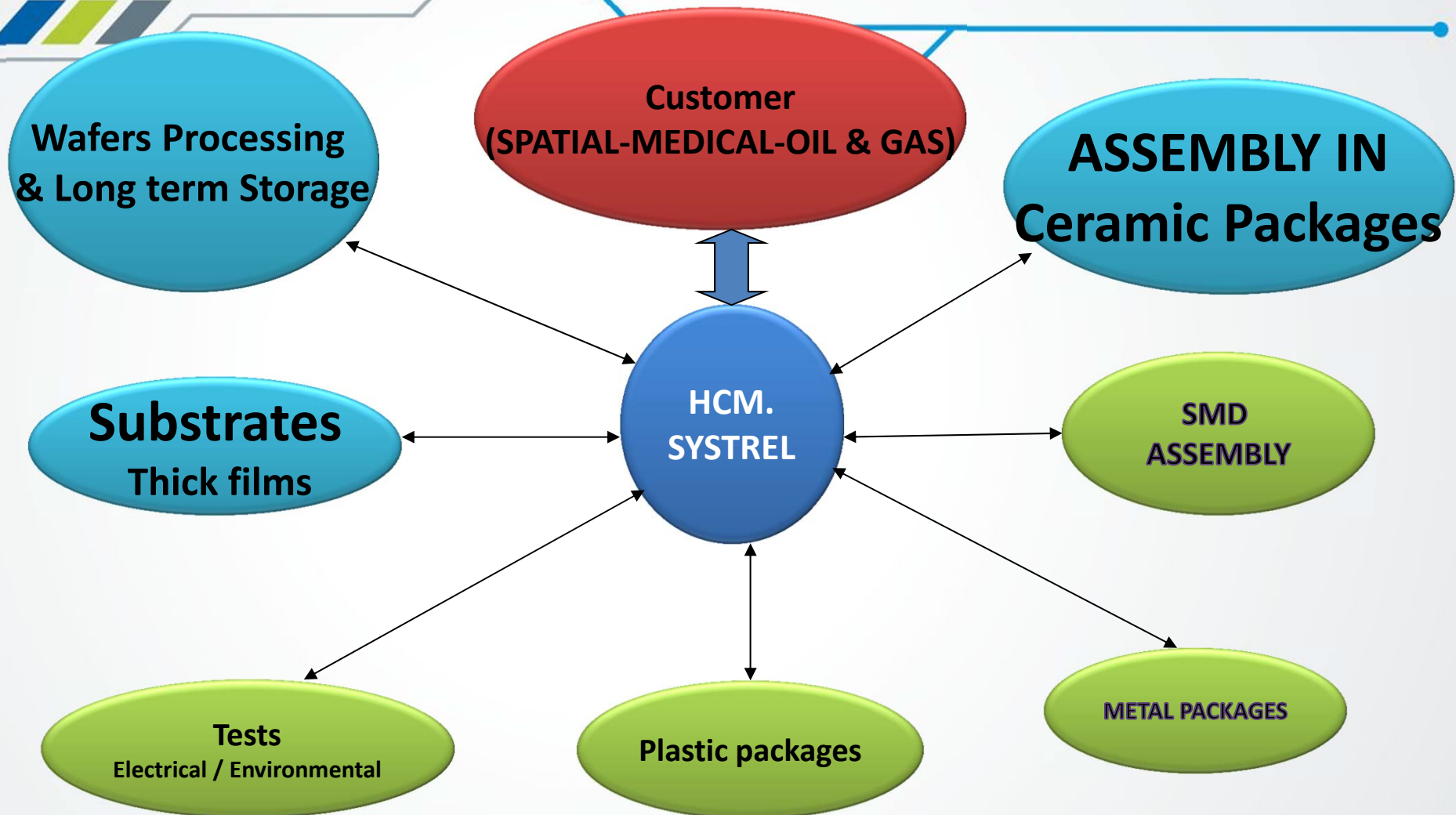




HCM.SYSTREL
Serma Group

EUROPEAN COLUMN ATTACH
ESA ECI Contract No:107948/13/NL/Cbi
CONTRACTOR : ATMEL





AEROSPACE INDUSTRY REQUIREMENTS FOR SATELLITE APPLICATIONS

- INCREASED ELECTRONIC SYSTEM PERFORMANCE
- HARSH SIZES & WEIGHT



HIGH PIN COUNTS COMPONENTS & ADVANCED PACKAGING



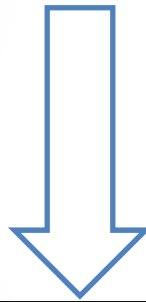
BALL REPLACEMENT BY REINFORCED COPPER COLUMN ON CGA → **HIGHER PACKAGE RELIABILITY DUE TO :**

- **HIGHER STAND-OFF AND STRUCTURAL FLEXIBILITY**
- **AVOIDANCE OF CTE MISMATCHES WITH PCBs**

BACKGROUND II

NON-EXISTENCE OF EUROPEAN SOURCE FOR
COLUMN BUILDING AND ATTACH ON LGA

NTK MCGA TECHNOLOGY END OF LIFE

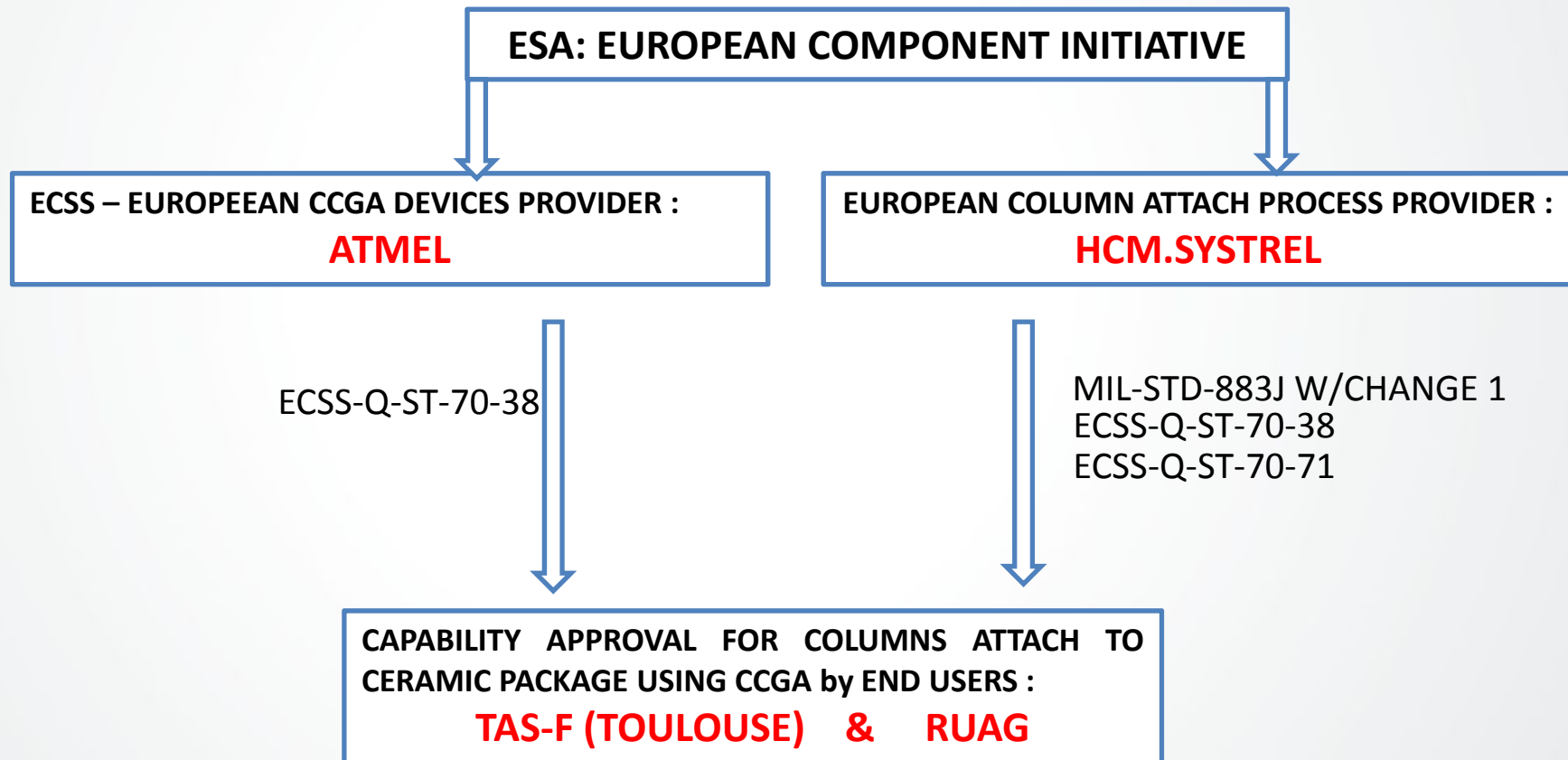


RELATED RISKS :

- LEAD TIME
- SCHEDULE ISSUES
- COST IMPACT
- POTENTIAL ITAR ISSUES WHEN PARTS ARE RETURNED TO EUROPE
- ABSENCE OF CONTROL OF THE SUPPLY CHAIN BY EUROPEAN SPACE AGENCIES

PROJECT FRAME

ESTABLISHMENT OF A EUROPEAN COLUMN TECHNOLOGY SUPPLY AND ASSEMBLY CHAIN
(ESA Contract No:107948/13/NL/Cbi)





OUR COLUMN TYPE COVERAGE :

- TYPICAL BODY SIZES : a range from 14mm² to 52.5mm²
- TYPICAL PIN COUNTS : from 256 to 1752 (and more)
- PIN PITCHES : from 0.80 mm to 1.00mm & 1.27mm
- TYPICAL LANDS GOLD THICKNESS : 0.03µm to 0.1µm .

DEGOLDING PROCESS VALIDATION ONGOING FOR GOLD THICKNESS HIGHER THAN 0.3µm

STANDARD REINFORCED COLUMNS MAIN MATERIALS : comply with JEDEC MO-158

- CORE MATERIAL : 80Pb20Sn WITH WRAPPED COPPER RIBBON
- MINIMUM COLUMN DIAMETER : 0.38mm (more or less 0.1mm)
- COLUMN LENGTH : 2.2mm (more or less 0.2 mm)

HCM.SYSTREL & PARTNERS FACED TWO MAIN CHALLENGES :

- **COLUMNS BUILDING**

- ➔ NEW EQUIPMENT FUNDED BY ATMEL
- ➔ DESIGNED & COMPLETELY BUILT-UP BY HCM IN LA ROCHELLE' PLANT :
- ➔ **AVAILABLE FOR ALL CUSTOMERS**

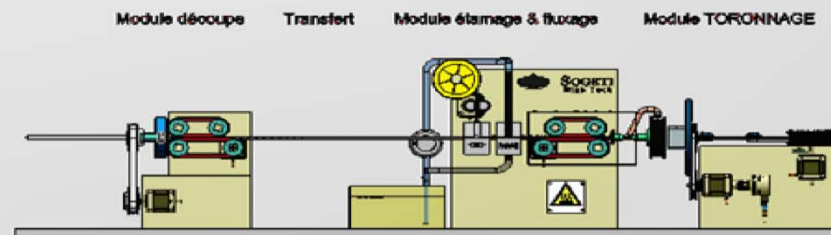
- **COLUMNS ATTACH ON CCGA ➔ HCM.SYSTREL INTERNAL NEW PROCESS FLOW.**

BUILDING OF COLUMNS ACHIEVEMENT → CONSTRUCTION OF A NEW PROTOTYPE (ATMEL property) : AN “IN-LINE” & AUTOMATIC EQUIPMENT WHICH IS UNDER QUALIFICATION IN HCM.SYSTREL PLANT (La Rochelle) : **FULLY OPERATIONAL BY Q3 2014.**

COMBINATION OF THE EQUIPMENT IS :

- **LINEAR WINDING MODULE** USING COPPER RIBBON AND PbSn CORE WIRE
- **LINEAR WIRE TINNING MODULE** USING ROLO FLUX.
- **INDEPENDENT FINAL COLUMNS CUTTING MODULE** ENSURING REGULAR CUT WITH NO BURRS.

TORONNEUSE DE COLONNES RENFORCEES





COLUMN ATTACH PROCESS ON ATMEL's CCGA IS HCM.SYSTREL PROPERTY AND **COMPLY WITH MIL STD 883J CHANGE 1.** IT HAS BEEN DEVELOPPED ON LGA1752 AND LGA625.

MAINS CHALLENGES :

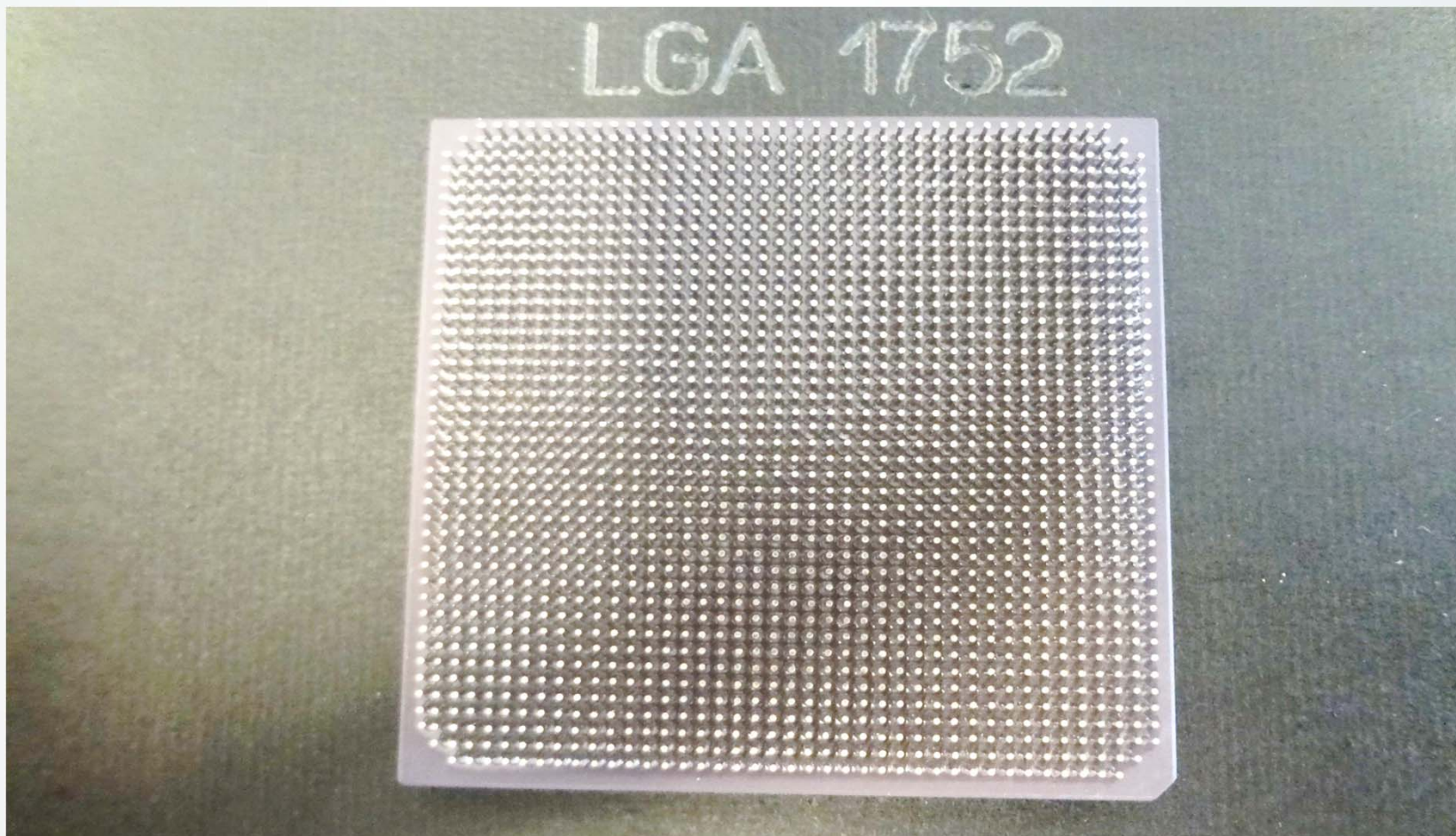
- TO BE ABLE TO ASSEMBLE COLUMNS ON CCGA WITH SPECIFIC CARE FOR COLUMNS HOLD DURING REFLOW.
- AVOIDANCE OF COLUMNS BENDING AT ANY STEP OF THE PROCESS.
- **REWORK SOLUTIONS**
- COMPATIBILITY OF THE PRODUCED COLUMNS WITH FINAL USER REFLOW PROCESS.
- COMPATIBILITY WITH SPACE APPLICATIONS AND ESD REQUIREMENTS.

SOLUTION : USE OF A “**ALL-IN-ONE**” TOOL WITH SPECIFIC MATERIAL FOR THE WHOLE PROCESS.

MAIN ADVANTAGES :

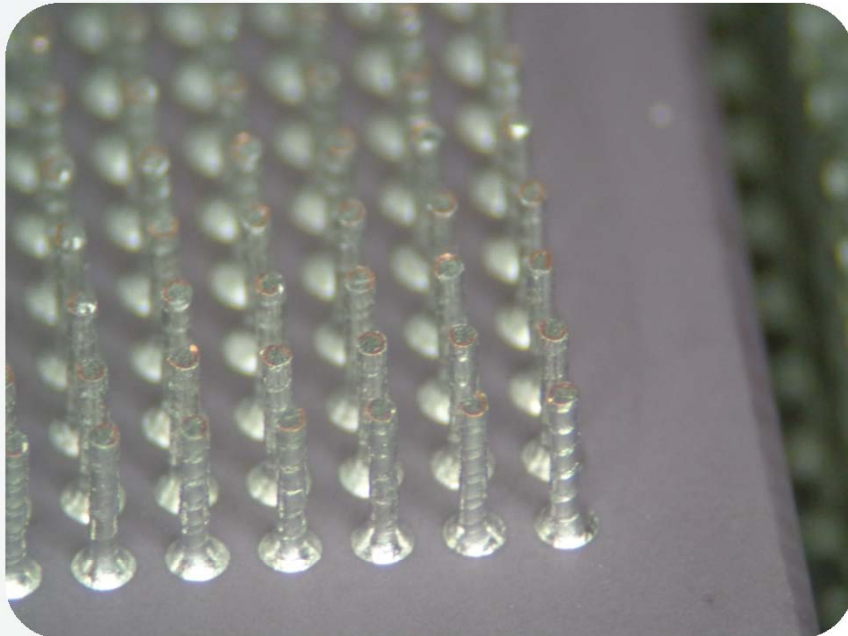
- MINIMIZE THE THERMAL PROFILES APPLIED TO THE COLUMNS : **1 REFLOW**
- PRESERVE COLUMNS INTEGRITY WITH MINIMAL RISK OF HAZARDOUS BENDINGS

LGA1752 PICTURES

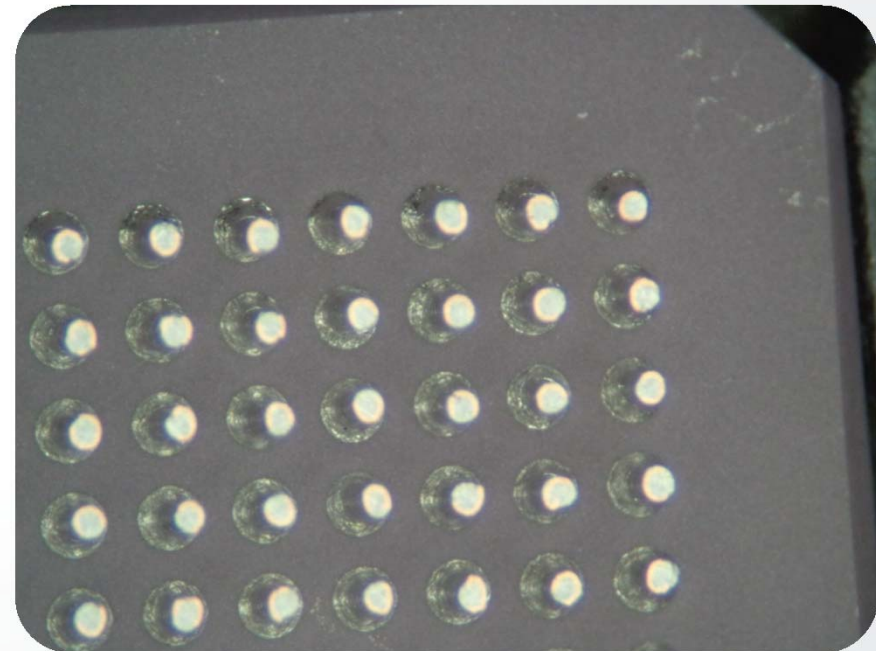


HCM.SYSTREL PROPERTY

COLUMNS PICTURES



HCM.SYSTREL PROPERTY

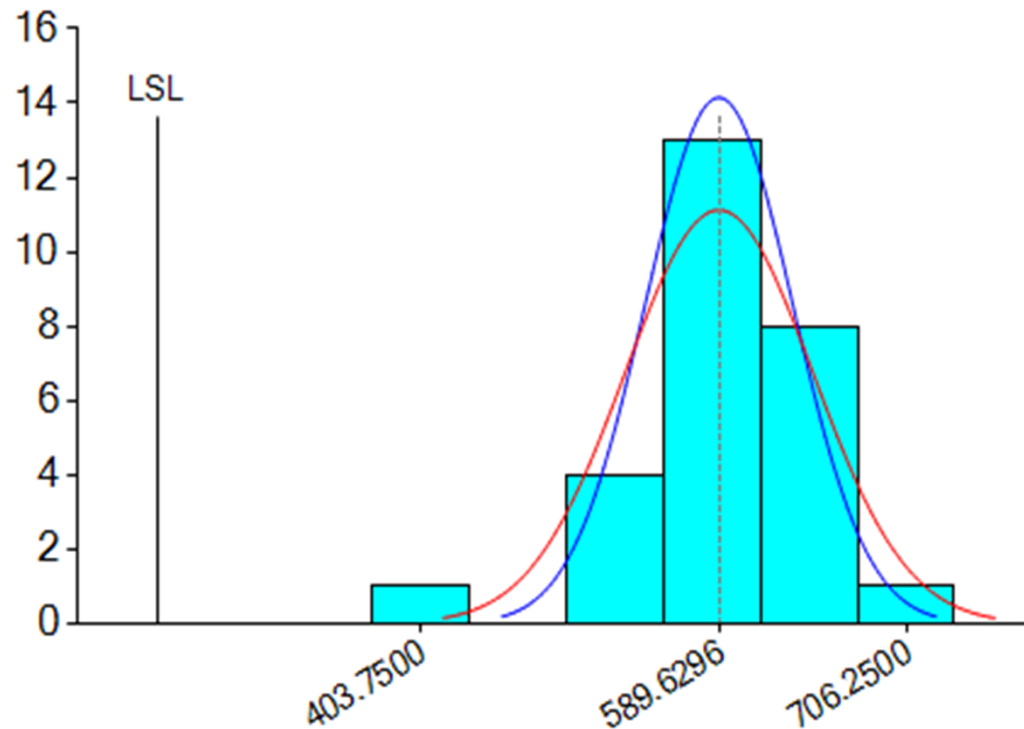


- **PROCESS CONTROL ON FINAL ATTACHED COLUMNS**
: **ACCORDING TO MIL STD 883J REQUIREMENTS**
- VISUAL INSPECTION : NO BURRS -NO VOIDS-NO MISALIGNMENT
- COLUMNS DIAMETER (0.38 mm)
- COLUMNS COPLANARITY (**less than 150 μ m**)
- CLEANLINESS
- WETTABILITY
- DESTRUCTIVE PULL-TEST

LGA1752 PULL-TEST RESULTS @ T0



**HCM.SYSTREL COLUMNS
COMPLY WITH MIL STD 883J
CHANGE 1 METHOD 2038
WHICH STATES THAT COLUMN
PULL-TEST MINIMUM SHALL
BE 319g FORCE**



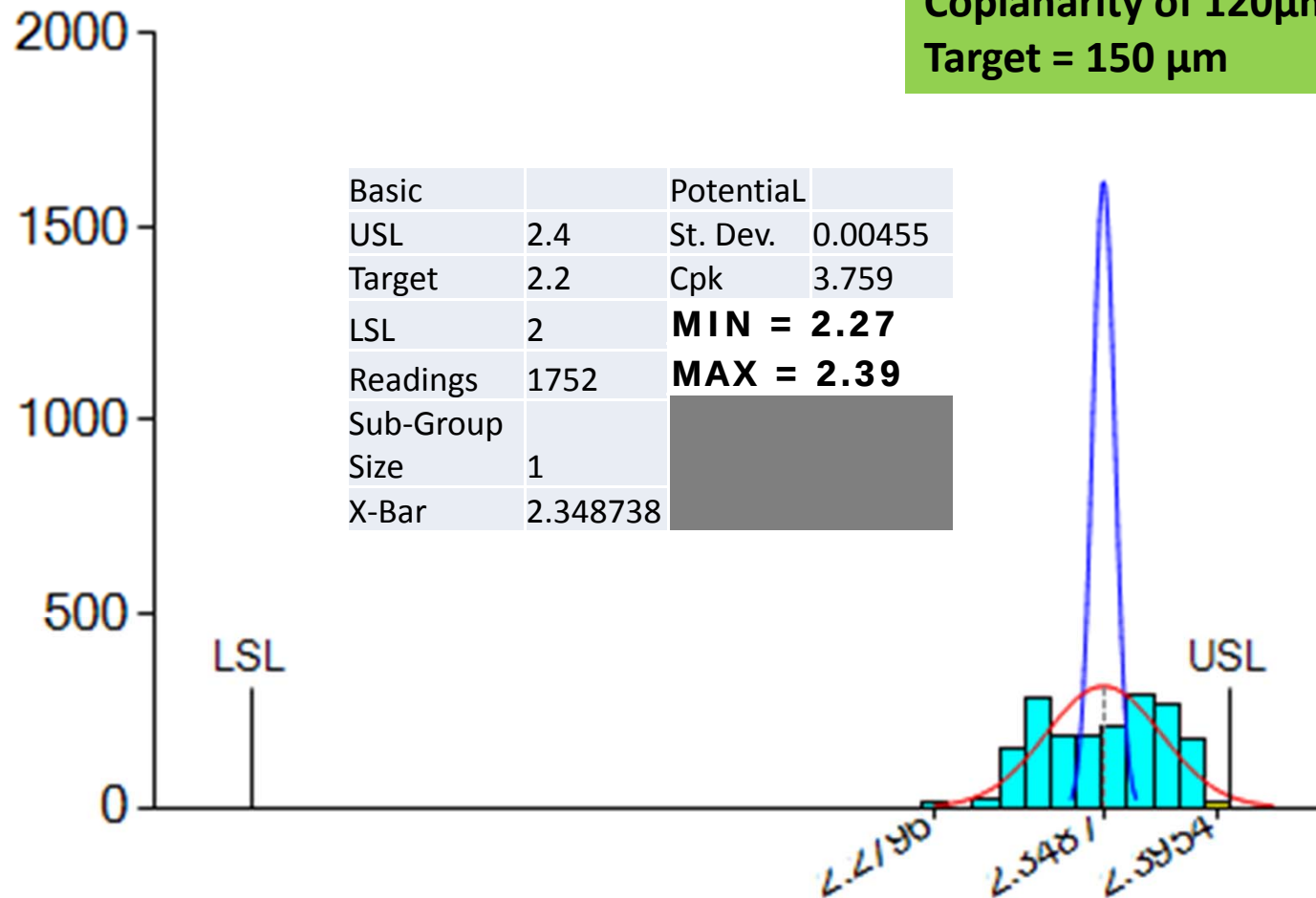
Readings	100
St. Dev.	46.03
LSL	319 g
CpK	2.53
X-Bar	589.62
Min	390
Max	720

TILT & LENGTH CONTROL MEAN : PROGRAMMABLE NIKON HEIGHT CONTROLLER FOR SAMPLING OR FULL COLUMN MATRIX MEASUREMENT WITH AN UNCERTAINTY OF 7µm .

[illegible]

LGA1752 COPLANARITY

Coplanarity of 120μm
Target = 150 μm



Q3 2014 :

- SOLDERABILITY TEST
- “COLUMNED SUBSTRATES” REWORK PROCESS SETUP **EXCEPT FOR QMLV DEVICES AS PER MIL STD38535J.**

Q3-Q4 2014 :

- ATMEL , TAS & RUAG PROTOTYPES DELIVERY & MACHINE QUALIFICATION

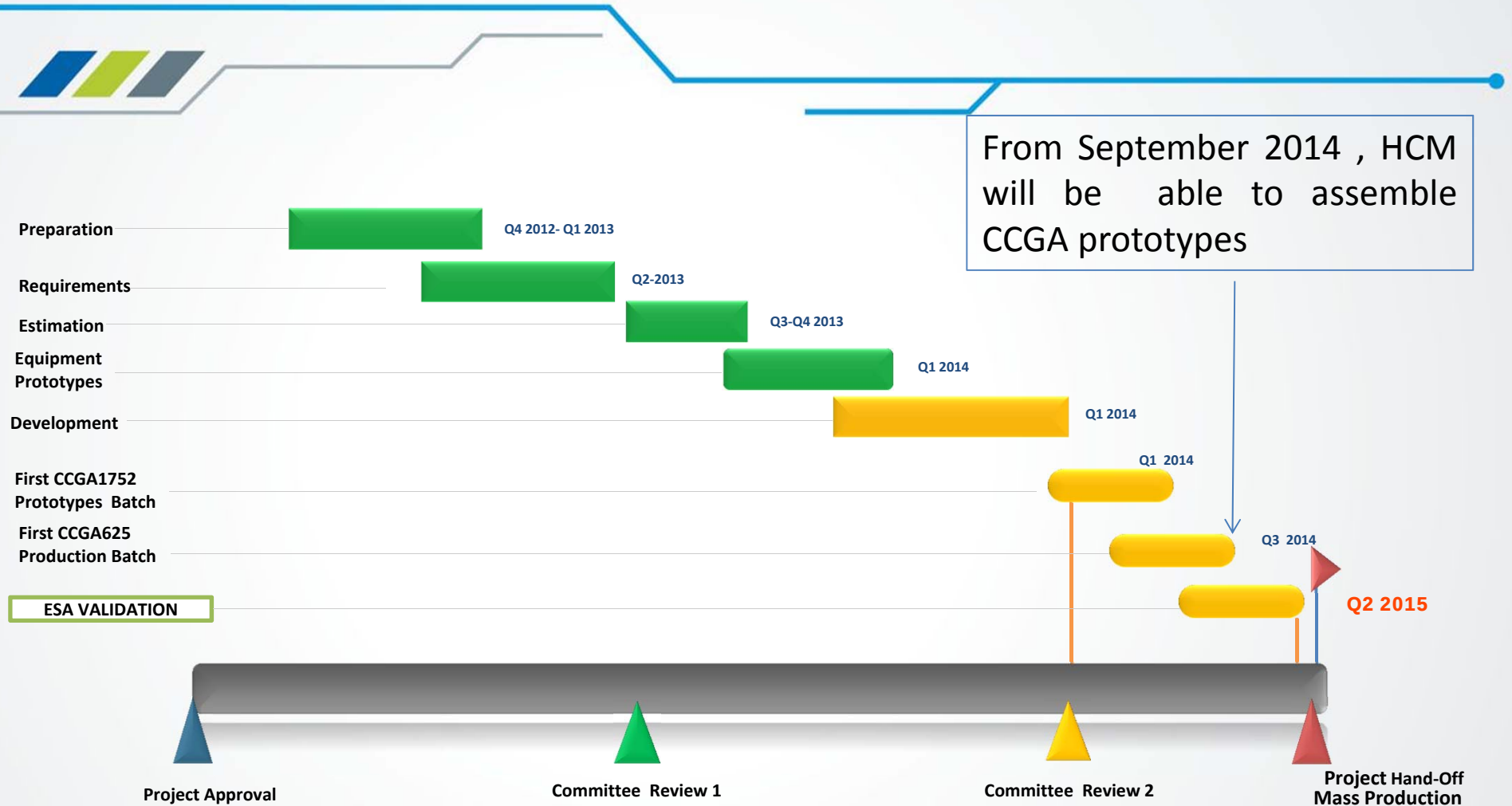
Q2 2015:

- ESA VALIDATION
- PRODUCTION OF FIRST STOCK OF COLUMN (READY TO USE) → MINIMIZE THE RISK OF ASSEMBLY DELAY

ASSEMBLY GENERIC TOOL AVAILABLE FOR ALL HCM.SYSTREL's EUROPEAN CUSTOMERS.

IF SUBSTRATE EXTERNAL DESIGN APPEARS TO BE SPECIFIC, DEDICATED TOOLS CAN BE BUILD UP.

COLUMN ATTACH TIMELINE





THANK YOU FOR YOUR ATTENTION

**ACKNOWLEDGEMENT TO ATMEL & ESA/ ECI FOR
TECHNICAL SUPPORT AND FUNDING.**