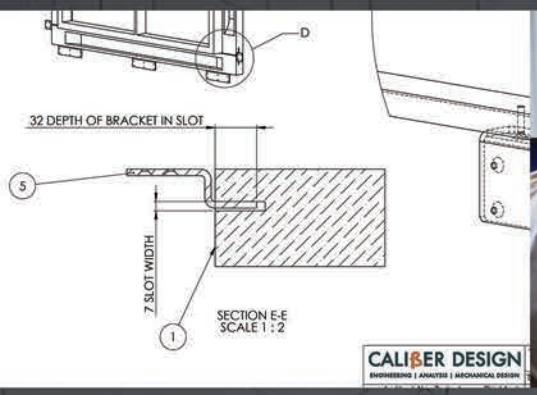
HOW TO GUIDE

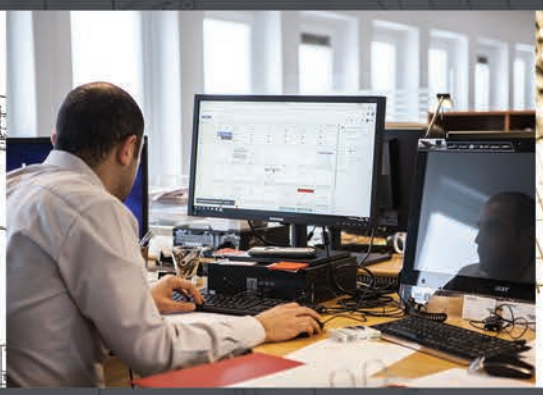
DRAWING SYSTEMS & PROCEDURES

8 key ideas for working smarter

CALIBER DESIGN

ENGINEERING | ANALYSIS | MECHANICAL DESIGN





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Think about your 3D CAD drawing system

In order to consistently create professional engineering drawings, it is important to have a well thought out system that works for you.

Can you answer these questions?

- Do you have **procedures** in place to ensure that every drawing produced is to a defined standard?
- Do you have **templates** set up to save you time, money, and rework?
- Does your **revision system** eliminate potential confusion?
- Are you employing **advanced techniques** such as drawing development macros to make your life easier?

If you are serious about producing professional drawings efficiently and to a high standard, then you should be able to confidently answer these questions.

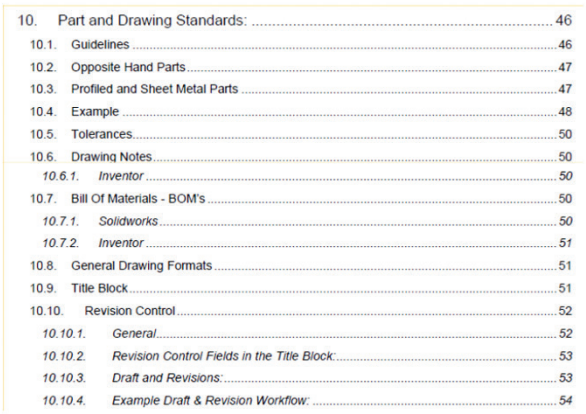
Read on for some tips on how to start improving your drawing systems today!

> The key is to develop a system that minimises upfront and ongoing time, so the next time a project needs drawings, everyone on your team knows exactly what is expected of them.

1 PROCEDURES
Where do I start? How do I do it?

Start a **drawing procedures document** with a step-by-step guide on how to create a drawing. Templates, naming structure, drawing standards etc should all be listed to avoid future confusion.

An example of a drawing procedure index:



10. Part and Drawing Standards: 46
10.1. Guidelines 46
10.2. Opposite Hand Parts 47
10.3. Profiled and Sheet Metal Parts 47
10.4. Example 48
10.5. Tolerances 50
10.6. Drawing Notes 50
10.6.1. Inventor 50
10.7. Bill Of Materials - BOM's 50
10.7.1. Solidworks 50
10.7.2. Inventor 51
10.8. General Drawing Formats 51
10.9. Title Block 51
10.10. Revision Control 52
10.10.1. General 52
10.10.2. Revision Control Fields in the Title Block: 53
10.10.3. Draft and Revisions: 53
10.10.4. Example Draft & Revision Workflow: 54

Before you draw, you need a plan! The most important part of a quality drawing system is laying out your procedures clearly.

Drawings should be laid out consistently so you can present professional drawing packs. This can be achieved with templates (discussed later) and sufficient detail in your procedures document.

Everyone should be trained or made aware of the relevant drawing standard for your company and/or client. That way you can be sure that every engineer is creating drawings with the same symbols, dimensions, hole callouts, etc.

Make sure your engineers and checkers are aware of the new procedures. They aren't much good if nobody uses them!

2 TEMPLATES
There's no need to reinvent the wheel!

Templates greatly increase the speed at which drawings can be created. Plus, a good template ensures your drawings will contain the necessary information every time.

Poor templates require you to enter text directly, update multiple sheets for changes and type in notes—ultimately costing you time and money.

A drawing template with a border and title block should be set up for part, weldment, and assembly drawings. A good template will contain some of these

A good template will never have you entering data directly into the title block or BOM!

NOTES FOR THE RELEVANT DRAWING: This way you know the correct information will be captured for each case. For example, the weldment drawing should mention the likes of specific welding tolerances and standards, whilst the part drawing may have surface finish notes. Drawings should mention material type, grade, and form. If it's a plastic part, include the allowable visual imperfections and flash, etc.

LIBRARY NOTES: Create templates for commonly used notes and symbols and store them in your CAD library. Then they can easily be dragged into drawings, saving time and ensuring repeatability.

AUTOMATIC PROPERTIES: These will save you time without having to update the title block for every sheet if there is a change! A good template will automatically update information such as dates and names. Furthermore, the details for the drawing should be entered in the custom properties area, so any update will automatically be extrapolated to all relevant sheets.

LINK YOUR PROPERTIES: If, for example, your drawing template has an entry for cut length, make sure that the actual value is linked to the model. The last thing you want is someone updating the model but the drawing still shows the old cut length!

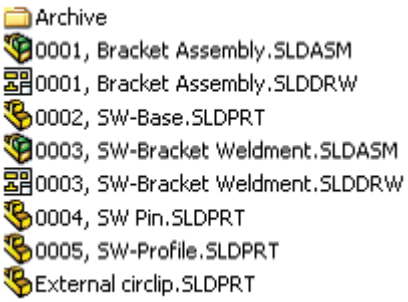
3 FILE STRUCTURE
Setup a system for everyone to follow

Have you ever opened a part and wondered where the drawing is, or what assembly it came from?

Use a workable structure! Naming your files sensibly will mean it's easy to group together parts, assemblies, and their respective drawings. Create a system in your procedures and stick to it! If all of your engineers are working to the same structure, confusion can be avoided.

The structure shown to the right is clearly numbered and ordered so its obvious where to look. Create something that makes sense for your workflow.

Note that any ordered part numbering system always has exceptions and inconsistencies. We recommend using a rolling number register where each number is meaningless but unique. There are lots of ways to sort by part, weldment, assembly etc. These days it is not so necessary to sort your files like this due to CAD tracking technology.



Experiment and work out a system that's best for you!

4 CHECKING
Catch mistakes before it's too late

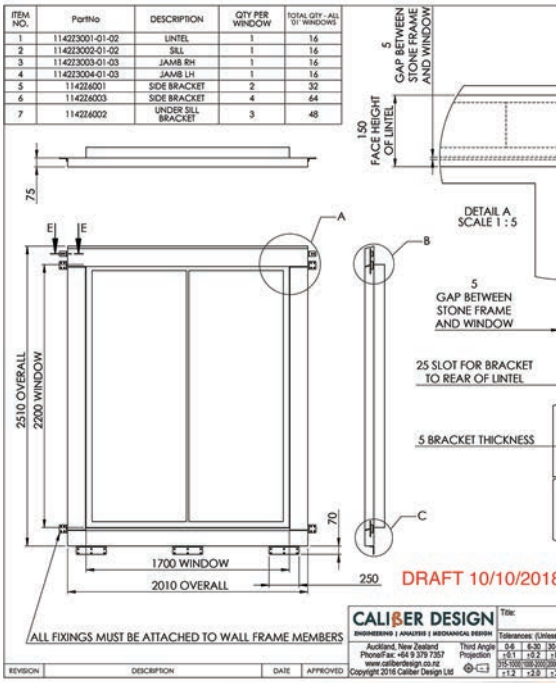
Having a good checking system is paramount to (a) catching problems before they leave the office and (b) supplying the customer with quality drawings.

First of all, PDF and check your own drawing. **Self-checking is an essential and measurable activity that can drive down rework.**

A drawing checklist makes it easier for the checker to ensure all important aspects have been covered.

If possible, have someone else check your drawings. A fresh set of eyes will often notice errors that you have missed. Ideally your 'checker' will be more experienced than you. Dedicated checkers are valuable in the context of maintaining drawing standards.

Have a procedure for signing off drawings so someone is responsible for making sure they have been checked and marked up as required. That way you know it was done!



5 REVISIONS
So many printouts … which one is right?

Revisions mean you can easily and efficiently keep track of what's changing and why. Without a solid revision system, changes may be lost, and items could be manufactured to old drawings.

In the initial stages, drawings should be labelled A, B, or Draft00, Draft01 etc. The purpose of draft revisions is that many changes are expected in the initial stages of development.

Once the drawing is deemed suitable for release, the revision should be changed to 'Released' to reset the changes.

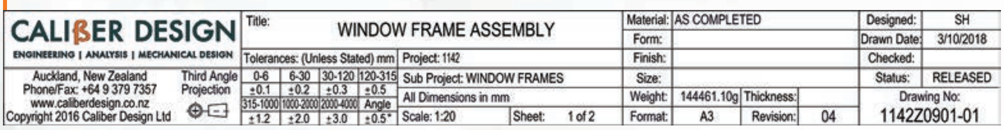
Order of revisions example:

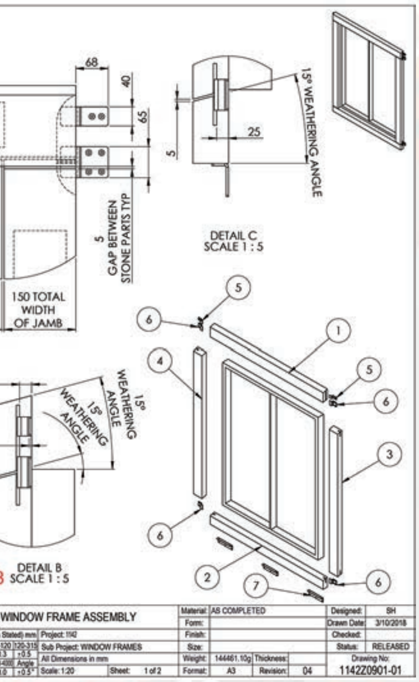
Rev	Status	
00	*Draft 0*	*(i.e. in-housereview or check)*
00	*Draft 1 etc*	*(i.e. clientreview/check)*

Drawingset is signed for check

Revision tables should show what has changed between releases. This is used by the manufacturer to identify what adjustments are needed for the next run.

This title block clearly shows all the necessary information needed to keep track of the drawing revision changes:





For ultimate control of models and drawings, nothing goes past a PDM (Product Data Management) system. However, a PDM system is only as good as the workflow you have in place. Without the backup of robust processes, a PDM will only automate a poor system ... creating an even bigger headache! Setting up a PDM is a subject in itself and we'd be happy to provide advice as to how to implement one should you require.

6 BACKUPS
Anything that can go wrong, will go wrong!

Keep a record! Hard copies with changes noted on them should be filed in a project folder. This way they can be reviewed later to see why a change was made. Include as-builts in your records.

Save old revisions as PDFs. It only takes a moment and means you can refer to old drawings easily when needed. Another tip is to ensure you have 'Previous Version' enabled within your system setup.

Redundant saves in an ordered environment are not confusing and limit the need to request backups from your IT department.

Backup your backups! If your hard drive ever has a problem, you will still need access to the latest files. With the right network or cloud storage setup this can be done automatically.

7 IP PROTECTION
Engage advanced technologies

Don't send your CAD files directly to just everyone! Even if you have signed NDAs, sending a **PDF** is a safer option.

Use a PDF writer that has the option to add **security** to your files. This can stop images or text from being copied, the document from being modified, or even the document from being printed.

If you need to you can even add a **password** to open files or **time limit** them.

8 MACROS
Why waste your time on repetitive tasks?

Here are some examples of helpful macros that you could implement:

Replace Sheet Format macro: replace the sheet format for your set of drawings.

A **Custom Properties** macro: automatically fill in basic properties and create boxes for users to enter data.

Revision macro: save out your drawing set from Draft to Released or vice-versa.

Save As PDF macro: save out a whole folder of drawings as PDFs and/or print the drawing to hard copy. Use this when you think your drawing set is ready for a release pack.

Make DXFs macro: automate output of DXF files of your sheet metal flat patterns for an updated drawing pack.

Macros can be employed to do boring repetitive tasks in an instant.

Quick summary

So, what should a professional drawing system include?

1. **PROCEDURES:** Setup a 'drawing procedures document' so that drawing files are setup in a consistent way. Keep your procedures up to date, encourage you team to add to them, and insist that everyone in your team to use them!

2. **TEMPLATES:** Invest some time in setting up a solid drawing template and you'll save yourself time and energy on every job and reduce the chance of mistakes sneaking in!

3. **FILE STRUCTURE:** Create a file naming structure that makes sense for your workplace and your workflow. Document it and stick to it.

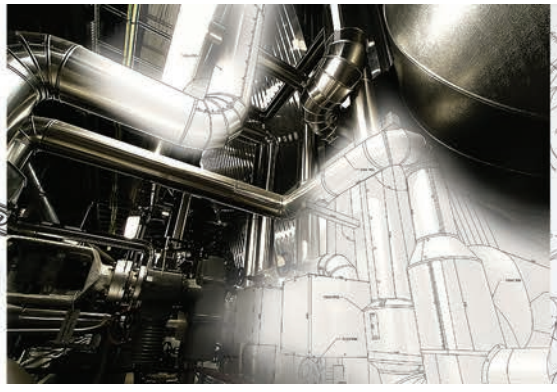
4. **CHECKING:** A well thought out review procedure ensures that every drawing gets checked thoroughly every time. Print and check your drawings thoroughly. Have someone else check your drawings.

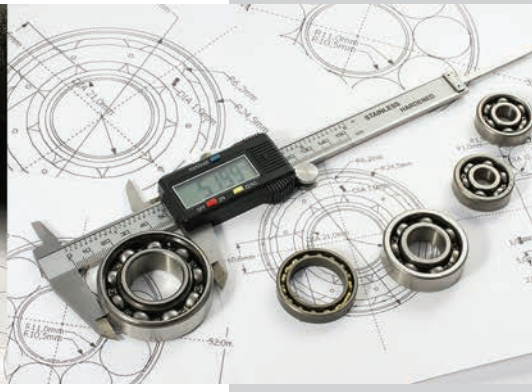
5. **REVISIONS:** Develop a clear and efficient system for keeping track of what's changing and why it changed. Without one, changes may be lost and items manufactured to old drawings!

6. **BACKUPS:** Files get lost, computer systems break down. Keep relevant hard copy records of your work, save revisions, and backup your backups.

7. **IP PROTECTION:** Your intellectual property is a valuable asset. Don't distribute your CAD files unnecessarily—PDFs often suffice. Use the security settings within your PDF writer to your advantage.

8. **MACROS:** Use your software's capabilities to the max and you'll save time and money. Macros can be setup to do boring repetitive tasks in an instant.





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"My favourite things in life don't cost any money. It's really clear that the most precious resource we all have is time."

Steve Jobs | *1955 - 2011*
Co-founder of Apple Computer