

MKTech Industry Sdn Bhd

TECHNICAL APPLICATION GUIDE

MKTECH INDUSTRY SDN BHD / ILLUSTRATIVE INDUSTRY IMAGE

STRUCTURAL STEEL FIT-UP PREPARATION

Cut edges. Protected connection faces. Recorded fit-up.

For structural steel fabricators, site supervisors, quality teams and project buyers.

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01 / PURPOSE AND NAVIGATION

Define the release before selecting the abrasive

A steelwork shop is preparing brackets for a bolted frame. The task is to finish the cut edges and remove burrs so the brackets seat to the approved detail. The trial compares the current method with a defined cutting and deburring sequence on the same bracket family.

Start from the approved connection detail. Control cut-edge finishing so the bracket retains its datums, hole pattern and specified contact surfaces through fit-up and coating.

Use the guide in three passes

Control drawing revision
Check the drawing revision, steel grade, fit-up datums and protected connection surfaces.

Protect holes and contact faces
Use the approved cut route and a separate deburring tool. Preserve holes, faces and marked datums.

Prove mating fit
Gauge the parts and check a representative mating assembly. Compare cost per accepted bracket.

Find the right section

WORKFLOW	PAGE	VALIDATION AND FIELD RECORDS	PAGE
Process and handover gates	03	Interface and release controls	09
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Scope and authority
The responsible engineer defines connection geometry, fit-up tolerances, permissible site modifications and faying-surface requirements. Use the approved drawing, fabrication instruction, tool manual and inspection plan.

The example scenario and cover photograph are illustrative. Use the job's approved requirements and record the actual site evidence.

02 / PROCESS AND HANDOVER GATES

Control every release between operations

Give the next operation a measurable condition, a named inspection and the status of any held work. Link each gate to the same part or zone ID.

01 Identify part | 02 Set datums | 03 Cut and deburr | 04 Gauge fit-up | 05 Release part

STAGE	CONTROL THE OPERATION	RELEASE EVIDENCE
Identify the part	Verify material, drawing revision, part ID, cut allowance, hole pattern and protected faces.	Traceable bracket and marked datums from the approved drawing.
Select the route	Use the specified saw, cutting or other process. Where abrasive cutting is permitted, confirm wheel compatibility and workholding.	Authorised method, guarded machine and secure support.
Deburr the edge	Use a separate abrasive for local burr removal and any specified edge treatment. Preserve faying surfaces and hole geometry.	Specified edge condition, with protected faces intact.
Check fit-up	Gauge length, squareness, hole position or condition and flatness as called up. Use a fixture or the approved mating part.	Recorded measurements and representative fit-up acceptance.
Release and label	Identify accepted brackets for the next operation. Route dimensional or fit-up deviations to the engineer.	QA record links part ID, results, hold status and coating or assembly release.

Make the handover traceable

Attach the drawing revision and bracket IDs to the measurement record. Keep the same approved datums in the shop and at fit-up. Record the disposition of any bracket requiring an engineering review.

Illustrative handover entry

Bracket B-17, drawing revision C. Part ID, inspection fixture and dimensional record match. Edge condition and protected contact face passed. A second bracket with a hole-position deviation remains on hold for engineering disposition.

03 / STARTING CONDITION

Read the connection before preparing the part

An abrasive decision starts with the approved detail, including the features that govern fit and the surfaces whose condition carries through to assembly.

AS-FOUND CONDITION	DECISION BEFORE WORK	CONTROL TO RECORD
Unverified drawing or part	Match material, bracket identification and drawing revision to the job traveller.	Hold until the part and its connection detail are traceable.
Cut allowance on a free edge	Find the cut line, finished dimension and specified edge preparation.	Use the authorised cut route and inspect from the named datum.
Burr near a hole or slot	Confirm the hole type, geometry and permitted edge treatment.	Remove only the authorised burr. Gauge the feature afterward.
Protected faying surface	Determine the specified contact-surface condition for the connection.	Protect the area through deburring, cleaning and coating.
Mismatched parts or forced fit	Check orientation, fixture, datum and actual hole positions.	Record the measured discrepancy and seek engineering disposition.
Distortion or severe edge damage	Check flatness and remaining dimension against the approved inspection plan.	Hold for QA and retain the part and evidence for review.

Record the starting condition before the first pass

A faying surface is a contact face between connected elements. For a slip-critical connection, the adopted specification and project detail govern its condition and treatment.

04 / ABRASIVE AND MACHINE SELECTION

Choose the complete working system

Identify the operation and required endpoint first. Confirm the abrasive, tool, guard, mounting and work control together before evaluating productivity.

OPERATION	FORMAT TO EVALUATE	CHECK BEFORE TRIAL
Permitted cut-off	Metal cut-off wheel designed for the alloy and machine.	Use for its declared cutting operation with the correct guard, support and wheel size.
Burr and edge cleanup	Grinding disc or flap disc suitable for the material and extent of removal.	Check the finished edge and bracket dimensions after deburring.
Local access	Compatible small abrasive where the approved work instruction allows it.	Protect bolt-hole geometry, seating faces and edges used as datums.
Faying-surface protection	Mask or segregate the surface where the fabrication specification calls for it.	Use the project-specified surface condition, especially for slip-critical joints.

Record these variables

Record the workpiece, abrasive construction and grade, product ID and dimensions, rated speed, tool model and setting, mounting and required guard or backing. Confirm the manufacturer's compatibility instructions for the exact setup.

Record workholding, access, extraction, required PPE and any permit or fire control. Agree the inspection method and abrasive change criterion before starting.

Use the operation to choose the tool

Cutting, deburring and surface preparation are separate operations. Match each abrasive to the steel and approved machine. Choose the fixture before the wheel so the cut is supported and the accepted datum can still be located afterward.

Follow the current machine and abrasive instructions for the exact setup. FEPA product-specific safety guidance is listed on page 15.

05 / STANDARD WORK

Prepare the bracket in a repeatable sequence

Use this work sequence as a template for an approved fabrication instruction. The detail drawing sets dimensional tolerances and permitted changes.

01 **Issue a traceable work card**
Match the bracket ID, steel grade and thickness to the latest drawing. Mark the datum, cut line, hole pattern and protected contact faces.

02 **Set the cut method and workholding**
Use the specified process and fixture. When abrasive cut-off is authorised, verify the wheel and machine system, permitted operation and spark controls.

03 **Verify the first cut against the datum**
Check length, squareness and the condition of the cut edge by the approved method. Identify distortion or inconsistent fixture seating before proceeding.

04 **Deburr with the designated abrasive**
Use a separate compatible deburring abrasive and stay within the work boundary. Protect the contact face, holes and any locating edge.

05 **Inspect on the agreed fixture**
Measure the drawing features and check the mating part or fixture. Route any discrepancy for approval before further material removal or connection alteration.

06 **Label and transfer accepted parts**
Link the bracket ID to the inspection record. Keep released and held work separated. Transfer surface-treatment and coating instructions with the part.

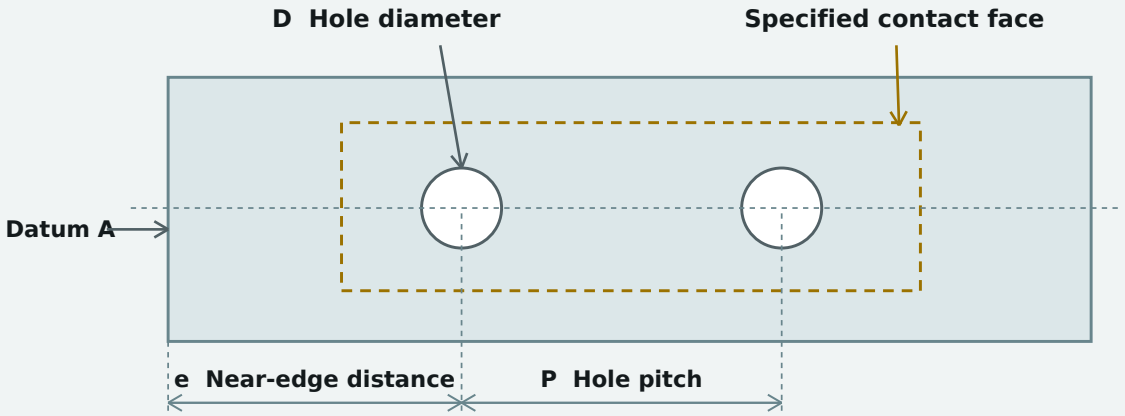
> **Record the release before proceeding**
> Attach the drawing revision and bracket IDs to the measurement record. Keep the same approved datums in the shop and at fit-up. Record the disposition of any bracket requiring an engineering review.

06 / APPLICATION DETAIL

Use drawing datums for the fit-up checks

The diagram is a simplified plate view. It separates hole diameter, hole pitch and near-edge distance so a measurement can be traced to the approved drawing.

INSPECTION SCHEMATIC



FEATURE OR CHECK	WHAT TO CONTROL
Hole diameter D	Measure by the named gauge or method and record the feature ID. Use the drawing for allowed size, shape and tolerance.
Pitch P and edge distance e	Locate hole centres from the approved datum. Use the specified convention when measuring edge distance and pitch.
Protected face	Check the mating or faying area as a separate release item. Keep an as-found record for any hole, edge or contact-face discrepancy.

Use the drawing as an inspection aid

Put the actual dimensions, limits and methods from the approved work instruction on the job card. Mark the feature, inspection location and disposition on the workpiece record.

07 / INSPECTION AND ACCEPTANCE

Measure from the approved datum

Decide how each feature is measured before preparing the batch. Use the same fixture, orientation, method and drawing revision when comparing routes.

CONTROL POINT	VERIFICATION METHOD	EVIDENCE TO RETAIN
Part and drawing	Verify steel, thickness, ID, orientation and drawing revision.	Work card ties each inspected bracket to its drawing and job.
Length and squareness	Use named datums and the approved gauge or fixture.	Actual value or fixture result, tolerance reference and disposition.
Hole size and location	Use the specified hole and position checks after edge cleanup.	Record feature ID, gauge, actual readings and any hold.
Edge and protected faces	Check burr condition, remaining geometry and required surface condition.	Record pass or rework separately for the cut edge and faying area.
Mating fit	Use the authorised mating part or fit-up fixture without forcing a mismatch.	Inspection record identifies the fixture, gap or fit check and reviewer.

At the hold point

Record actual readings and units where the inspection plan calls for measurements. Record the applicable limit or reference, method, date and reviewer. Retain the rejected or held items in the register until the responsible team records their disposition.

Apply the named requirement

Record the actual measured value where the inspection plan requires it. A pass tick alone cannot resolve a later fit-up issue if the feature and datum were never recorded.

08 / INTERFACE AND RELEASE CONTROLS

Protect the connection through coating and assembly

The shop release must carry the specified condition of the contact faces and the identification of the mating pieces forward to coating or assembly.

CONTROL POINT	WHAT TO VERIFY	WHAT TO TRANSFER
Shop versus site	Establish where cutting, cleaning and fit-up are permitted and who authorises any field modification.	Send a marked drawing and current inspection record with the part.
Faying surface	Check the condition and treatment required for the adopted connection specification.	Identify the surface and preserve the approved condition.
Coating and masking	Apply the coating or masking requirements for the joint and adjacent areas.	Record coating release, protected faces and handling restrictions.
Mating assembly	Check orientation, fit and the named fixture or matching part.	Provide IDs and actual measurements with the fit-up release.
Deviation review	Route mismatches, scuffed contact surfaces and out-of-tolerance features for approved disposition.	Record the decision and required reinspection before assembly.

Transfer the evidence with the work

Keep the same part identification through packing and site receipt. Protect fitted and inspected contact surfaces from handling damage during transfer.

09 / TROUBLESHOOTING

Investigate the cause before repeating the work

Record the first stage where the defect appears. Inspect the material, setup and previous operation before changing the abrasive or repeating a pass.

SYMPTOM	CHECK FIRST	CONTROL THE NEXT RUN
Bracket rocks or has a gap	Burr, distortion, wrong datum or mating part variation.	Check clean contact faces and the drawing. Hold a discrepancy for the engineer.
Bolt pattern will not align	Part orientation, drawing revision or hole position differs.	Verify identification and measure to the specified datums. Request engineering disposition.
Cut is out of square	Cut route, workholding or operator method varied.	Inspect the fixture and process, then check the next representative part before release.
Protected face scuffed	Masking or abrasive boundary was missed.	Identify the affected area and refer to the connection specification and engineer.
Burr recurs after deburring	Check cut direction, wheel condition, support and the next handling step.	Review the sequence and inspect the first corrected bracket.
Fastener seating differs	Inspect orientation, burrs, specified hole geometry and contact faces.	Hold the connection for QA or engineering disposition before assembly.

Keep the as-found evidence

Use a part or area ID and photograph or reading. Record the setup, stage, observed condition and who approved the next action. Compare the first corrected piece with the same acceptance reference.

10 / CONTROLLED VALIDATION

Run a trial that supports a decision

Can the candidate cutting and deburring route reduce time per accepted bracket with the same drawing, fit-up and contact-face criteria?

01 **Match the parts**
Use the same bracket family, drawing revision, material, thickness, fixture and initial condition.

02 **Isolate the comparison**
Identify the one approved change being evaluated. Keep measurement, handling and other operations common.

03 **Record measured features**
Use the same datums, gauge and fixture. Capture the dimensional and mating-fit result for each bracket.

04 **Retain holds and rework**
Keep all starts in the record. Record time, consumables and actual disposition for every rejected or reworked bracket.

05 **Release within scope**
Check repeatability on representative operators and bracket variants. Document the drawing revision, tool setup and conditions that require a new trial.

Write the approval scope in advance

Name the approved material or part family, tool and abrasive setup, acceptance criteria and responsible reviewer. Define the sample and repeat checks around the risk and normal variation of the process.

ACCEPT
All named criteria pass and the result repeats in scope.

EXTEND
The process needs more evidence for a condition or operator group.

HOLD
A quality or operating limit failed. Investigate before release.

11 / QUALITY AND ECONOMICS

Measure cost per accepted result

Compare the same work and inspection scope. Retain time and consumables for all starts, including work that remains held or rejected.

Calculation

Included cost per accepted unit = included consumables and direct labour divided by finally accepted output. Calculate labour from active, changeover and additional rework minutes once.

Hypothetical comparison at RM 54 per labour hour

ILLUSTRATIVE TRIAL	A / CURRENT	B / CANDIDATE
Units started (brackets)	30	30
First-pass accepted	24 / 30	28 / 30
Finally accepted after rework	28	30
Held or rejected at close	2	0
Active, changeover and rework minutes	125 + 20 + 36	118 + 16 + 17
Included direct labour	RM 162.90	RM 135.90
Consumables	RM 56.00	RM 68.00
Total included cost	RM 218.90	RM 203.90
Cost per finally accepted unit	RM 7.82	RM 6.80

The example includes only consumables and recorded direct labour within the cut and deburr trial. Scrap value, downstream assembly and project overhead are outside the cost boundary.

At the example's candidate labour and accepted output, the candidate could spend up to RM 98.64 on consumables before equalling the baseline unit cost. Recalculate when time, acceptance or the cost boundary changes.

Use the arithmetic to compare scope and yield. The values are hypothetical and the approved quality criteria govern release.

12 / REUSABLE FIELD FORM

Preparation and release card

Print one card per job, batch or zone. Attach the drawing or map, abrasive and tool labels, readings and any authorised disposition.

Bracket and mating part ID, material and thickness

Approved drawing, revision, datum and fixture ID

Hole and edge requirements, protected contact faces

Cutting tool, wheel, guard and deburring abrasive

STAGE	METHOD OR PRODUCT	READING / EVIDENCE
Identify part		
Set datums		
Cut and deburr		
Gauge fit-up		
Release part		

Release checks

- ☐ Drawing revision, part ID and orientation verified.
- ☐ Cut edge, hole geometry and datums checked.
- ☐ Specified contact-face condition protected.
- ☐ Fit-up released or disposition and reinspection recorded.

Hold, corrective action or referenced attachment

Inspector, date and release status

13 / REUSABLE FIELD FORM

Paired trial and acceptance record

Complete one record per matched comparison. Attach raw observations, inspections and the list of held, rejected or reworked items.

Trial ID, date, location and operator group

Matching conditions and scope of costs

Bracket ID, cut dimensions, hole condition, fixture fit and protected-face status

MEASURE OR OBSERVATION	A / CURRENT	B / CANDIDATE
Tool, setup and consumable IDs		
Started / first-pass / final accepted		
Held or rejected and disposition		
Active / changeover / rework minutes		
Consumable quantity and cost		
Inspection method and readings		
Total included cost / accepted output		

- ☐ Comparable work and the same acceptance criteria used.
- ☐ Failures and rework retained in the record.
- ☐ Acceptance, extension or hold decision recorded.

Approved scope, changes requiring revalidation and follow-up

Reviewer and supervisor, date and decision

14 / TECHNICAL REFERENCES

Source notes and further reading

The references describe methods, application boundaries and abrasive selection. Use the current manufacturer data and the project-specified edition and acceptance criteria.

01 **RCSC Specification for Structural Joints**
Design, installation and inspection context for high-strength bolted joints. Use the project's adopted specification and edition.

02 **MKTECH Correct Cutting Technique**
Compatible abrasive systems, work support and controls for identified cutting operations.

03 **MKTECH Cutting Defects and Corrective Action**
Process checks for wandering cuts, burrs and abnormal tool behaviour.

04 **FEPA abrasive safety instructions**
Product-specific guidance for bonded wheels, flap discs, fibre discs and belts.

05 **MKTECH Industrial Abrasives Handbook**
Technical RFQ checklist for materials, abrasive type, machine data and required finish.

06 **FEPA abrasive wheel guidance**
Cutting and grinding application, wheel markings and guarding for the complete setup.

07 **MKTECH product families**
Abrasive ranges and technical enquiry details. Confirm the current specification before ordering.

Titles link to the reference pages. The application scenario, sketches and trial figures are illustrative.

15 / APPLICATION SUPPORT

Turn the job details into a better specification

A useful enquiry tells MKTECH what the abrasive must do, how the machine is configured and how the result will be accepted.

INPUT	WHAT TO SEND
Drawing and material	Connection and part detail, revision, steel grade and thickness, cut line and starting edge condition.
Machine and consumables	Approved cut process, machine model and rating, mounting and current cutting and deburring references.
Quality requirement	Datums, hole and edge criteria, fit-up method, coating requirements and any protected faying surface.
Trial and supply	Expected trial quantity, inspection owner, release criteria, production volume and delivery location.

Prepare one representative example

Send the bracket drawing, steel grade and thickness, allowed cut method, machine model, current abrasive and fit-up acceptance criteria.

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01 **Discuss the application**
Product selection, trial scope and supply enquiry.

02 **Browse MKTECH product families**
Review cutting, grinding, flap and finishing abrasive ranges.

03 **Read the corresponding case study**
Open the illustrated application and its latest guide.