European Source of Plastic Encapsulation for Space components

Matt Booker
Head of Sales – Assembly Services
ALTER TECHNOLOGY TÜV NORD UK Ltd
Matt.Booker@uk.altertechnology.com

Szymon Bednarski
Senior Development Engineer, Hi-Rel & Space Applications
ALTER TECHNOLOGY TÜV NORD UK Ltd
Szymon.Bednarski@uk.altertechnology.com

ALTER UK BACKGROUND

TÜV NORD GROUP

ALTER TECHNOLOGY LOCATIONS *Seville* *Madrid* *Toulouse* *Livingston*

2003
Optocap Founded by Scottish Enterprise

2009
Management Buy-Out

2016
Acquisition by ALTER TÜV NORD

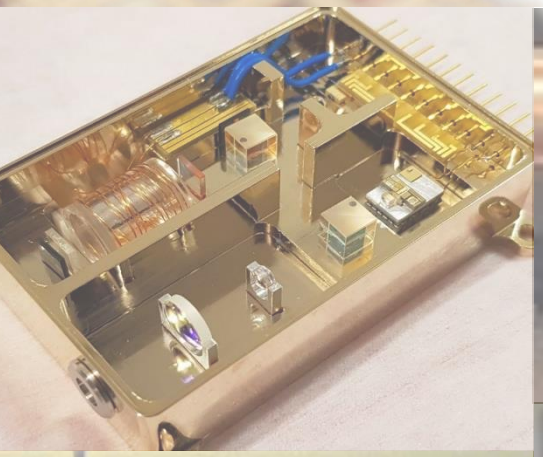
2019
Alter Technology TÜV NORD UK

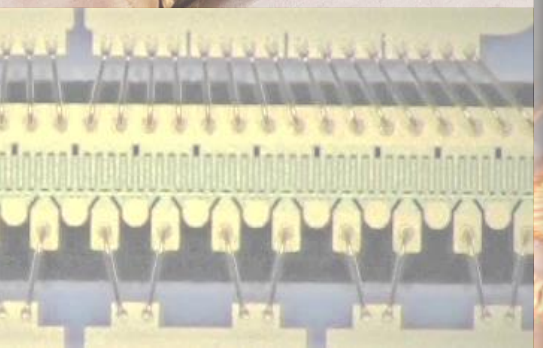
ALTER UK Company History

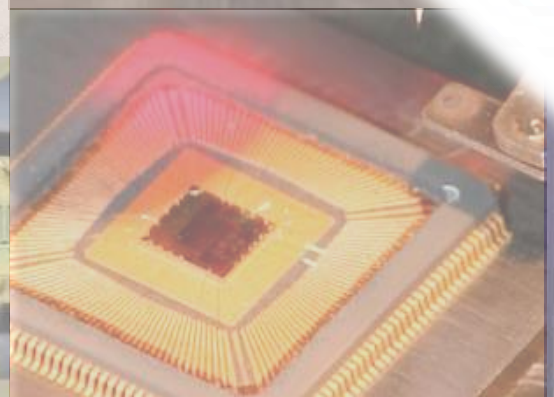
UK PACKAGING SERVICES

ALTER TECHNOLOGY

- R & D
- Fast Turn Prototyping
- Package Design & Modelling
- Process Development
- Automated Volume Manufacturing
- Flight Module Assembly





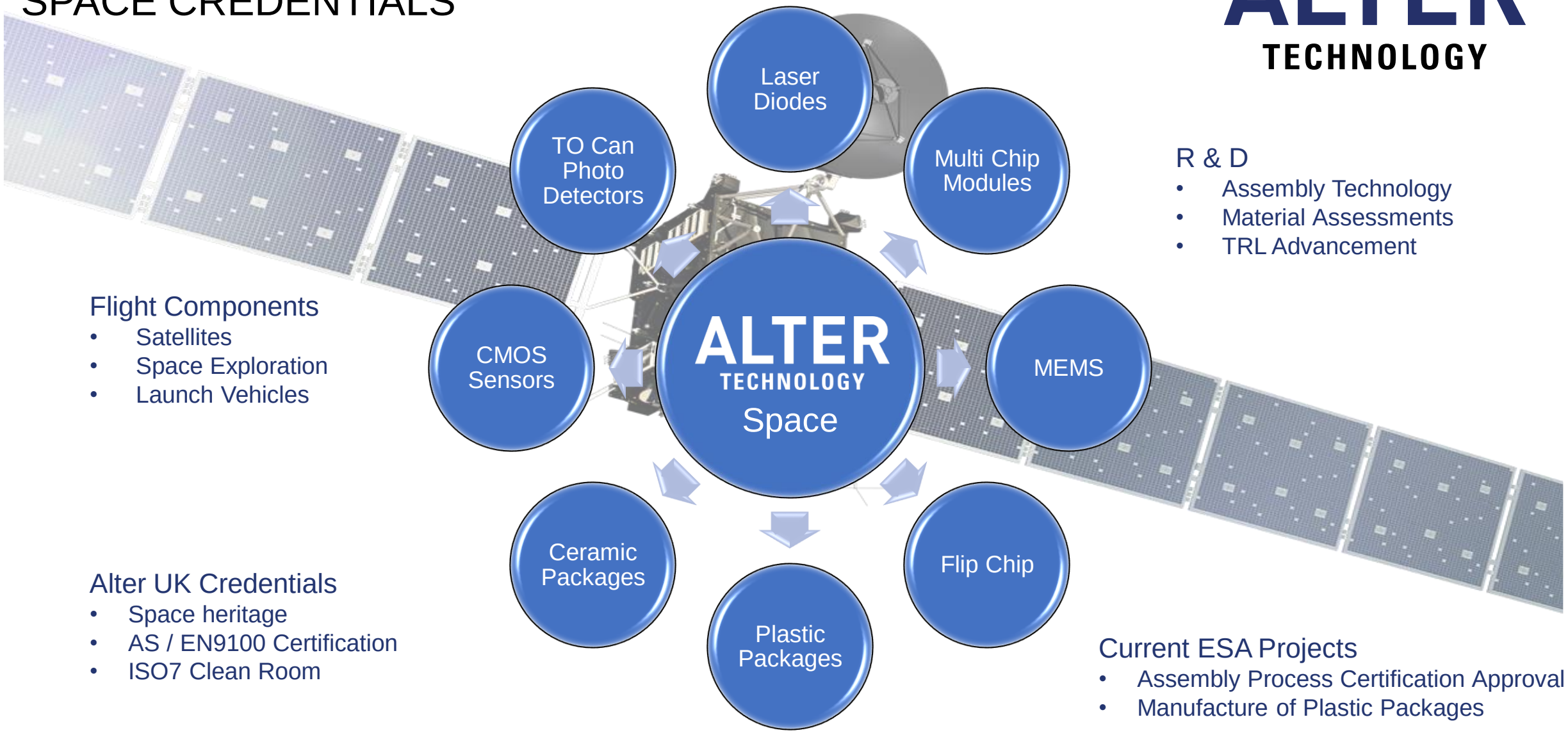


UK CAPABILITIES

ALTER TECHNOLOGY

SPACE CREDENTIALS

ALTER TECHNOLOGY



Flight Components

- Satellites
- Space Exploration
- Launch Vehicles

R & D

- Assembly Technology
- Material Assessments
- TRL Advancement

Alter UK Credentials

- Space heritage
- AS / EN9100 Certification
- ISO7 Clean Room

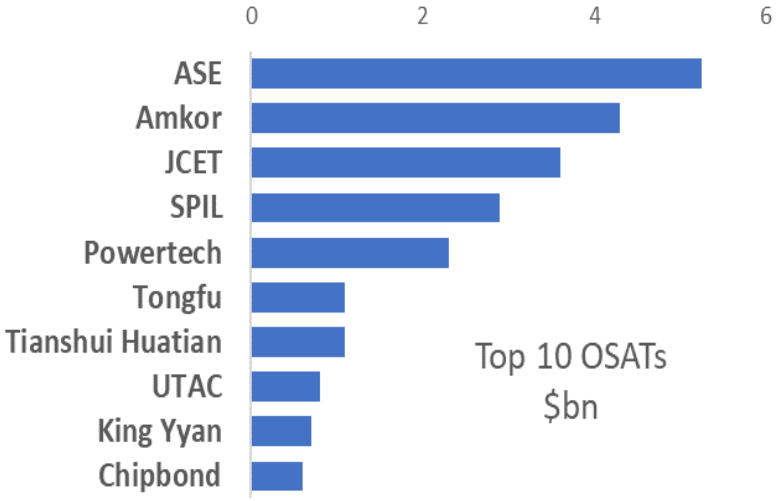
Current ESA Projects

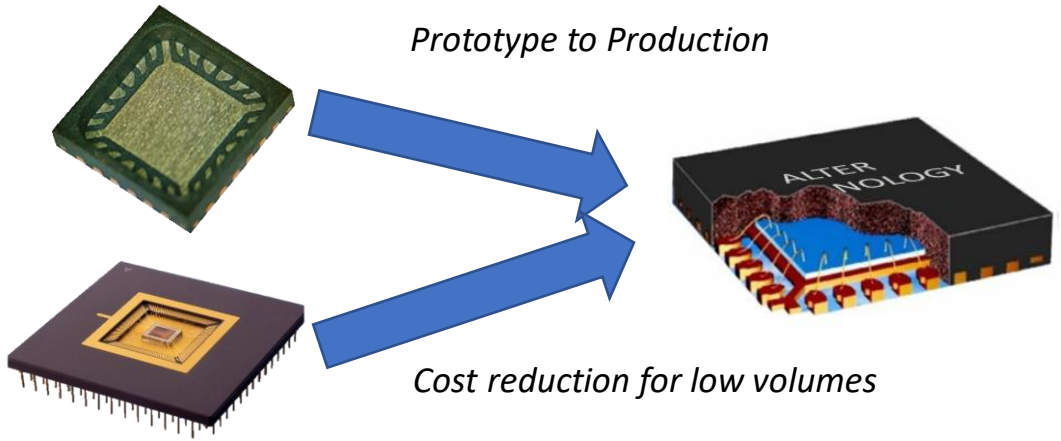
- Assembly Process Certification Approval
- Manufacture of Plastic Packages

CURRENT PEMS MARKET OFFERING

ALTER TECHNOLOGY

- Large scale OSATs centred in Asia (top 5 OSATs = $18bn)
- High volume & very low cost (millions/day)
- Capacity dominated by consumer, mobile & automotive
- Difficult to access for low & medium volume applications
- Small batches and customers “pollute” the production lines.
- Some success stories with start-ups projecting high volume
- Specialist packaging in EU focused on sensors
- Use of single cavity packages very high cost



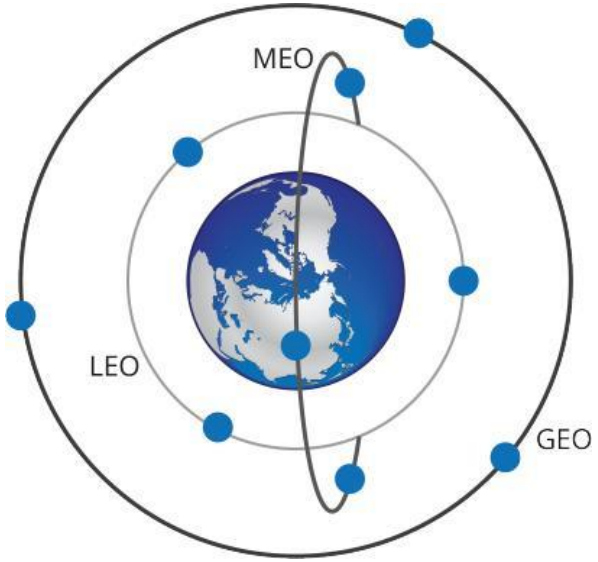


SPACE & DEFENSE LANDSCAPE

ALTER TECHNOLOGY

- Emerging use in Space, especially COTS in LEO, small sats.
- OCMs providing enhanced product ranges targeting high-rel
- Limited to catalogue / line card
- ASICs and custom devices not catered by COTS
- High-rel quality and traceability requirements not aligned with OSAT
- Current specifications allowing plastic via. Up-screening.
- No route to build parts yet… but ESCC9000P on it's way (ATN actively participating!)
- ESA funding TRL advancements for Plastic

GOAL: Plastic encapsulated devices with Space level controls.



VALUE PROPOSITION

ALTER TECHNOLOGY

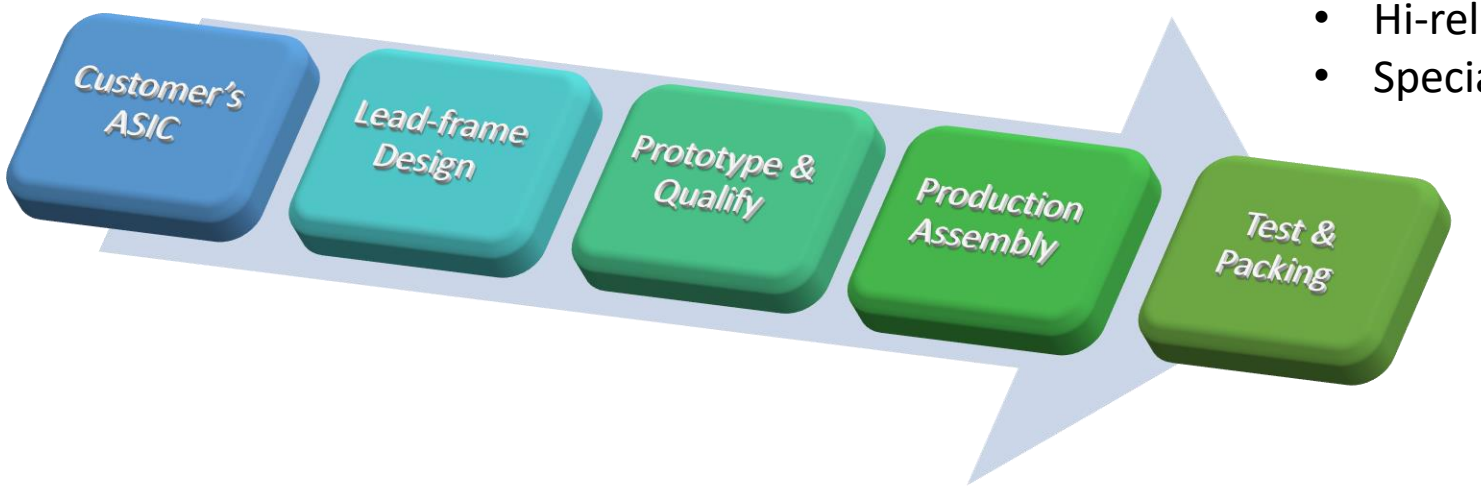
Alter have a unique *value proposition*

Active and known in the markets who need support:

- Prototype / MPW Designs / Pilot Production
- Medium Volume, Industrial, Medical, Start-ups, etc.
- Space Heritage and Network

What we can offer:

- Complete production line, including molding.
- ATG level turnkey approach with Test and Qual.
- Hi-rel work-flows including traceability & inspections
- Specialist support from Concept to Manufacturing



OUR APPROACH TO PEMS

ALTER TECHNOLOGY

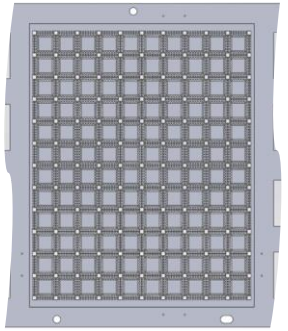
Initial offering

- QFN 0.9mm thickness (Quad-Flat-No-leads)
- 3x3mm to 12x12mm body sizes
- Selection of open tool lead-frames being developed
- Cu alloy leadframe with NiPdAu/Ag plated leads
- Saw singulation

Fico MMS-I

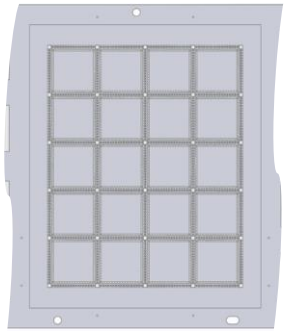
Why QFN?

- Very flexible, range of package sizes with same mold
- Low cost etched leadframe and tooling
- Matches market demand
- Why not leaded packages? - dedicated tools per type



Features & benefits

- Matrix assembly, synonymous with COTS / OSAT
- Common assembly tooling & mold
- Platform which can be used for BGA, LGA, MCM, SiP with right tools



Array Panel Assembly

IMPLEMENTATION AT ALTER UK

Evaluation project with ESA *

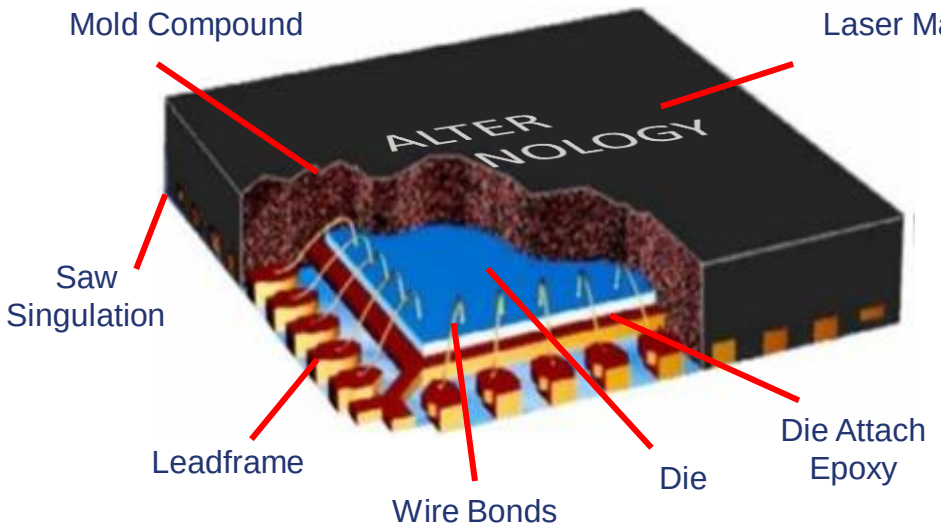
- Identified test vehicles for wide process window 4x4 and 9x9mm
- Design and tooled-up lead-frames
- Evaluation flow based on ECSS-Q-ST-60-13C & PEM-INST-001

  + MSL evaluation

  + soldering verification

  + outgassing

*Evaluation under a programme of, and funded by, the European Space Agency.



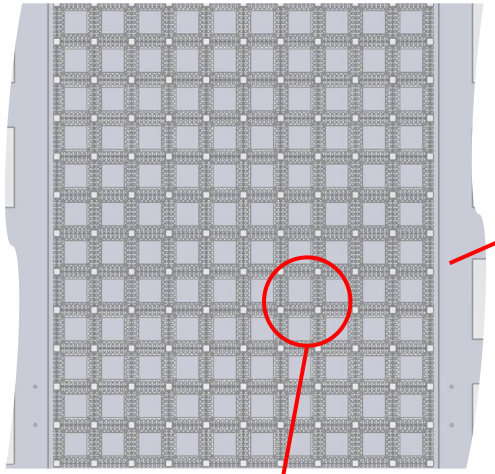
Cut-away of QFN structure

- Laser Mark installation complete
- Mold tool manufacture and debug complete
- FICO Mold Press Installed
- Developing further Open-Tool lead frames
- Range of application notes for end users

PROCESS HIGHLIGHTS

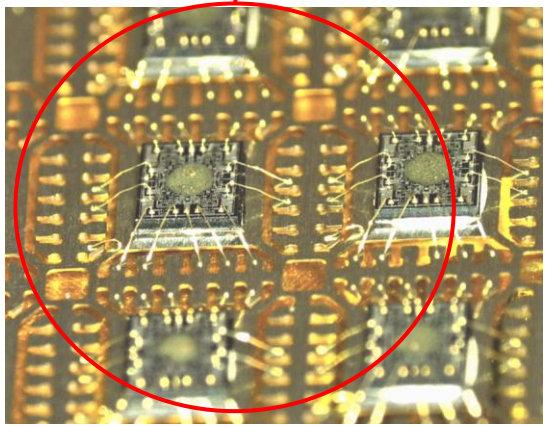
ALTER TECHNOLOGY

1. Array lead-frame Panel
~100's QFN positions

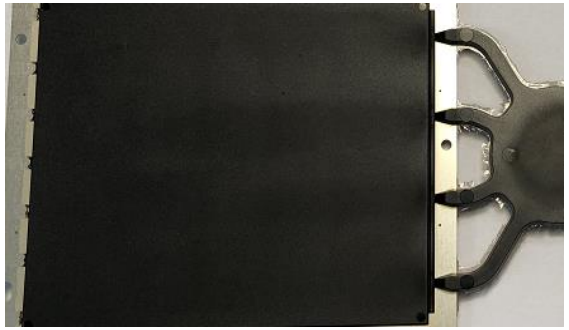


External features fixed for any design.

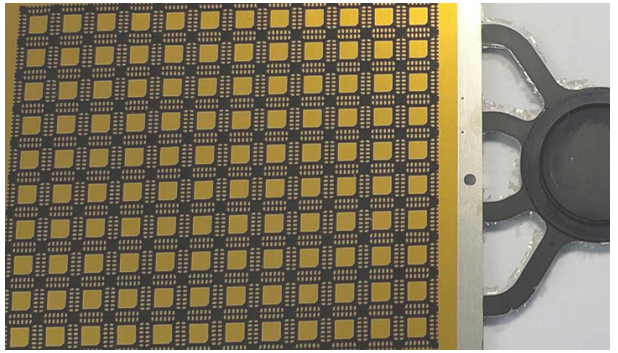
2. Die attach and wire bond



3. Block Panel Molding



Top View

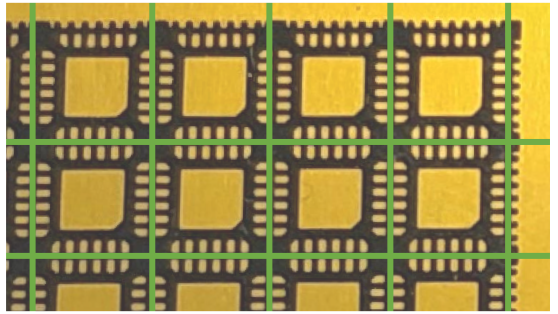


Bottom View

2 x leadframes per mold shot

4. Laser Mark Panel

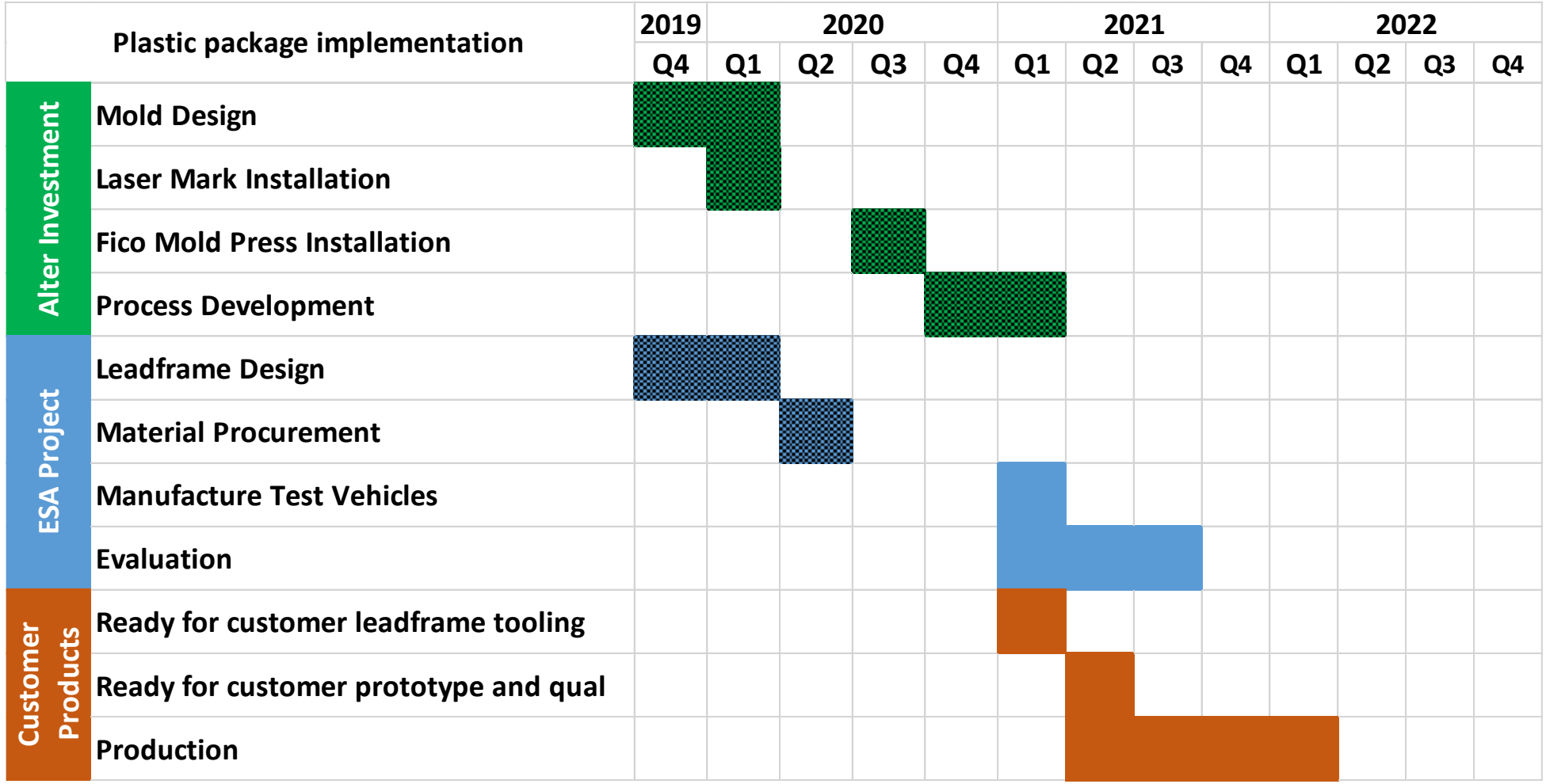
5. Saw Singulation



6. Load to tube or trays, transfer to Test

SCHEDULE

ALTER TECHNOLOGY



ALTER
TECHNOLOGY

Thank you

Any Questions?