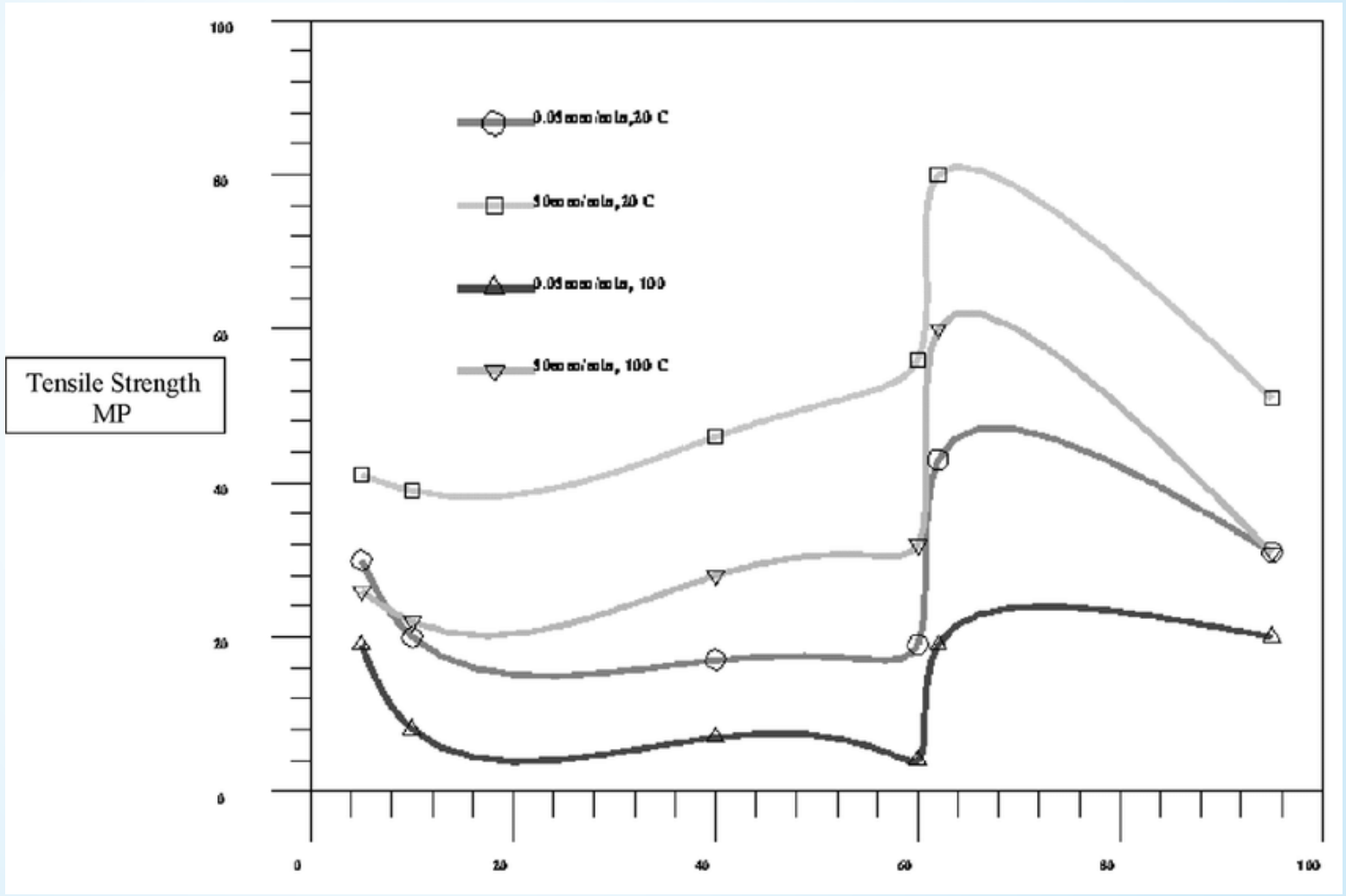
GOAL :

Achieving maximum solder break strength in LGA assembly by using adhesive.

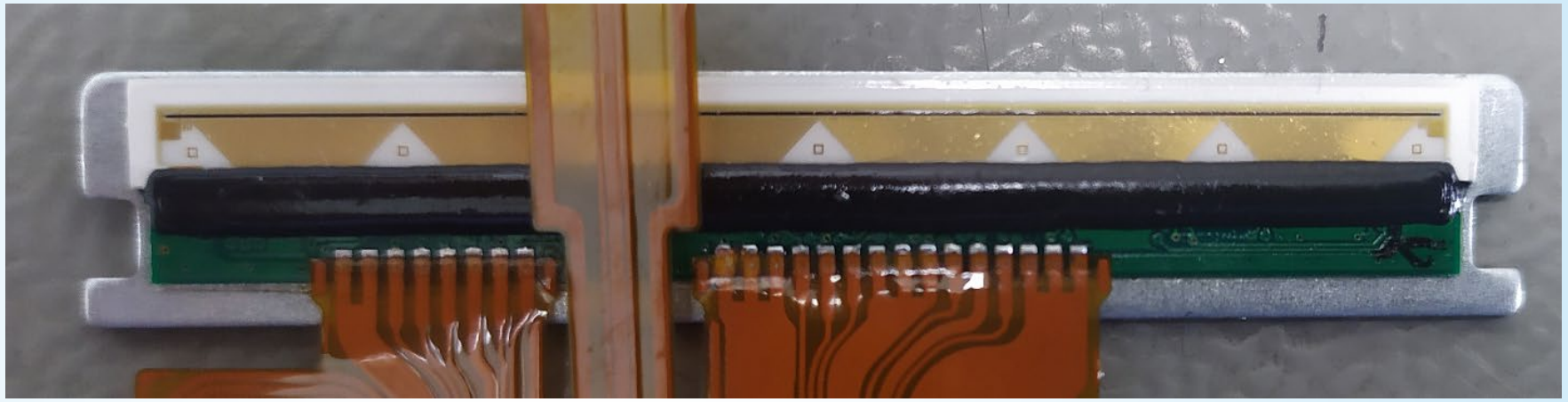
TASKS :

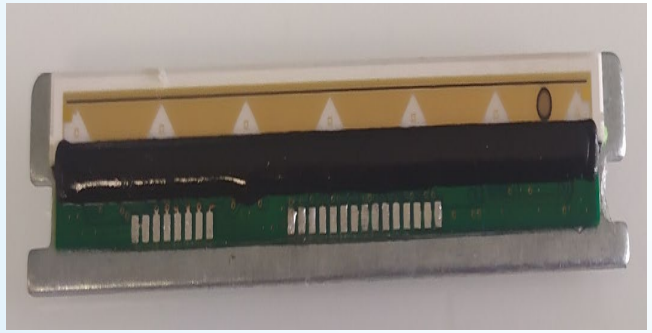
1. *Review and definition of methodologies for measuring the breaking strength of solders.*
2. *Analysis of the LGA used system and determination of the measurement technology.*
3. *Analysis of the resulting breaking force when soldering a specific system and determining a technology to stabilize and increase the breaking force.*
4. *Measurement of breaking strength using adhesive to stabilize and increase the strength of solder joints.*
5. *Collecting the results obtained using statistics.*
6. *Analysis of processed statistical data.*
7. *Conclusions.*

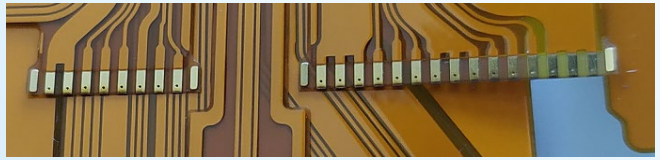
Study of solder failure process



Research object

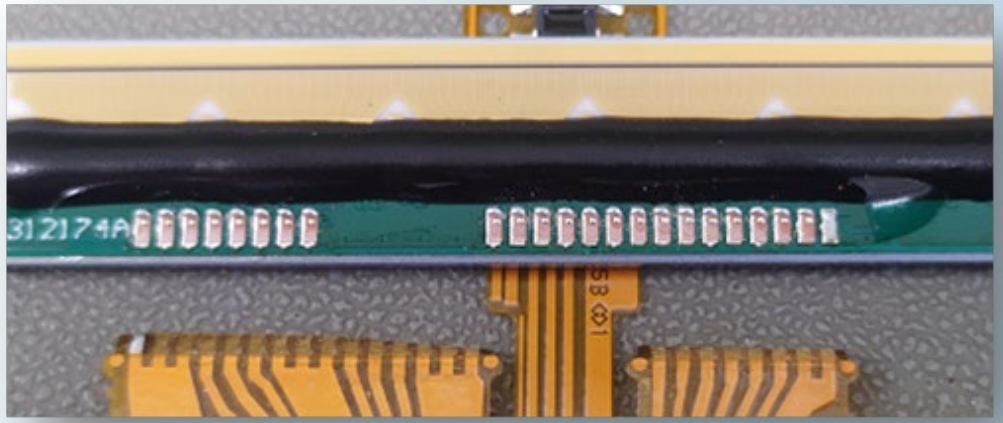




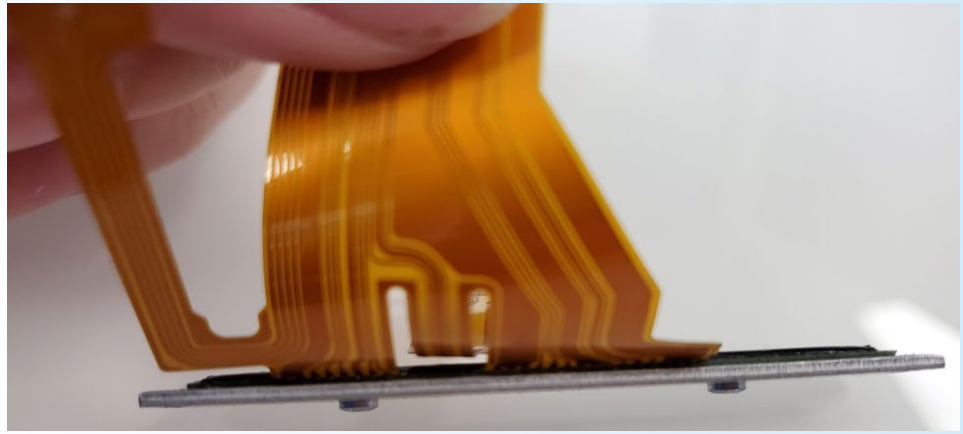


Soldering and bonding process

	Base	Rise 1	Pre Heat	Rise 2	Reflow	Cool 1	Post Heat	Cool 2
Temp. °C	170	-	200	0.0	420	150	151	150
Time sec.	01.5	01.0	01.5	01.5	10.00	-	-	-
Station temp.:150°C								
Applied force: 10,58kg								



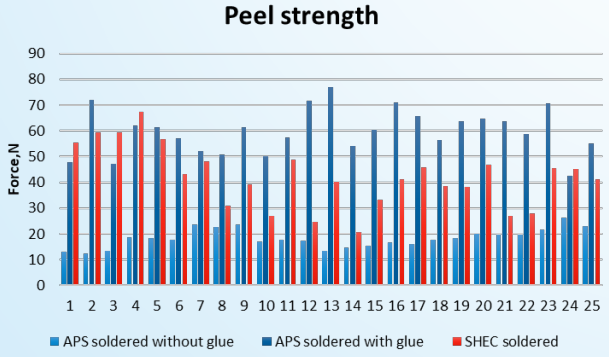
Break force measurement methodology for a thermal printer head

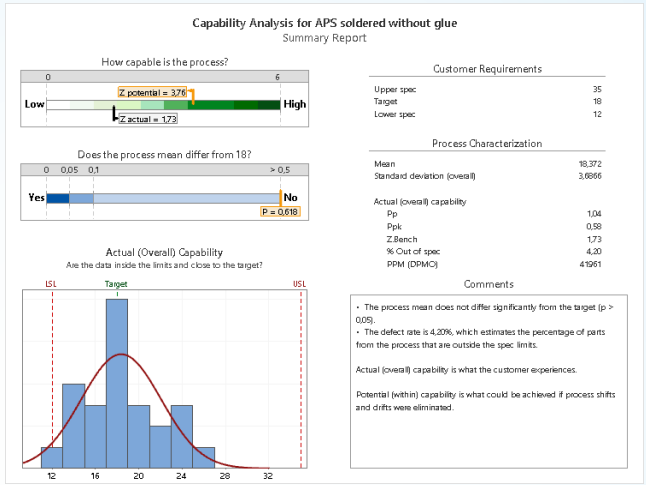


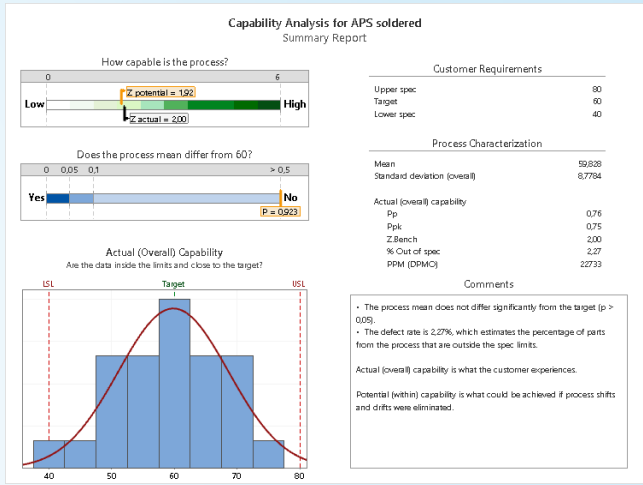
The preparation of the measurement is manual and is carried out in the direction shown in the photo, which is the most critical for the product. The measurement itself is automatic, thanks to the created intelligent measuring system.

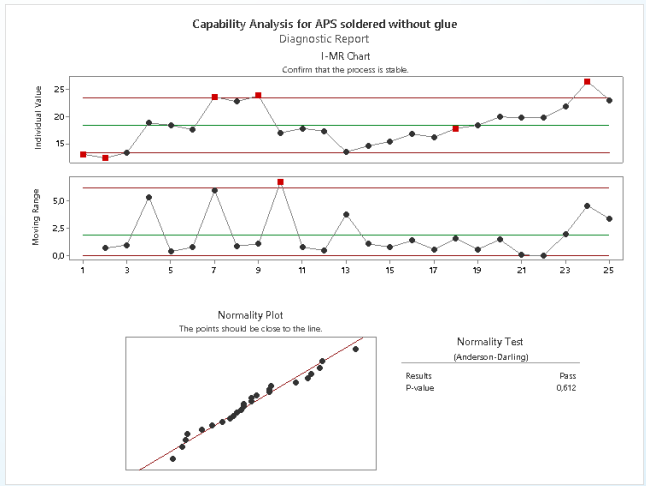
Results

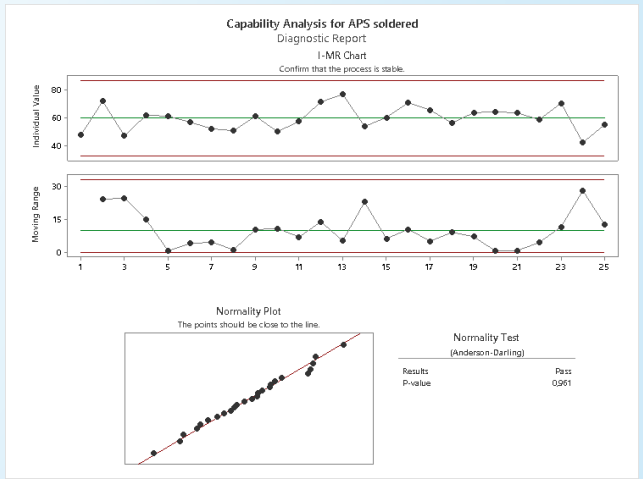
Sample№	Force, N		
	APS soldered without glue	APS soldered with glue	SHEC soldered with glue
1	13,1	47,7	55,3
2	12,4	72,1	59,6
3	13,4	47,2	59,4
4	18,8	62,2	67,5
5	18,4	61,3	56,7
6	17,6	57,1	43,3
7	23,6	52,3	48,1
8	22,7	50,9	30,8
9	23,8	61,4	39,2
10	17	50,3	26,9
11	17,8	57,5	49
12	17,3	71,6	24,5
13	13,5	77,1	40,1
14	14,6	54	20,8
15	15,4	60,4	33,1
16	16,8	71,1	41,2
17	16,2	65,8	45,9
18	17,8	56,5	38,6
19	18,4	63,8	38,4
20	19,9	64,6	46,9
21	19,8	63,6	27,1
22	19,8	58,9	28
23	21,8	70,7	45,5
24	26,4	42,4	45,2
25	23	55,2	41,2











Conclusions

THE CONDUCTED EXPERIMENTS AND THEIR RESULTS SHOW THAT IT IS POSSIBLE TO INCREASE THE STRENGTH AND LONG-TERM RESISTANCE OF THE SOLDERS USING AN ADDITIONAL LAYER OF ADHESIVE.
THE USE OF A SUITABLE ADHESIVE WOULD ALSO ALLOW IT TO SERVE AS A PROTECTIVE COATING AGAINST CORROSION.

Thank you for your attention!

An African proverb: ***"He who looks well will finally see."***

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