

TECHNICAL APPLICATION GUIDE

MKTECH INDUSTRY SDN BHD

AEROSPACE PRECISION SURFACE FINISHING

Choose the finishing route by feature

Control airfoil profile, root form, edges and local blends. Includes a worked tool-wear trial and two printable worksheets.

For aerospace manufacturing engineers, MRO planners, technicians and inspection teams.

MKTECH-TA-AERO-009 / 2026 EDITION

NOVEMBER 2026

01 / PURPOSE AND NAVIGATION

Start with the feature

An airfoil section, a root and a thin edge each need a different contact strategy and inspection plan. Use this guide to turn the governing feature requirements into controlled finishing work.

Classify the feature

Map the work zone, protected form, initial condition and allowed removal.

Specify the process

Select approved tooling and support for the material and geometry. Define the operating range and checks.

Verify at the right points

Record profile, edge, texture and any required non-destructive testing as distinct acceptance checks.

Find the right section

Feature-to-process selection	03	Troubleshooting and holds	10
Airfoils and section profile	04	Worked tool-wear trial	11
Roots and attachment form	05	Process measures and handover	12
Edges and local blend zones	06	Feature planning worksheet	13
Alloy behaviour and tooling	07	Station and verification log	14
Standard work and tool condition	08	Technical references	15
Geometry and surface verification	09	MKTECH application support	16

Set the technical boundary

Use the authorised route for the specific part

For manufacture, use the applicable drawing, process specification and customer requirements. For maintenance, use current applicable maintenance data and the approved repair data required for the task. The responsible organisation controls capability, disposition and release. [1-3]

MRO = maintenance, repair and overhaul. NDT = non-destructive testing. CMM = coordinate measuring machine. Lay = predominant direction of the surface pattern.

02 / FEATURE-TO-PROCESS SELECTION

Classify the feature and the work

Mark the operation on a controlled drawing or work map. Tie the location to the correct part revision or configuration, and define the evidence needed before abrasive contact. [1-4]

FEATURE	WHAT MUST REMAIN WITHIN LIMITS	PLAN BEFORE CONTACT
Airfoil or contoured surface	Section profile and transitions at the specified locations.	Define section stations, datum alignment, permitted contact zone and the profile measurement route.
Root or attachment	Fit, bearing surfaces, fillets, local form and specified surface treatment.	Identify protected contact faces, access restrictions, approved fixtures and the applicable gauge or program.
Leading or trailing edge	Edge shape, radius or remaining thickness at the required stations.	Define the protected edge, allowed removal and the independent edge inspection.
Local blend or repair zone	Removal boundary, remaining stock and transition into surrounding material.	Map the indication, check previous repair history where required and confirm the approved disposition.

Resolve interfaces between features

A permitted airfoil operation may approach a protected root or edge. Assign a separate control and check to each affected feature. Use the inspection sequence required by the actual work instruction.

Manufacturing record

Identify drawing revision, process route, fixture, control plan and customer acceptance.

Maintenance record

Identify part status, applicable maintenance data, damage disposition and required repair authority.

Hold unclear zones, missing limits or unverified component status for authorised disposition before work. [1-3]

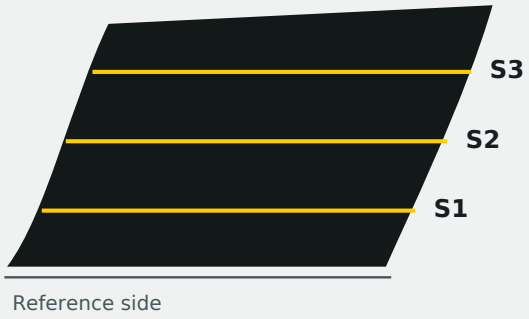
03 / AIRFOILS AND SECTION PROFILE

Control the profile by station

Identify the required sections and sides of the airfoil, then define the reference alignment and measurements used to compare as-found, in-process and final form. [4, 5]

Example station map for a contoured specimen

ILLUSTRATIVE ELEVATION / NOT TO SCALE



Use the specified stations
Confirm the datum reference, section locations and required profile or edge checks. Set the inspection program and sampling plan before work.
S1, S2 and S3 identify locations in the example. Use the actual drawing or task data.

01 **Establish the as-found section record**
Locate the indication or machining pattern at the named station and side. Record the relevant profile, edge or thickness readings and the governing limit.

02 **Control the intended contact zone**
Use the specified fixture, support and stage limits. Inspect at the defined stops for local flats, edge change or movement of the finishing boundary.

03 **Compare the same feature after finishing**
Use the authorised alignment, probe or inspection method and sampling. Keep station results and any local excursions with the inspection record.

Use the alignment required by the job
A change in fixture, datum or alignment can change the reported profile. Resolve measurement-method differences before assessing part conformance. [4]

04 / ROOTS AND ATTACHMENT FORM

Protect the load-bearing form

Start with the attachment geometry and the approved access path. Locate the surfaces used for fit, load transfer and inspection, and establish which features are protected by the governing data. [1-4]

ROOT DETAIL	DEFINE BEFORE WORK	VERIFY AND RECORD
Bearing or mating faces	Required contact geometry, protected faces and any limitations on allowable finishing.	Specified fit or dimensional check, location, gauge or program, and actual result.
Fillet, flank or transition	Required form, radius and local boundary. Confirm the approved tool and support for access.	Specified profile or radius check at the mapped feature, including any required inspection report.
Treated or coated zone	Identify coating, peening or other specified surface condition and the authorised treatment sequence.	Treatment status and required verification or disposition before handover.
Restricted or uncertain access	Check that the approved tool and inspection method can reach the feature without disturbing its neighbours.	Proof of approved setup and inspection access, or an engineering hold.

Record the setup that preserves repeatability

Capture fixture identity, location and orientation, tool or holder geometry and the protected surfaces. Record any required calibration or reference checks for the fit and form measurement.

Access

Use the approved setup for both finishing and inspection. Route restrictions to the process owner.

Disposition

Hold the affected feature if fit, form or required treatment is uncertain.

05 / EDGES AND LOCAL BLEND ZONES

Check edges and removal allowance

Define the applicable edge requirement and permitted blend boundary before work. Check the edge as its own feature even when the nearby finish meets its requirement. [1-5]

CHECKPOINT	EDGE CONTROL	LOCAL BLEND CONTROL
Before abrasive work	Record section location, required edge shape and applicable remaining thickness or radius.	Map the indication and approved work zone. Check removal limits and previous work where required.
After the first permitted stage	Inspect at the designated position for any change to radius, contour or thickness.	Record readings at the same identified locations and check how much allowance remains.
Before another correction	Verify the specific edge remains within the allowable condition for further work.	Reconcile cumulative removal. Route an unresolved indication or uncertain margin for disposition.
Before handover	Verify the specified final edge condition and adjacent profile independently of texture.	Check the transition, permitted boundary and required surface or NDT evidence.

Preserve the original evidence

Record the start location and existing condition before correction. Use comparable datum-based readings where the instruction requires before-and-after comparison. Keep inspection, removal and rework history traceable.

Pause for disposition when the allowance is uncertain

Hold work if the indication remains at the removal limit, the edge changes unexpectedly or a protected surface is affected. Obtain the authorised disposition and reinspection plan before resuming. [1-3]

06 / ALLOY BEHAVIOUR AND TOOLING

Match media to material and form

Confirm the actual alloy, condition, geometry and surface treatment. Use the approved media, backing and process range for the job. The matrix identifies what to review. [6-9]

MATERIAL OR CONDITION	RISK TO REVIEW	CONTROL TO DEFINE
Nickel-base superalloy	Tool wear and thermal effects can change the surface and near-surface condition in some grinding routes. [6, 7]	Specify the tool condition, contact window and thermal or material checks required by the process.
Titanium alloy	Loading or smeared material may change the cut and surface. Assess the specific dust hazards. [6, 11]	Control tool condition, contact and approved residue handling. Verify the required surface evidence.
Corrosion-resistant alloy	Media transfer, retained residue or a changed scratch pattern near the feature.	Follow the specified segregation, cleaning and inspection route for the alloy and stage.
Composite or mixed construction	Material-specific damage and residue at the surface or interface. Assess exposure and dust control. [8, 10]	Use the approved composite or mixed-material process and its specified inspection and cleaning route.

Identify the full abrasive system

Feature fit

Record the product family, code, grade, point shape or backing and the approved contact area.

Assembly limits

Confirm tool, holder, mounting, guards and applicable operating limits for all installed items. [9]

Have the responsible safety team verify extraction, dust handling and exposure controls for the materials and operation. [9-11]

07 / STANDARD WORK AND TOOL CONDITION

Define the contact method

Document the approved method at the operation level. Include the contact area, direction, permitted pass or time rules, setup and inspection checkpoints for the exact feature.

01 **Identify the authorised work and setup**
Record part and feature, drawing or repair data revision, work instruction, tool, fixture, media and support. Confirm equipment and any required measurement checks.

02 **Define how the contact is controlled**
Use the specified approach, direction, support and operating range. Specify pressure or force, dwell and fluids only where the approved instruction defines them.

03 **Check the finish and form at the stage gates**
Verify as-found state, permitted removal and intermediate profile. Confirm prior-stage scratches have cleared to the required condition before changing grade.

04 **Record wear and change criteria**
Identify the approved tool or media condition and replacement criteria. Record loading, loss of cut or a change in finish and the last accepted check.

05 **Control the restart after a change or pause**
Check the setup and feature as required after a media change or shift handover. Transfer open holds, recorded results and any work remaining.

Record changes at the right level

Compare the full assembly and approved conditions before accepting another product. A grade label leaves differences in grain, construction, backing and contact behaviour. Use the applicable change process. [1, 3, 9]

Keep the job within its approved process range

Escalate deviations to engineering and quality. Record any approved change to equipment, media, support, technique, inspection or cleaning before applying it.

08 / GEOMETRY AND SURFACE EVIDENCE

Verify each required characteristic

Agree the instrument, inspection location, alignment, method and decision rule before finishing. Record the evidence at the stage required by the governing data. [1, 3-5]

CHARACTERISTIC	METHOD TO DEFINE	EVIDENCE TO RETAIN
Profile, fit and form	Specify the gauge, CMM or other approved method, the reference alignment, section locations and sampling.	Fixture and program revision, instrument ID, actual profile or size results, and acceptance reference.
Edge, radius and remaining stock	Check the defined edge locations and method. Use comparable readings to assess change where required.	Location, initial and subsequent results, units and remaining allowance decision.
Texture and lay	Specify the parameter, trace direction, filter or cutoff, evaluation length and measurement location as applicable.	Instrument and settings, individual readings with units and required lay or visual condition.
Visual and material condition	Use the specified lighting or inspection aid. Use the prescribed test for thermal or material effects where called up.	Observed condition, location, any follow-up report and authorised disposition.
NDT where specified	Use the approved technique, sequence and personnel requirements for the actual feature and indication.	Procedure and revision, coverage, report reference and disposition.

Keep the measurement settings stable

If access, temperature, probe, alignment or uncertainty affects a result, document the issue and obtain the approved metrology disposition. Keep the original data and any authorised repeat readings. [4, 5]

> **Verify required properties independently**
>
> A profile check, a texture result and an NDT report answer different questions. Record the evidence for every applicable requirement before handover.

09 / TROUBLESHOOTING AND HOLDS

Diagnose faults before rework

Preserve the part condition, identify the last acceptable check and retain the process evidence. Use the applicable nonconformance or repair disposition route for changes to the work. [1-3]

OBSERVED CONDITION	REVIEW POSSIBLE CONTRIBUTORS	IMMEDIATE ACTION
Heat tint or suspected thermal effect	Tool loading or wear, contact, dwell, approved fluid delivery or an operating deviation.	Hold the part and preserve the surface. Obtain the required material assessment. [6, 7]
Flat or local profile shift	Support, contact path, fixture movement, or a change to the measurement datum or sampling.	Check the documented setup and use the approved profile method. Obtain disposition.
Root or edge rounds unexpectedly	Tool reach, backing compliance, contact outside the zone or cumulative removal.	Hold the affected feature. Verify its form and determine what further work is authorised.
Persistent or new scratch	An earlier-stage mark, carried abrasive, tool debris or contact in handling.	Record the indication and review remaining allowance before authorised correction.
Loading or loss of cut	Media and workpiece compatibility, tool condition, contact or a change to the approved setup.	Stop the affected operation, document the condition and review parts since the last accepted check.
Results vary by operator or shift	Setup, support, permitted direction, stage inspection or different starting condition.	Compare work records and measurements. Align the approved instructions and verify repeatability.

Keep uncertainty out of the next operation

Quarantine or otherwise control affected work as required. Keep the part, station, operator, tool state and any open inspection or disposition linked in the work record.

Preserve an uncertain indication

If an indication could require further inspection, obtain the prescribed assessment before another abrasive stage changes the evidence. [1-3]

10 / WORKED QUALIFICATION TRIAL

Test the finish across tool life

Illustrative trial on contoured, non-flight training specimens. The question is whether a candidate backing system preserves section profile across the approved tool-use window.

01

Match the specimens and measurement setup

Use comparable material condition, geometry and starting surface. Keep datum, inspection program and section locations S1 to S3 fixed for both arms.

02

Compare three defined tool conditions

Run baseline A and candidate B with comparable new, mid-use and late-use media within the authorised trial window. Record tool condition and use the protocol's stop criteria.

03

Retain the results by station and tool condition

Record profile and specified finish checks, change reasons and failures. Review each condition separately before deciding whether the candidate is repeatable.

Illustrative section-profile results

CONDITION	BASELINE A PASSED	CANDIDATE B PASSED
New media	6 / 6	6 / 6
Mid-use media	6 / 6	6 / 6
Late-use media	6 / 6	4 / 6
All profile checks passed	18 / 18	16 / 18

Investigate the late-use result

Both candidate failures occur at S3. Retain the profiles and media records. Investigate contact and tool condition with engineering and agree the scope of any repeat trial before releasing a change.

The counts illustrate a decision on training material. The job specification and approved qualification plan set the actual limits, sample size and release requirements.

11 / PROCESS MEASURES AND HANDOVER

Track finishing repeatability

Track results by feature, tool condition and operation. Use them to understand variation while applying the job's approved acceptance criteria to each part or lot.

MEASURE TO TRACK	DEFINE THE BASIS	WHAT TO REVIEW
First-pass geometry yield	Parts meeting all required geometry checks at first inspection ÷ starts in the comparison scope.	Report holds separately. Review which stations, features and tool conditions drive failures.
Media use and change reasons	Record media or tool changes per defined quantity of attempts or work completed.	Review wear, loading and changes by stage alongside the inspection results.
Rework and holds	Count parts affected, approved rework and repeat inspections by reason.	Review repeated local errors, remaining allowance and completeness of the disposition.
Record completeness	Check required identity, setup, results, traceability and sign-offs for the work order.	Confirm the actual configuration and evidence support the handover and any release decision.

Make the handover traceable

Record the last accepted stage, part or lot identity, applicable data and revision, protected zones, required inspection evidence and unresolved work. Keep authorised changes and deviations with the job.

Keep release authority with the responsible organisation

In manufacture, follow the approved quality and customer process. For CAAM Part 145 maintenance, route the completed records to appropriately authorised certifying staff for the applicable release. [1-3]

12 / REUSABLE WORKSHEET A

Plan the finishing operation

Print one copy per feature or trial. Attach the drawing or work map and applicable process, maintenance or repair data. Enter the limits and references from the approved work documents.

JOB OR TRIAL ID / OWNER / DATE

PART / SERIAL OR LOT / REVISION

FEATURE / MATERIAL AND CONDITION / AS-FOUND STATE / TREATMENT

APPROVED ZONE / PROTECTED SURFACES / DATUM / REMOVAL ALLOWANCE

CONTROL ITEM	APPROVED SETUP OR REFERENCE	ACCEPTANCE CHECK OR RECORD
Fixture and part orientation		
Tool, media and support		
Direction and contact method		
Permitted process and media change		
Intermediate and final verification		

INSPECTION STATION IDS / REQUIRED SEQUENCE AND METHODS / NDT REFERENCE

HOLD CRITERIA / DISPOSITION AUTHORITY / AUTHORISATION AND DATE

Use worksheet B or the authorised work record for measured results.

13 / REUSABLE WORKSHEET B

Record station and surface checks

Print one copy per part or specimen as defined in the plan. Use the same mapped feature locations for comparable readings and record actual values with units.

WORK ORDER OR TRIAL / DATE / OPERATOR

PART / SERIAL OR LOT / FEATURE MAP

TOOL, MEDIA AND FIXTURE / INSPECTION PROGRAM OR GAUGE AND CALIBRATION REF.

STATION OR FEATURE	METHOD / LIMIT REF.	AS FOUND	IN PROCESS	FINAL / STATUS
Section S1 or location				
Section S2 or location				
Section S3 or location				
Root, edge or protected zone				
Finish or other check				

MEASUREMENT UNITS / ALIGNMENT AND SETUP / NDT OR MATERIAL REPORT REFERENCES

Complete the required handover checks

- ☐ Required station readings and independent geometry and finish results are traceable.
- ☐ Tool changes, cleaning and inspection records are attached where required.
- ☐ Holds, deviations and authorised disposition are recorded.

REMAINING ALLOWANCE OR DEVIATION / SUPPORTING REPORT / HOLD OR NEXT OPERATION

VERIFIED BY / DATE / TIME

AUTHORISED STATUS AND RECORD REFERENCE

Use the applicable organisation's controlled work and release records. [1-3]

14 / TECHNICAL REFERENCES

Source notes and further reading

Use the current governing data for the job. The sources below support the principles and measurement methods described in the guide.

[1] CAAM CAD 8601 | Maintenance Organisation Approval OPEN
Part 145 requirements for maintenance data, performance, certification and records.

[2] CAAM CAD 6801 | Continuing Airworthiness of Aircraft OPEN
Part M provisions on continuing airworthiness and repair data.

[3] CAAM CAGM 8601 | Part 145 guidance OPEN
Guidance on maintenance data, planning and performance of maintenance.

[4] NPL | CMM measurement strategies OPEN
Sampling, part loading, alignment and other influences on CMM results.

[5] NIST | Surface roughness and step height calibrations OPEN
Surface measurement conditions, parameters and sources of uncertainty.

[6] University of Birmingham | Titanium and nickel point grinding OPEN
Study of workpiece condition, wheel loading and surface effects.

[7] Curtis et al. | Inconel 718 grinding and surface integrity OPEN
Study of wheel specification, near-surface response and residual stress.

[8] U.S. FAA AC 43-214A | Composite and bonded structure OPEN
Technical background on procedures and controls for composite repairs.

[9] FEPA | Abrasive product safety publications OPEN
Product-family guidance on compatibility and safe use.

[10] DOSH Malaysia | Local exhaust ventilation guidance OPEN
Design, inspection and testing of local exhaust ventilation systems.

[11] U.S. OSHA | Combustible dust overview OPEN
Technical background on dust hazards, including certain metal dusts.

MKTECH handbook and product resources

022 Finish fundamentals →
023 Roughness and finish →
024 Scratch refinement →
042 Surface inspection →
046 Abrasive safety →
MKTECH products →

Expanded from MKTECH-TA-AERO-009. Illustrative images come from the supplied guide. Confirm directive revisions in the CAAM directives index. Sources accessed November 2026.

15 / MKTECH APPLICATION SUPPORT

Share the feature and the process

MKTech Industry Sdn Bhd supports industrial abrasive selection and supply enquiries from Petaling Jaya, Malaysia. Share the application details that you are authorised to disclose.



DEFINE THE APPLICATION

Which feature are you finishing?

Provide the material, protected geometry, current abrasive system and the required surface and inspection. Include the scope of any authorised product comparison.

Include these details with the request

Feature and boundary

Part family, material condition, finish objective and protected geometry.

Tool and consumable

Current tool, holder, media code and grade, contact method and tool-change condition.

Trial and supply

Required evidence, quantity, delivery location and authorised contact.

Contact MKTECH →

Browse products →

Open handbook →

sales@mktechindustry.com · +60 3 5626 4639

Use the responsible engineering and quality process

MKTECH can discuss product specifications and supply. The responsible organisation controls approved process limits, qualification, inspection and release.