



Quartz Installation Proof of Concept

Rev F Fixed robot trial and budgetary quotation

Prepared for ASM

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AETEC recommends a fixed-arm POC before committing to mobile integration. A UR30 on a fixed pedestal repeatedly lifts a full-scale printed chamber dummy from representative foam and places its three datum holes onto three pins in a dummy machine interface. The trial tests access, metrology, sequence and recovery with the proposed gripper geometry.

Trial element	Proposed implementation
Robot	Fixed UR30 using temporary laboratory or rental access. No AMR and no robot ownership transfer.
Part	Segmented 3D-printed chamber shape with fins, long tubulation envelope, three replaceable datum-hole inserts and adjustable ballast.
Source	Low foam-lined box, representative fin-slot access and controllable extraction resistance.
Destination	Machine-shaped full-size dummy with side posts, entrance frame, upper crossbeam, cabinet obstruction envelope and tubulation well; three adjustable pins and replaceable seating references.
Measurements	Automatic T1 camera/probe and T2 gripper exchanges. Camera first; probe three pin centres/heights and three seating-plane contacts. Fixed upward metrology, external F/T and pad loads.
Guides	Guide-free baseline. Two removable Teflon guides evaluated only as an optional comparison.

The printed dummy does not reproduce quartz fracture strength, surface damage, friction, stiffness, contamination or thermal behaviour. Passing this POC does not validate real quartz stress limits or production cleanroom operation.



1 Trial sequence and proposed acceptance

Stage	Evidence to record
Geometry and access	Retain the reconstructed machine entrance, posts and overhead obstruction. Check complete approach and withdrawal, fin slots and tube clearance against the machine-shaped dummy.
Metrology	Automatically capture T1; image then probe all three pins and three contact surfaces. Fit the pin frame and support plane. Verify T2 nest, return T1 and automatically capture T2. Calibrate changer, camera, probe and upward station.
Repeated placement	Proposed 100 normal cycles after tuning, with no unintended contact, no dropped load and all three seats confirmed. This is a proposed POC criterion, not a delivered result.
Controlled fault trials	Introduce excessive extraction resistance, an offset pin pattern, an incomplete latch and an inconsistent measurement. Verify retained HOLD and deliberate recovery.
Force and uncertainty	Log force/moment versus displacement and measured frame repeatability. Agree numerical limits from actual geometry and sample data before acceptance.
Decision gate	Proceed to approved real-quartz handling trials, then mobility, floor-load, cleanroom and safeguarding qualification.

Trial outputs

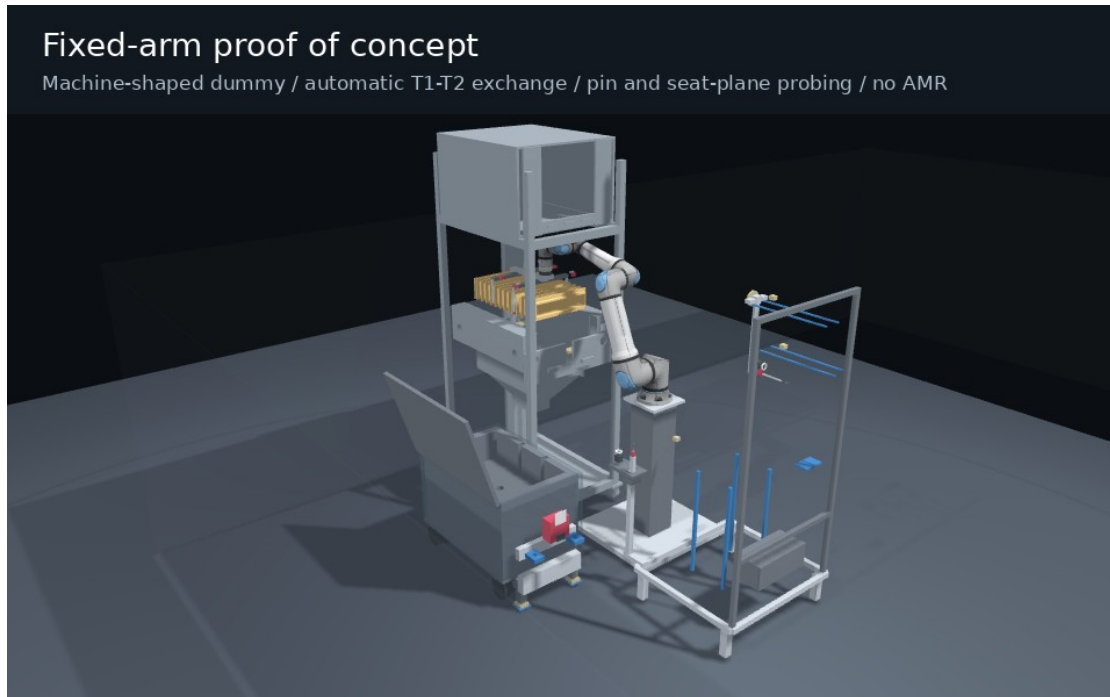
Provide dimensioned dummy and fixture files, gripper access findings, measurement and force logs, repeat-cycle results, fault/recovery evidence, revised risk and tolerance budget, and a recommendation on whether guides are necessary. The animation is a concept sequence and is not test evidence.

Responsibilities and exclusions

ASM confirms part and interface drawings, contact restrictions and the relevance of the dummy. AETEC supplies the agreed lab setup, programming, metrology and reporting. Actual quartz parts, production installation, AMR, trolley exchange, ISO 7 qualification and production process acceptance are outside this POC unless added in writing.



2 POC hardware and controls



The obstruction frame retains the approximately 830 x 1130 x 2743 mm reconstructed envelope and 1250 mm seating datum. These are proposed mock-up dimensions derived from the customer imagery; validate critical access dimensions before fabrication. Machine process components may be represented by lightweight obstruction panels.

The trial begins with automatic camera/probe capture, multi-view imaging, three-pin and three-plane-point contact probing, and T2 nest verification. After exchanging to the carrier, measure the retained dummy at the fixed upward station, enter level, seat and unload. Retrieve and repeat using the same access corridor. All tool ownership changes and touch points are recorded.



3 POC budgetary quotation

Ref	Scope	Qty	Budget SGD
P01	UR30 lab use or four-week rental/trial access	1	12,000
P02	Fixed pedestal/bench and lab protection	1	4,500
P03	Full-scale segmented 3D printed dummy quartz with three datum holes and adjustable ballast	1	2,700
P04	Machine-shaped dummy frame, access obstructions, tubulation well, three pins and seating references	1	11,250
P05	Foam box, fin-slot access and positively located floor-supported holder	1	3,000
P06	Prototype fin-gap gripper and replaceable pads	1	6,750
P07	External F/T and pad-load trial kit use/rental	1	4,500
P08	T1 camera/probe and fixed upward station trial access, calibration and reference artifacts	1	7,500
P09	POC mechanical design	110 h	13,200
P10	POC robot programming and measurements	150 h	18,000
P11	Repeat pick/place trials, force logs and evaluation report	90 h	10,800
P12	Consumables and local logistics	1	1,200
P13	Automatic tool changer, T1/T2 plates, service interfaces and two supported nests	1	8,250
P14	POC HMI, buffered event traces and fault-recovery verification	40 h	4,800
	Engineering risk allowance	1 lot	10,845
	Package total excluding tax		119,295

Budget total: SGD 119,295 excluding applicable taxes. The temporary UR30 access allowance is unconfirmed. If a suitable existing robot is available at no incremental access cost, the corresponding budget becomes SGD 106,095. That alternative does not reduce trial scope or transfer robot ownership.

Schedule, supplier availability and commercial terms require confirmation. POC fees are additional to the mobile-system budget. Any reuse credit must identify the actual reusable equipment and engineering; no automatic credit is included.