BLISTERS RCA WORKSHEET.

PROBLEM STATEMENT:	**Blisters and bumps on pins**

DIMENSIONS	IS	IS NOT QUESTIONS	IS NOT	DISTINCTIONS	CHANGES
WHAT					
What specific item/object/unit(s) has the defect?	Connector pin for Customer A's cable adapter	What similar item could logically have the defect, BUT DOES NOT?	All other nickel-gold plating parts	This adapter is used by Customer A only.	Learned about Customer A wash-bake cycle in Feb 2016.
What specifically is the defect?	Blisters and bumps	What other defect(s) could logically exist, BUT DO NOT?	Corrosion, chipping, delamination, plating adhesion failures		
WHERE	**WHERE**	**WHERE**	**WHERE**	**WHERE**	**WHERE**
Where is the defective item/object/unit(s) observed geographically?	Plating vendor's plant and our assembly plant	Where else could it be observed, BUT IS NOT?	Customer A's plant	Defects sorted out before reaching customer. Our plant finds 2-4x more defects than plating plant.	No changes - Our plant performs 100% inspection; plating plant samples only.
Where is the defect on the item?	All over the pin	Where else could the defect be on the unit,	Specific zone or area of pin		
WHEN					
When was the defective item/object/unit(s) first observed?	Reported by customer as "spots" in Feb 2016. Our assembly plant confirmed existence of blisters in early Apr 2016.	When else could it have been first observed, BUT WAS NOT?	Before or after	Time	(1) Introduced wash-bake to mimic customer in Feb. (2) Separated plated and unplated part numbers in Mar. (3) Changed plating vendors in Mar. (4) Went from 50/50 to 70/60 thickness spec in Mar. (5) Doubled original thickness spec two weeks later.
When has it been observed since (pattern or trend in terms of *frequency of observation*)?	Continuous	When else or at what other times, could the defective item have been observed, BUT IS/WAS NOT?	Sporadic, intermittent, isolated event	Continuous pattern despite numerous changes between Mar 2016 and present.	Six different process plans introduced between Mar and Aug: testing methods; wash test; handling methods; spec changes; plating methods; cleaning methods.
When in the item's normal cycle of operation or history was/is the defect observed?	(1) Post-plating, before bake. (2) Post-plating, after bake. (3) Incoming inspection at our assembly plant. (4) Post-assembly inspection in our plant.	When else in the normal cycle of operation could the defect be observed, BUT IS/WAS NOT?	SEM inspection of parts received from machining supplier at plating plant.	Operations	(1) Wash-bake introduced in our plant's receiving and final inspection in Feb. (2) Wash-bake introduced at plating vendor's plant after plating in May. (3) Expanded to bake-wash-bake in vendor's plant in Jul.
SIZE					
How many items/objects/units have the defect?	2-5 %	How many similar items could have the defect, BUT DO NOT?	More or less		
What is the size and impact of a single defect?	10 um; Customer very dissatisfied	What other size could the defect be, BUT IS NOT?	More or less than 10 um Affecting schedule, production, deliveries		
How many defects are on each item?	From 1-5 up to 25. 90% are blisters.	How many defects could there be, BUT ARE NOT?	More or less		
What has been the trend?	Steady at 2-5 % levels	What other trends could occur, BUT WERE/ARE	Increasing or decreasing		

Possible Causes	Does not explain . . .	Explains (only if ...)	Further Questions
Bake-wash-bake introducing the defects	Defects observed post-plating both before and after bake-wash-bake.		
Contamination	No plating adhesion failures.	Individual contaminants too small to affect	
Plating deposits	Blisters not found on any other parts.		
Current disruption	Only 2-5% of pins have blisters/bumps	Much higher percentage of pins have the defects.	
Operator error	Only 2-5% defects; blisters not found on other parts processed by same operators.		Do our operators get stupid only when plating Customer A parts?
Porosity	SEM receiving inspection of raw parts from machining supplier shows very little porosity.	Bright dip fails to reduce porosity	
Left in bright dip too long	Only 2-5% of pins have blisters/bumps	Much higher percentage of pins have the defects.	

List and Test Most Likely Causes

Rank Order	Identify and List "Most Likely" Cause	How to verify/address likely cause	Verification Results
1	Contamination	(1) Institute better incoming inspection for contamination/cleanliness of parts; (2) Assure that machining supplier performs proper first cleaning - vibratory finishing - final cleaning protocol; (3) Adopt vapor degreasing of parts prior to plating.	Nov 2016: Plated one lot of parts after vapor degreasing. Zero blister defects found via 100% inspection both before and after bake-wash-bake.
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