

TECHNICAL APPLICATION GUIDE

MKTECH INDUSTRY SDN BHD

MKTech Industry Sdn Bhd

HEAVY FABRICATION ABRASIVE ROI

Measure grinding cost per accepted component

Weld preparation, tool selection, trial design and a worked return-on-investment example. Includes two printable shop-floor worksheets.

For fabrication managers, production engineers, supervisors, quality teams and industrial buyers.

MKTECH-TA-HF / 2026 EDITION

NOVEMBER 2026

01 / PURPOSE AND NAVIGATION

Measure cost on work that passes

Compare abrasives on accepted output under representative conditions. Disc price, grinding time and disc life each explain part of the result.

Define the operation

Identify the weld or edge condition, permitted removal, tools and acceptance criteria.

Run a fair trial

Pair comparable work and operators. Track grinding, changes, consumables and rework.

Make the buying decision

Compare quality first, then cost per accepted unit and the value of any time released.

Find the right section

Weld and finish requirements	03	Troubleshooting	10
Incumbent baseline	04	Worked accepted-part cost	11
Abrasive and tool selection	05	Payback and price ceiling	12
Compatibility and safety	06	Trial planning worksheet	13
Standard work and wear	07	Production trial log	14
Controlled A/B trial	08	Technical references	15
Quality and acceptance	09	MKTECH application support	16

Set the technical boundary

Use the drawing and approved work instruction

The responsible engineering and quality teams define the permitted operation and acceptance criteria. Follow the tool and abrasive instructions and site safety controls. Changes to a load-bearing weld, weld repair or specified finish require the applicable authorisation. [1-6]

A/B = incumbent and candidate comparison. WPS = welding procedure specification. EHS = environment, health and safety. ROI = return on investment. RM = Malaysian ringgit.

02 / WELD AND FINISH REQUIREMENTS

Define the accepted finish first

Identify whether the job is weld cleanup, a defined profile change, edge preparation or blending. Use the drawing, inspection plan and coating specification to establish the endpoint. [3, 4]

TYPICAL OPERATION	CONFIRM BEFORE GRINDING	EVIDENCE FOR ACCEPTANCE
Spatter or cleanup	Mark the area and the features to protect. Check if spatter removal is permitted at the joint and surrounding surface.	Agreed visual check and no damage to protected features.
Weld cap or transition	Confirm allowable profile, base-metal removal and required checks. Route cracks, suspected defects or structural changes through the approved welding procedure.	Profile or geometry readings and any required inspection report.
Edge for coating	Identify the specified edge condition, preparation grade and coating handover requirements. Check adjacent faces, holes and fit surfaces.	Edge and local preparation checked by the specified method. Coating handover documented.
Directional or visible finish	Identify accepted appearance and lay, boundary, blend zone and any roughness or profile requirement.	Approved visual standard, measurements where required and inspection location.

Mark what may be touched

Identify the working zone and the surfaces that retain their dimensions or profile. Record the as-found condition and agree where to check after stock removal and after refinement.

Weld acceptance

Use the drawing and applicable weld inspection criteria for the actual joint.

Coating handover

Verify the coating preparation requirements at their specified stage.

ISO 5817 and ISO 8501-3 cover different acceptance topics. Apply the requirements called up for the job. [3, 4]

03 / EXISTING PRODUCTION

Capture the incumbent baseline

Choose a repeatable work unit such as one bracket or a defined length of equivalent weld. Record the current material, starting weld profile, tools, operators, shift and endpoint.

MEASURE	AGREE THE COUNTING METHOD	WHY IT MATTERS
Starts and acceptance	Count all trial starts. Separate first-pass accepted, accepted after authorised rework, held and rejected.	Preserves the original denominator and records the cost of poor yield.
Active finishing time	Time from first abrasive contact to the agreed operation endpoint, excluding separately timed stops and rework.	Shows the time spent on the defined work scope.
Changes and interruptions	Time each abrasive change and planned adjustment. Record unrelated delays separately with reason codes.	Separates product-related time from queueing, handling or other interruptions.
Abrasive consumption	Track issue, return, part-used media and discard reason by code. Agree how to account for usable carryover.	Links abrasive cost to actual consumption and allows an auditable comparison.
Rework and other cost	Time authorised rework and record incremental media, labour and any agreed scrap or disposal cost.	Captures the consequence of finishing failures without charging the same time twice.

Normalise for the work actually done

Match the work before comparing minutes per part or metres per disc. A heavier or irregular weld changes the removal demand. Where products differ materially, compare within each defined part or weld group.

> **Keep one timing basis for both arms**
>
> Agree which checks, adjustments and handling are in scope. Record any time already included in the labour total before adding a separate downtime charge.

04 / ABRASIVE SYSTEM SELECTION

Choose media for the operation

Select the abrasive together with the machine, mounting or backing and the required result. Check manufacturer compatibility for the material and operation before comparing cost. [1, 2]

PRODUCT FAMILY	WHERE TO EVALUATE IT	RECORD AND CHECK
Bonded grinding wheel	Approved weld stock removal or shaping where access, geometry and tool setup permit.	Wheel type, grain or grade, size, bore, tool and guard. Check removal and profile after the pass.
Flap disc	Weld blending or scratch refinement when its shape and backing suit the work zone.	Grain, grit, profile and backing. Check edge rounding, cut rate and the finishing pattern.
Fibre disc	Surface grinding or refinement with an approved backing pad and attachment.	Disc grade, pad and support. Check the resulting profile and uniformity at the transition.
Mounted point or burr	Local features or restricted access where the specified route permits the tool.	Shape, shank, holder and applicable mounted limits. Verify the feature after removal.
Nonwoven abrasive	Surface conditioning, directional finish or blend work when the job permits it.	Product construction, grade and support. Check lay, residue and the required finish.

Keep compatibility separate from trial preference

Use the product data for the exact metal and task. A common grit label leaves differences in grain, backing, bond and support. Record the full product code and approved assembly when comparing alternatives.

Control material transfer

When the job requires segregation, identify dedicated tooling and media for the alloy or finish. Verify the specified cleaning and downstream inspection before handing the work over.

05 / SAFE AND REPEATABLE SETUP

Verify the whole tool assembly

Use the instructions for the exact grinder, abrasive and attachment. The site approves the work-area controls, supervision and operator training before the trial. [1, 2, 5-7]

01 **Check application and speed compatibility**
Verify that the abrasive is specified for the operation, the grinder and the material. Check the permitted speed, diameter, mounting, support and guard for the complete assembly.

02 **Inspect and fit under the site procedure**
Check markings, storage condition, damage and expiry where applicable. Fit with the specified flanges, pad or holder, following the equipment isolation and setup procedure.

03 **Secure the work and prepare the area**
Confirm support, access and the operator's safe working position. Use the site's measures for sparks and hot work, adjacent equipment and combustibles.

04 **Control exposure for the actual task**
Review dust, extraction, noise and protective equipment with EHS. Include any coatings and combustible metal dust in the hazard assessment. [5-7]

05 **Agree stop and change criteria**
Stop using damaged or abnormal equipment and follow the site procedure. Record the approved media wear limit and practical change criteria for both trial arms.

Match the product to its permitted use

Use a cutting wheel for its specified cutting operation and a grinding product for its permitted grinding operation. Follow the product and tool instructions for orientation and loading. [1, 2]

Record the tool's applicable no-load speed and the rated limits for the wheel and support. Check the actual combination against the instructions before approval. [1, 2]

> **Compatibility is a trial gate**
> Hold any incompatible assembly or missing control for review. Start the comparison after the responsible team has accepted the setup and safe working conditions.

06 / STANDARD WORK

Control the pass and the handover

Use the authorised sequence for the part. Document how the operator identifies the endpoint and records the media condition at each change.

STAGE	CONTROL THE WORK	WHAT TO CAPTURE
Before first contact	Mark permitted zones and verify the as-found weld or edge. Check the approved abrasive assembly, work support and setup.	Starting condition, part and operator IDs, and product, tool and fixture references.
Remove authorised stock	Use the specified contact method and work zone. Check geometry at the agreed holds to preserve the base material and required profile.	Active time and stock condition. Record abnormal heat, gouging or tool behaviour.
Blend or refine	Follow the approved sequence and protect adjacent features. Match the required scratch pattern or preparation endpoint for the next operation.	Abrasive change, stage time and result against the local acceptance check.
Verify and hand over	Check the required weld and finish characteristics. Follow the site procedure for any nonconforming part.	First-pass and final status, report references and any authorised rework.

Document why a disc came off the tool

Record wear limit reached, loss of cut, loading, damage, job end or a grade change. Keep usable carryover separate from spent media. Use the same accounting rule across the trial.

Grinding time

Record the active operation using the agreed start and stop definitions.

Change time

Capture swap, check and restart separately when the cost model includes them.

07 / CONTROLLED COMPARISON

Match work in both trial arms

State what the trial will decide. For example, compare two disc systems for blending the same family of carbon-steel weldments after confirming both setups and the acceptance criteria.

01 **Fix the scope and outcome**
Name the incumbent and candidate assemblies, operation and primary metric. Agree sample size and operator coverage for the job's variability and risk.

02 **Match work and starting conditions**
Use the same part family, material, weld profile range, access and finish requirement. Record the welding reference and as-found condition for each matched block.

03 **Balance operator and order effects**
Run both products with each participating operator where feasible. Vary order across matched blocks and record any practice runs, interruptions or setup changes.

04 **Keep the inspection criteria fixed**
Use the same checks and rejection rules in both arms. Record each hold, failure, authorised rework and setup deviation in the trial record.

Example of a balanced run order

MATCHED BLOCK	OPERATOR 1	OPERATOR 2
Comparable parts, early shift	A then B	B then A
Comparable parts, later shift	B then A	A then B

Report the scope of the result

If the tool, support or sequence changes along with the disc, report a comparison of complete systems. Review results by operator and part group before combining totals.

08 / INSPECTION AND ACCEPTANCE

Keep quality separate from speed

Agree the result before the trial starts. Inspect at the required stage and record actual readings or references to the controlled inspection record. [3, 4, 8]

CHECK	WHAT THE INSPECTOR VERIFIES	WHAT TO RECORD
Weld and base material	Specified joint profile, remaining section and permitted condition of the weld and adjacent metal.	Location, gauge or inspection method, limit source and measured or classified result.
Edge and downstream readiness	Required edge, transitions, cleanliness and preparation condition for the next operation.	Zone, agreed inspection method and handover condition.
Surface texture or appearance	Specified visual finish, lay or profile where the job calls for it. Use the specified measurement method.	Location, reference sample or parameter, instrument and result.
Nonconformance and rework	Hold items outside the criteria for authorised disposition. Reinspect after authorised corrective work.	Failure mode, cause review, rework and final acceptance or rejection record.

Report first-pass and final yield

First-pass yield

Parts accepted at first inspection ÷ all parts started. A lower result can signal extra work hidden by final yield.

Final yield

Parts finally accepted ÷ all parts started. Include accepted items after authorised rework and show any unresolved holds separately.

Review results at the feature level

Compare failures by part family, operator and location. Resolve out-of-limit results under the site procedure and record which assemblies and operations the approved result covers.

09 / FAULT ISOLATION

Investigate what changed

Use the observed symptom to guide the investigation. Keep the part, product code, operating conditions and last acceptable result traceable.

OBSERVED SYMPTOM	REVIEW POSSIBLE CONTRIBUTORS	ACTION AND EVIDENCE
Slow cut or glazed face	Product and material compatibility, actual contact, tool performance, wear or loading.	Record time and wear condition. Review the approved grade or setup with the process owner.
Short life or rapid wear	Starting weld size, part variability, grade, application, storage or work technique.	Compare on matched welds. Record each discard reason and media consumed.
Gouge or rounded edge	Tool support, access, work boundary, media shape or the authorised removal sequence.	Hold the part. Check profile and remaining material and obtain disposition.
Deep scratch after blending	Previous-stage marks, carryover of coarser particles, fixture contact or support damage.	Record the pattern and zone. Review the permitted correction and inspect after any rework.
Vibration or abnormal sound	Assembly, seating, media damage, wear, tool condition or workpiece support.	Stop and isolate under the site procedure. Escalate for inspection before restarting. [1, 2]
Variation between operators	Differences in starting work, timing, contact or interpretation of the finish standard.	Review results by operator and matched block. Align the work and inspection instructions.

Keep rejected runs visible

Log unexpected conditions and excluded measurements with reasons. Retain affected runs in the record and show how the exclusions influence the interpretation.

Treat a repair as a controlled operation

Escalate suspected weld defects and out-of-tolerance profiles through the approved engineering and quality process. [3]

10 / WORKED COMPARISON

Calculate cost per accepted part

Illustrative comparison on 100 comparable starts per arm. The model uses a loaded labour rate of RM60/hour, or RM1/minute, and the same included cost scope in both arms.

TRIAL INPUT OR RESULT	INCUMBENT A	CANDIDATE B
Started / first-pass accepted / finally accepted	100 / 96 / 98	100 / 98 / 99
Discs consumed × unit cost	26 × RM9	17 × RM13
Included abrasive cost	RM234	RM221
Grinding / changes / authorised rework	480 / 70 / 35 min	390 / 45 / 15 min
Included labour time and cost	585 min / RM585	450 min / RM450
Included process cost	RM819	RM671
Included cost per finally accepted part	RM8.36	RM6.78

Cost per accepted part = included process cost ÷ finally accepted parts

Using unrounded figures, included cost is about 18.9% lower in this example. Processing time and abrasive consumption include the work on unsuccessful starts. Scrap material value, equipment and disposal charges are outside this example's cost scope.

Compare the result with the quality record

First-pass acceptance is 96% for A and 98% for B. Final acceptance is 98% and 99%. Review the individual failures and the repeatability of the result before accepting the candidate.

Time per accepted part

A uses 5.97 min and B uses 4.55 min, including changes and authorised rework.

Media per 100 accepted parts

A uses about 26.5 discs and B about 17.2 discs on the same normalised basis.

All values are hypothetical. Use the actual consumption, labour rates, quality data and cost scope for your comparison.

11 / ROI AND PROCUREMENT

Separate cash savings and capacity

Use the accepted-part costs from page 11. In this illustrative model, the same job runs at 1,000 accepted parts per month and requires RM2,400 in one-time implementation cost.

DECISION INPUT	ILLUSTRATIVE RESULT	HOW TO INTERPRET IT
Modelled process-cost reduction	About RM1,579 per month using the included media and labour cost per accepted part.	The labour element values time released. Check whether it reduces paid hours or frees usable capacity.
Recurring media cost reduction	About RM155 per month using media spend per accepted part.	This is the model's direct consumables saving at the stated volume and prices.
Simple cash payback	About 15.4 months using only the media saving.	Assumes constant volume, prices and no added recurring cash costs.
12-month cash ROI	About -22.3% using only the media saving and the one-time cost.	Calculate (12 months of savings minus one-time cost) ÷ one-time cost.

Calculate the candidate's cost-parity price

Multiply the incumbent cost per accepted part by the candidate's accepted count. Subtract candidate costs other than discs and divide by the discs consumed. Using the example's unrounded values, the candidate reaches cost parity at about **RM22.20 per disc** if usage, labour, yield and the cost scope hold.

Record the commercial assumptions with the approval

State the monthly volume, time that can be used or saved, product price and expected additional costs. Review the calculation if the work mix, disc consumption or acceptance changes.

12 / REUSABLE WORKSHEET A

Plan the abrasive comparison

Print one copy per trial. Agree the work unit, representative conditions, cost scope and acceptance checks with production, quality and EHS before starting.

TRIAL ID / DATE / OWNER

PART OR WELD GROUP / DRAWING REV.

MATERIAL / STARTING WELD OR EDGE RANGE / WORK UNIT / WPS OR PROCESS REFERENCE

REQUIRED GEOMETRY, PREPARATION OR FINISH / INSPECTION METHOD / LIMIT SOURCE

CONTROL TO AGREE	INCUMBENT A	CANDIDATE B
Abrasive code, grade and price		
Tool, backing and setup		
Expected operators and blocks		
Change and stop criteria		
Inspection and disposition		

TIMING DEFINITIONS / LABOUR RATE / MEDIA ISSUE, RETURN AND CARRYOVER BASIS

COST SCOPE AND EXCLUSIONS / OUTPUT MEASURE / ACCEPTANCE AND DECISION OWNER

AUTHORISED BY / DATE / SAFE SETUP AND TRIAL CONDITIONS REFERENCE

Capture each run on worksheet B or in the controlled trial record.

13 / REUSABLE WORKSHEET B

Record runs, time and acceptance

Use one copy per trial block. Attach part-level inspection and media records as required. Use separate columns for active time, changes and authorised rework.

TRIAL ID / BLOCK / DATE / SHIFT

WORK UNIT / OPERATOR AND PART IDS

PRODUCT CODES AND LOT / TOOL / TIMING AND ACCEPTANCE REFERENCES

RUN / PART	OP. / ARM	GRIND MIN	CHANGE MIN	REWORK MIN	MEDIA	RESULT
1						
2						
3						
4						
5						

DISCS ISSUED / RETURNED USABLE / SPENT / CHANGE OR DISCARD REASONS

A TOTALS / FIRST-PASS AND FINAL ACCEPTED

B TOTALS / FIRST-PASS AND FINAL ACCEPTED

Close out the block

- ☐ Start, hold, rejection and authorised rework records reconcile with the accepted count.
- ☐ Abrasive cost, active time and separately timed change or rework are reconciled.
- ☐ Deviations and inspection reports are attached.

OBSERVATIONS / DEVIATION AND DISPOSITION / SIGNED OFF BY AND DATE

Result can be first-pass accepted, held, accepted after authorised rework, or rejected. Record final status for each start.

14 / TECHNICAL REFERENCES

Source notes and further reading

Check the current revision of the governing job documents. Select the references and handbook chapters below for supporting information.

[1] FEPA | Bonded wheels on angle grinders
Compatibility and use recommendations for cutting and grinding wheels.
OPEN

[2] FEPA | Abrasive product safety publications
Safety resources for bonded, coated and other abrasive product families.
OPEN

[3] ISO 5817 | Quality levels for weld imperfections
Reference for specified fusion-welded joints. Apply the project requirements.
OPEN

[4] ISO 8501-3 | Preparation grades for welds and edges
Visual preparation grades for steel surfaces before painting.
OPEN

[5] DOSH Malaysia | Local exhaust ventilation guidance
Design, commissioning, inspection and testing of LEV systems.
OPEN

[6] DOSH Malaysia | Occupational noise control
Workplace noise assessment and control guidance.
OPEN

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

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

MKTECH Industrial Abrasives Handbook

014 Weld grinding →
061 Unit price and total cost →
062 Cost per accepted part →
063 Controlled product trials →

Developed from MKTECH-TA-HF-008. Images are illustrative and come from the supplied guide. Web references accessed November 2026.

15 / MKTECH APPLICATION SUPPORT

Share the fabrication operation

MKTech Industry Sdn Bhd supports abrasive selection and supply enquiries from Petaling Jaya, Malaysia. Bring a description of the work and how you measure the accepted result.



DEFINE THE APPLICATION

What must the part pass?

Share the material, starting weld condition, permitted operation and inspection criteria. Include current abrasive consumption and work time if you want to compare process cost.

Include these details with the request

Work and finish

Material, part family, weld or edge condition, work scope and accepted finish.

Current setup

Grinder, support, media code, size, grit, change reasons and current usage.

Trial and supply

Trial scope, representative output, required quantities and delivery location.

Contact MKTECH →

Browse products →

Open handbook →

sales@mktechindustry.com · +60 3 5626 4639

Use the site's approval process

MKTECH can discuss product specifications and supply. The responsible site team controls tool compatibility, weld acceptance and production approval.