CML Techniques

CML International

MARKETING SUMMARY

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Introduction

CML Techniques is a comprehensive web-based management system which allows the project team to access, review and comment on all the commissioning and handover documentation in a paperless environment. The system is based on the latest platform which allows rapid reference, search and recovery of information. There is no data storage limit or risk of lost documents, so this system is a perfect solution where there are large quantity of documents, publications, manufacturer's literature and record drawings to manage.
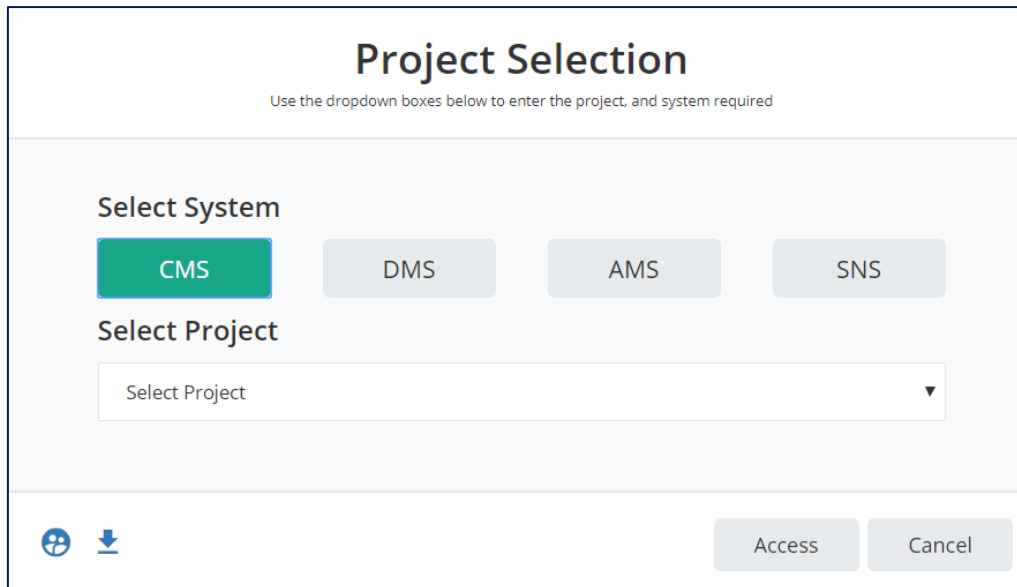
Completing the technical data for equipment schedules can be progressed in several ways. The commissioning management documents are always useful, so it is essential you or the DC schedules information required making it easier to capture from the following:

- Commissioning Method Statements
- Requests for Inspections
- Site observations
- CAS Sheet updates
- Material Submittals & Schedules
- Various contractor correspondence
- Minutes of meetings

CML Techniques has been developed by us to cover all aspects of commissioning and O&M document storage from the commencement of a project through completion and handover to the ongoing maintenance of the systems and equipment i.e. Facilities Management. There are four systems forming CML Techniques:

1.00	Commissioning Management System	(CMS)
2.00	Documentation Management System	(DMS)
3.00	Asset Management System	(AMS)
4.00	Snagging Management System	(SNS)

CML Techniques is completely managed by the relevant project teams and uploading of all documentation will be carried out by the project team individuals. This ensures that all information stored is of the highest quality and the system doesn't get overloaded with data that is not required.

Figure 1: Project Module Selection

Projects are configured for CMS, DMS or AMS based on the type of the project requirement. It is required for the project team to agree for the global settings on how long the project team get to review and respond to certain documents, this will be agreed with the project team before commencing any of the systems. SNS module is in progress and not developed in the new system. More detail on how this works is described later in this document.
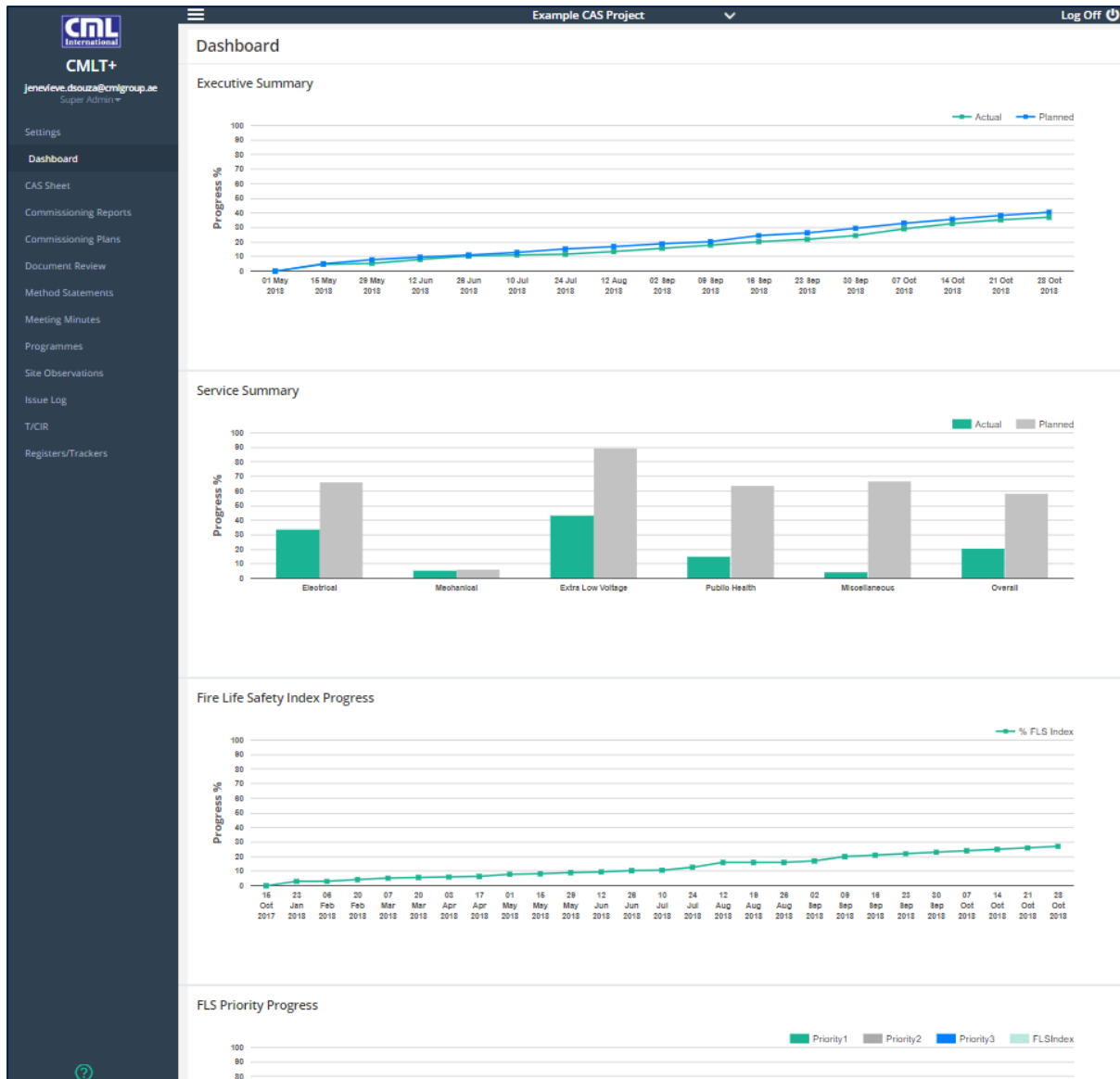
Figure 2: Dashboard

The following notes outline the process and methodology behind each system.

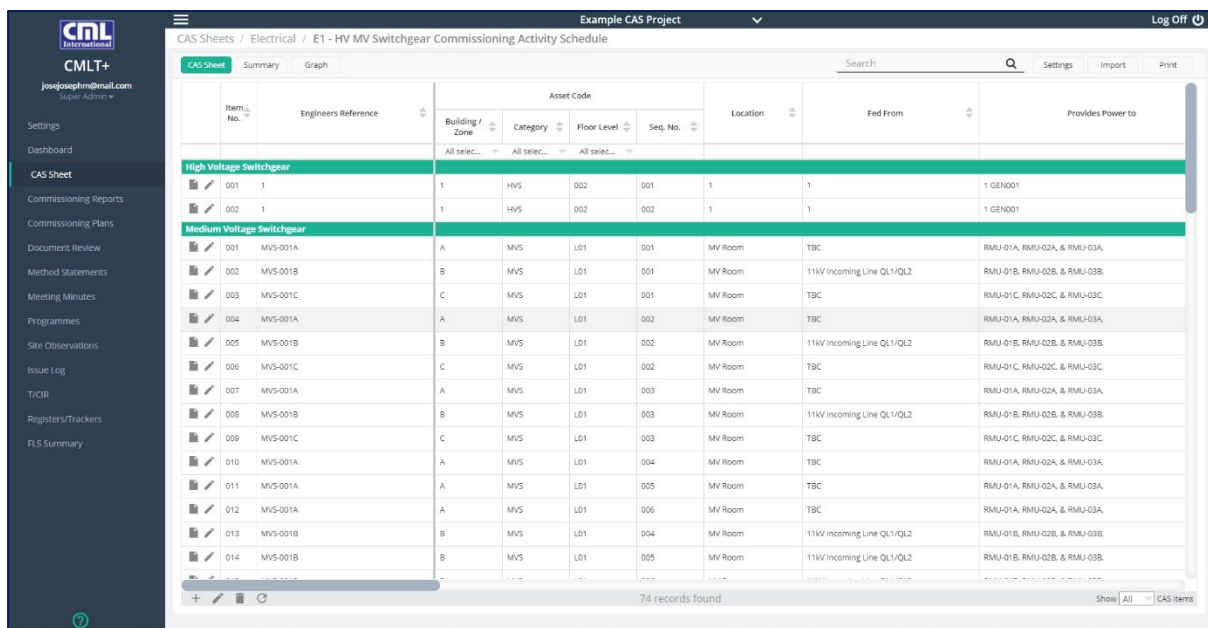# 1.00 Commissioning Management System (CMS)

This is the first system that is developed on a project and becomes the basis for the subsequent systems. It has been designed to collate all commissioning related documentation and utilises CML's in house protocols in an easy to use paperless environment. The full system ideally should be set up at the design stage of a project and run through to the final system handovers and training. It can also be setup at later stages of the project utilising only some of the modules. The basic modules in the CMS system are as listed below:

    1.01   CAS (Commissioning Activity Schedules)
    1.02   Commissioning Reports

2.01 CAS

The CAS module is an online version of CML's Commissioning Activity Schedules and is a database of all plant, equipment, systems and processes that are to be commissioned. The database details every stage of commissioning for each piece of kit which is then weighted to provide percentage complete for that system using the inbuilt formula. Progress summary is also available in graphical representation for reporting purpose. Progress of the CAS sheets can be generated at zone level, equipment level and test level.

Figure 3: CAS Sheet

The filters inbuilt into our CAS sheets will breakdown the reports as required by the project users, with filters being available for both our CAS sheets and the graphical reporting.

CAS sheets module is standardized for every project with minimal customizations based on the project/client requirements.

Figure 4 - CAS Sheet Graph

The CAS will be updated by the CML team throughout the project as and when the commissioning progresses, this creates a real time progress indicator. The percentage complete being split across each phase of the commissioning gives a more accurate picture of where the project is at compared to the more usual model which is 0 or 100% depending on sign off.

2.02 Commissioning Reports

Various reports of commissioning process activities undertaken through the design, construction and reporting recommendations for post-construction phases of the building project shall be completed and uploaded to CML Techniques.

Figure 4: Commissioning Reports

Uploaded reports will be accessible for all the project users configured in the system. Also, this will ensure and enable easier references in future recommissioning activities.
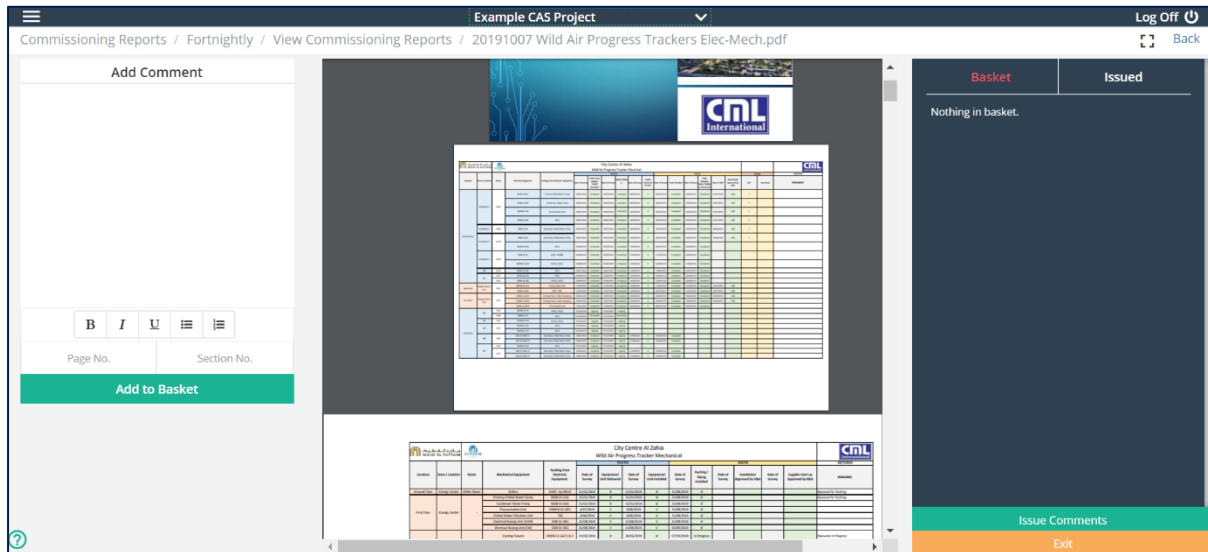

Figure 5: View/Review Commissioning Report

2.03 Commissioning Plan

This module contains all revisions of the project specific commissioning plan from the initial draft to the recent revision. When a draft or revised plan is uploaded an automatic email will be sent to all relevant parties stating that it is available for their review and comment. The reviewing of the plans is carried out with an onscreen copy open and boxes to provide the page and section number of any comment which is made; this allows the plan to be reviewed as it is read. If through the review the reviewer decides an earlier comment is not applicable as it is covered elsewhere there is the ability to remove any comments added.

Since a Commissioning Plan is a live document and updates will occur as and when there are changes in the site procedures, design or site set up there will be no limit on when the plan can be commented on. Therefore, the document will remain open for review throughout the project's lifespan, with revised plans being uploaded as and when comments require.
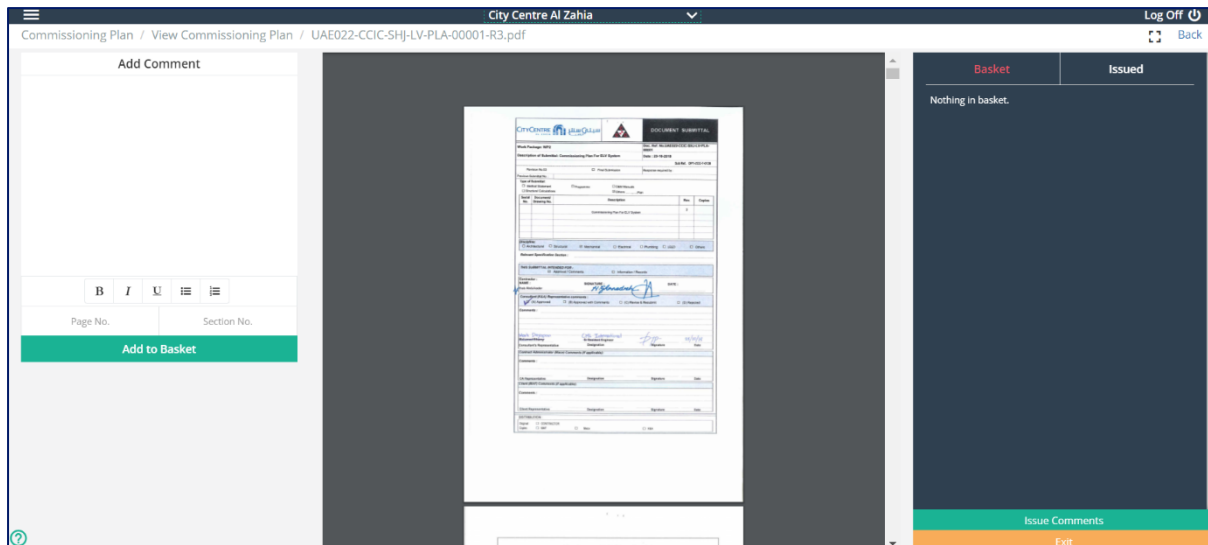
Figure 5 - Commissioning Plan Review Page

Once the review is completed the reviewer will save their comments and close the plan utilising the onscreen prompt, there will be no status for the plan since it is a live document. A log of all the comments made against each revision of the plan will be stored in the reports section as an audit trail of changes.
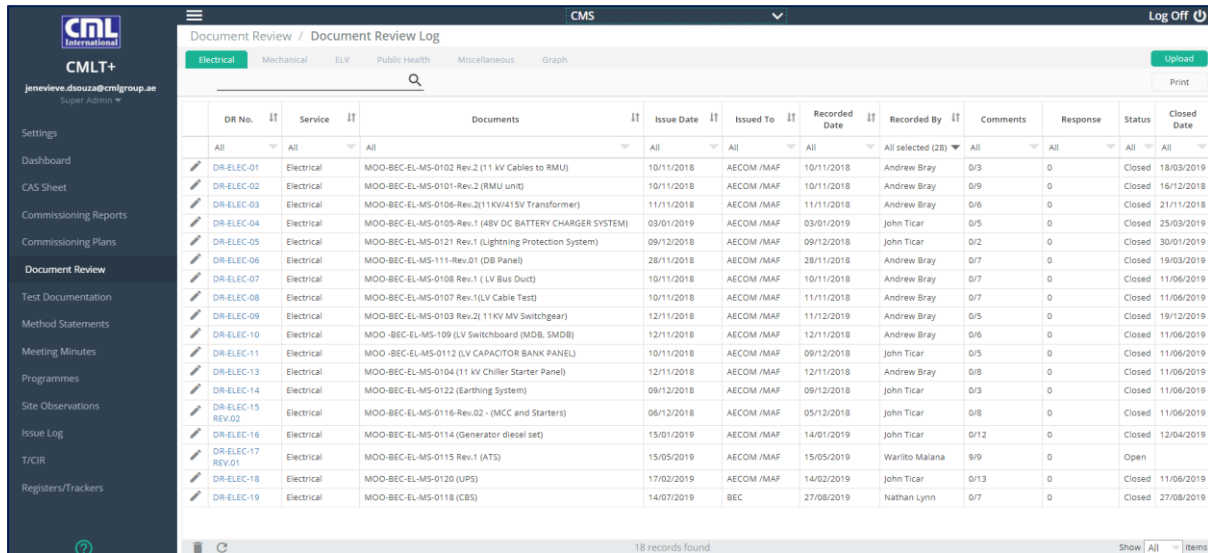
2.04 Document Reviews

The online version of CML's DR system contains a complete audit trail of all comments made and relevant responses to every document reviewed by the commissioning management team. The way in which it works is whenever CML reviews a document a new DR is produced, the documents reviewed include but isn't limited to:

- Drawings
- Specifications
- Method Statements
- Technical submittals
- Commissioning Plans
- Programmes

When producing a new DR the team add in the base information; i.e. the name of the document to be reviewed, the service heading it falls under, who is to be the recipient of the review plus which other parties should receive copies of the review. Once this information is entered the team can add as many comments as required regarding that document, when completed, saved and submitted automatic emails will be sent to all parties.

The party the review was directed to will receive a mail stating, depending on the global settings, how long they have to respond to the DR. All other parties

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who were copied in will receive a notification mail stating which document has been reviewed, by whom and who the recipient is. Reminder emails will be sent at 3 days and 1 day to the end of review date. If there is no response within the given period, the system will commence recording overdue days on the DR Master Log.

Figure 6 - Document Review Log

When a DR notification is received the person who the DR was sent too will have the ability to respond to each of CML's comments online. Once completed, saved and submitted further automatic emails are then sent back to CML and all other parties stating that there is a response to a DR, this will contain the details of which DR it was and who responded. At this stage the CML project team will, depending on the response, close the DR. If however the team doesn't believe the responses given close out their comments a workshop will be arranged to hopefully close any issues.

The DR Log contains a full database of all document reviews, on this page we have set up filters for the following:
- Service – allowing for a service specific list of DR's
- Issued to – allowing for a list of all DR's sent to a certain party
- Status – allowing for a list of all open or closed DR's

A combination of all these filters can also be selected therefore you can check to see what DR's are open on a specific service or by which party. Any DR can be opened from the Master Log and printed if required.

At the end of the project the list of open DR's can be reviewed to find any potential risks.

2.05 Method Statements

This section will contain all service specific method statements, and accompanying documents, for review and comment by the project team. Based on the specification, drawings and CAS the CML project team will compile the list of method statements required and what is required for each one, including:

- Method Statement – we suggest use of CML's template
- Inspection Test Plan (ITP)
- Test Documentation
- Risk Assessments

CML will then upload the relevant documentation as and when our project team are happy that it meets the criteria in the specification. When uploaded mails will go to all parties stating which document has been uploaded and depending on the global settings how long they have to review the document.

The reviewing is carried out with an onscreen copy of the document open and boxes to provide the page and section number of any comment which is made; this allows you to review the document as it is read. To assist the reviewer there is the ability to open additional documents that maybe required during the review, therefore depending what is being reviewed they can open the relevant method statement, ITP, Test documentation or risk assessment. If through the review the reviewer notices an early comment is not applicable as it is covered elsewhere there is the ability to remove any comments previously added.

Figure 7- Method Statement Register Page

Once the review is completed the reviewer will save their comments and close the document utilising the onscreen prompt, if the reviewer is designated as the

accepting party, they will then be requested to change the status of the manual. The basic system utilises Accepted, Accepted with Comments & Rejected but this can be changed to codes A, B, C or 1, 2, 3 depending on contract requirements. When any comments are posted a notification email will be sent to the CML team advising that they have been posted, these will then be reviewed and either actioned in a subsequent draft or discussed with the relevant parties if required. CML will respond to all comments allowing for an audit trail for closing them out.

A full report on the method statements, their accompanying documents and their statuses can be opened and printed from the report section of the system. The report will include a full log of comments made on each document and each revision.
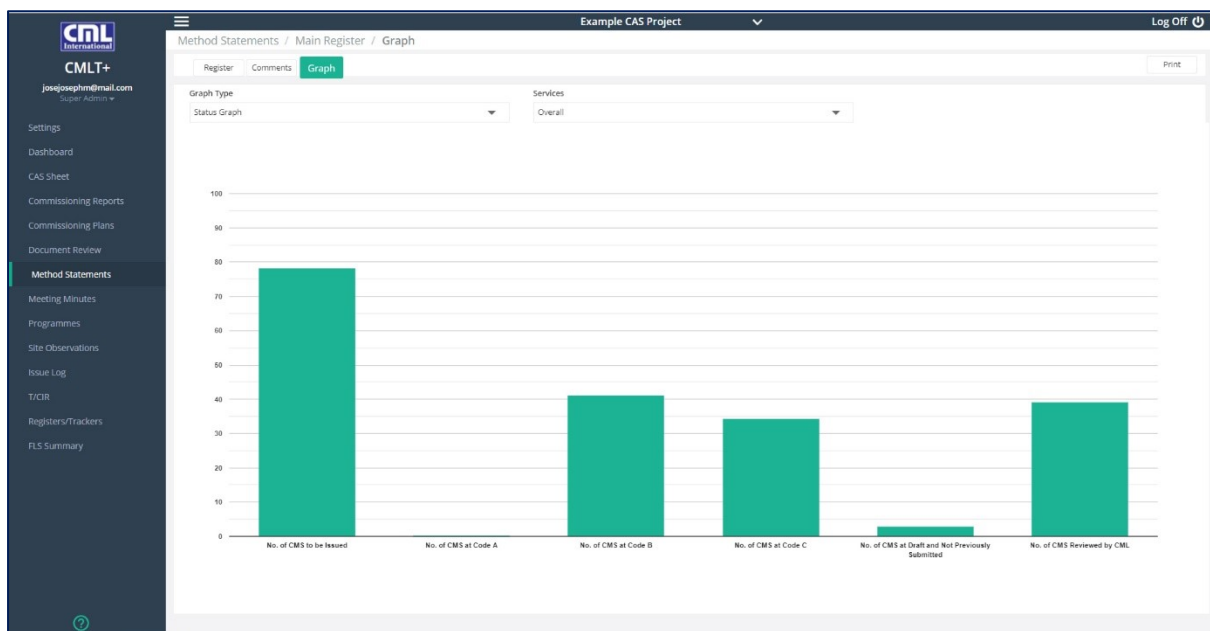
Figure 8 - Method Statement Status Graph

2.06 Minutes

CML will upload copies of all their standard commissioning meeting minutes and any minutes for workshop meetings. These can be read online and / or printed off by any of the project team. Automatic mails will be sent to all whenever a set of minutes is uploaded.
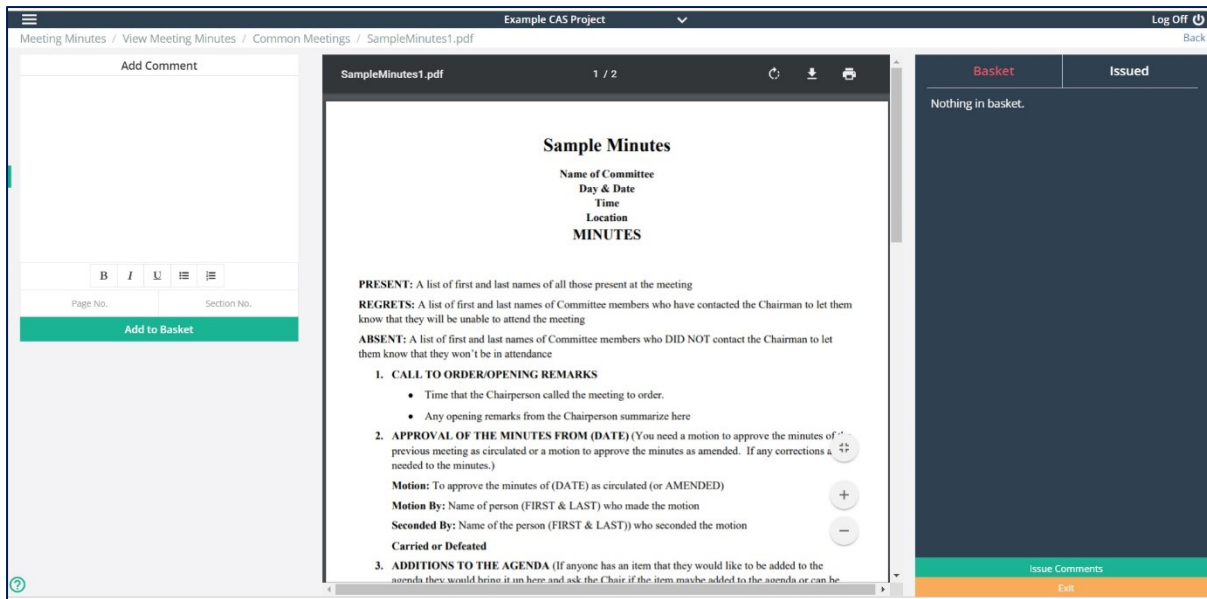
Figure 9 - Meeting Minutes View Page

2.07 Programmes

This module is for the storage, review and comment of commissioning programmes. The CML team will upload their commissioning programmes within this section so they can be reviewed and commented on by the relevant parties onscreen. This is carried out in a similar way to the method statements except the activity code is noted as point of reference for each comment.

Depending on the project requirements CML will upload full, two week look ahead and / or service specific programmes for review at set periods.

Reports will be generated listing all comments added and CML responses.
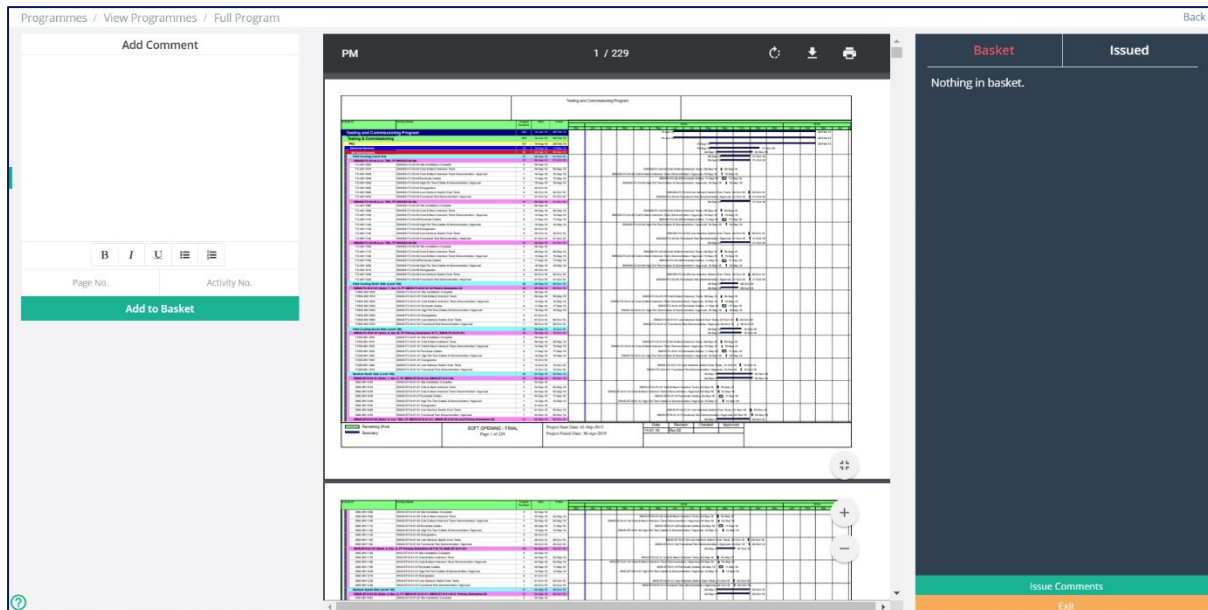
Figure 16 - Programme Review and View Page

Uploaded programmes will be enabled for the project users for review and commenting.

2.08 Site Observations

This operation of this module is very similar to the Document Review module the only real difference that it is a review of the onsite installation rather than documents, when the CML team adds a comment they can also add photographs to assist in communicating any problems.

The module has the standard mails going to the relevant parties, ability for the receiving party to respond to the comments, reminder mails, open and closed status, overdue days and filters on the SO Master Log. This again as per the DR's will produce a risk register for all outstanding SO's.

Figure 11 - SO Main Page

2.09 Testing & Commissioning Documentation

This section is for storage review and comment of the final Testing & Commissioning Documentation the file tree is exactly as that for the CAS section. As the CML team produces the initial CAS database the T&C database will replicate the CAS layout for the storing of the relevant test sheets later.

We have also added filters and search function to the T&C section, for ease of use for finding documentation.

Final T&C documents will then be uploaded as and when they are witnessed into their respective positions by the CML team. A full report on the status of the completed / uploaded documents will be within the reports section, filters are available to look at more specific detail.

Figure 7 - Test Documentation Page

The contractors and / or specialists will be given access to the test documents where they will be able to review and update the documents online or onsite utilising Personal Digital Assistants (PDAs). This will streamline the testing and commissioning process and ensure that the T&C documentation is all of the same high standard. Witnessing & accepting of T&C will also be possible on site with the PDAs.

2.00 Documentation Management System (DMS)

This section has been developed to allow the project team to carry out timely reviews of O&M manuals; comments are automatically record and track through to closure by CML management. The DMS is to be offered free of charge to any of our clients when we are signed up to author a complete suite of either MEP or Building Fabric manuals.
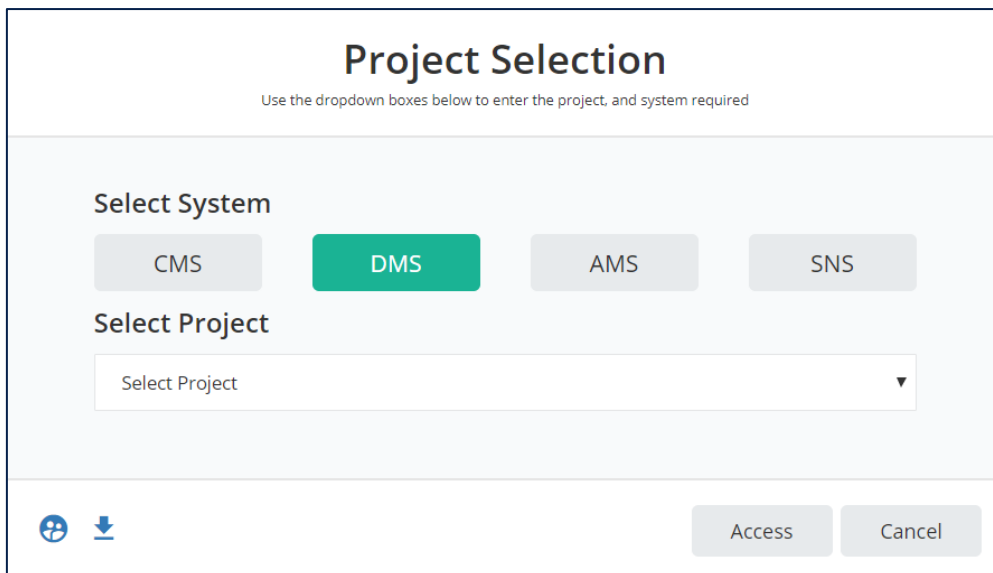

Figure 8 – DMS-Project Selection Page

2.01 System Layout

The system is laid out in a simple to navigate file tree, we suggest that for all projects the information is divided into the following folders:

- Mechanical
- Electrical
- Public Health
- Specialist
- Building Fabric

We would then suggest that each of these folders is subdivided in individual system manuals e.g.:
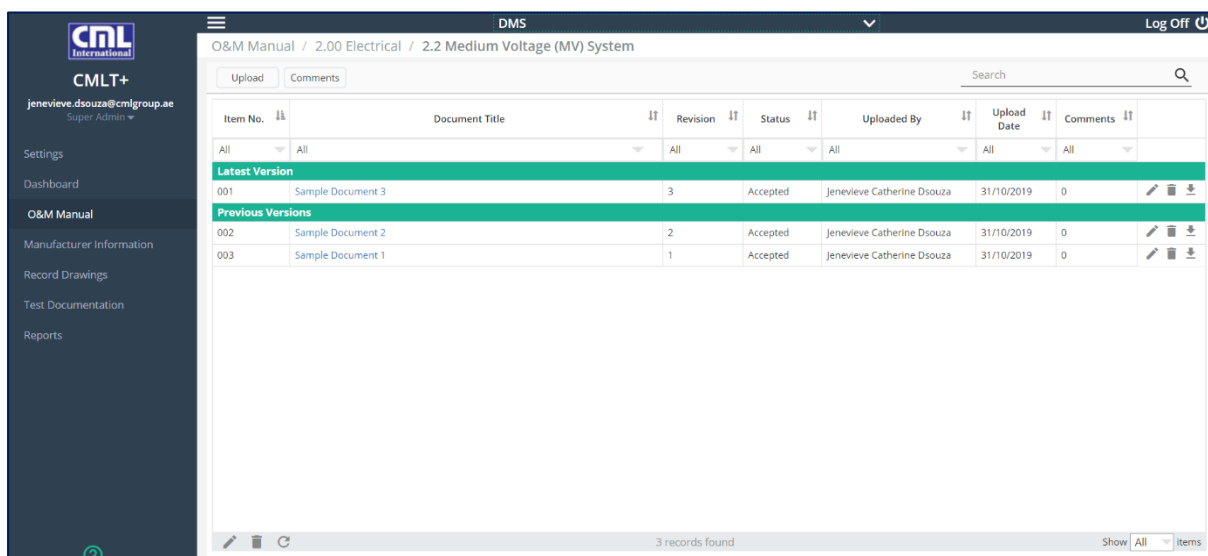
- Mechanical
    - Chilled Water & Associated Pumps
    - Ductwork & Associated Plant
    - Computer Room Air Conditioning
    - Split & DX Units
    - Fuel Oil Systems

Each of the manuals are then further split into the following four types of information:

- Mechanical
    - Chilled Water & Associated Pumps
        - O&M Manual
        - Manufacturers Information
        - Record Drawings
        - Test & Commissioning Documentation

This allows the user easier access to the information required. Please note on larger sites, Burj Khalifa being one of them, we recommend that these systems are further divided into system elements to allow for easier search and retrieval of required information from the massive amount collated for the project.

As stated, this is the way in which we recommend the system is set up however our system is flexible, and we can store the information in anyway as per specification or client requirements.

Figure 14 - O&M Selection Page

2.02 System Buildup

Once the layout has been agreed we then start to add the information required into each of the system sub folders i.e.:

- Manufacturers Information – A list of manufacturers' literatures is compiled by our document management team by reviews of the latest drawings, specification and the Commissioning Activity Schedules.
- Record Drawings – A list of drawings is added which is taken from the latest drawings produced i.e. Detailed Design or Shop.
- Test & Commissioning Documentation – A list of test documentation required is drawn up from the Commissioning Activity Schedules in the same way as in the CMS but the breakdown across the manuals will be carried out in line with the manual packages.

This will then be the basis to track and monitor the progress of the document management package, because as the relevant information is added this will then automatically show as a completed item therefore update the percentage complete. One of the advantages of a web based system is that the information will be continually uploaded as it is completed and / or sourced; therefore the buildup will be gradual not as it is in standard hard copy manuals where all the information comes in at the tail end of the project.

There is no review of this information on the DMS as it would have been approved either in the standard way or through use of the CMS package.

2.03 O&M Manual

Once the system list is agreed and the relevant information is available CML will commence the production of the draft manuals. We recommend that this is carried out utilising our tried & tested 10 section templates, which can be altered to suit specification or client requirements. The reason we suggest this is our template is a hyperlinked document which makes the navigation through the sections easier. However, if the client has their own template, which is the case with several developers, this can be utilised by our teams although there may be a requirement for additional costs.

For all the MEP systems we strive to have the draft manuals uploaded onto the web site prior to their energisation. Building fabric manuals will be produced through the construction period and drafts uploaded at least 6 months prior to the completion date, provided all the information is available.

Figure 15 - O&M Review Page

When a manual is uploaded onto the DMS system an automatic email will be sent out to the relevant parties informing them that the manual is ready for review. Depending on the global settings the project team will have between 15 & 30 days to review and comment on the manuals once they are uploaded. Automatic reminders that the manual review period is ending will also be sent at 3 days & 1 day to go, once closed the system will not allow further comments. This is to push the relevant parties to review the manuals in a timely manner as all too often the time take to review the manuals is longer than it has taken for CML to produce them.

The reviewing of the manuals is carried out in the same way as method statements with an onscreen copy of the manual open and boxes to provide the page and section number of the comments. To assist the reviewer on this system there is the ability to open additional documents that maybe required during the review i.e. manufacturers literature, record drawings, test documentation or another manual.

When the comments are posted a notification email will be sent to the CML team advising of that they have been posted, these will then be reviewed and either action in a subsequent draft or discussed with the relevant parties if required. CML will respond to all comments allowing for an audit trail for closing them out.

2.04 Reports

The system automatically produces standard reports these are:

The Quick view report which details the following the Package Name, Document Name, Upload Date, Version, Total Number of Comments, the number of Outstanding Comments and the Status of the Manual. Within this report there is

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the ability to open pop ups which detail all the comments made and CML's responses.

The Summary report displays the statistical data of the documents that has been uploaded till date. Document summary includes total number of Manufacturers Information, Record Drawings & Test Documentation expected against the actual amount uploaded. This report shows a percentage uploaded for each type of document for each manual.

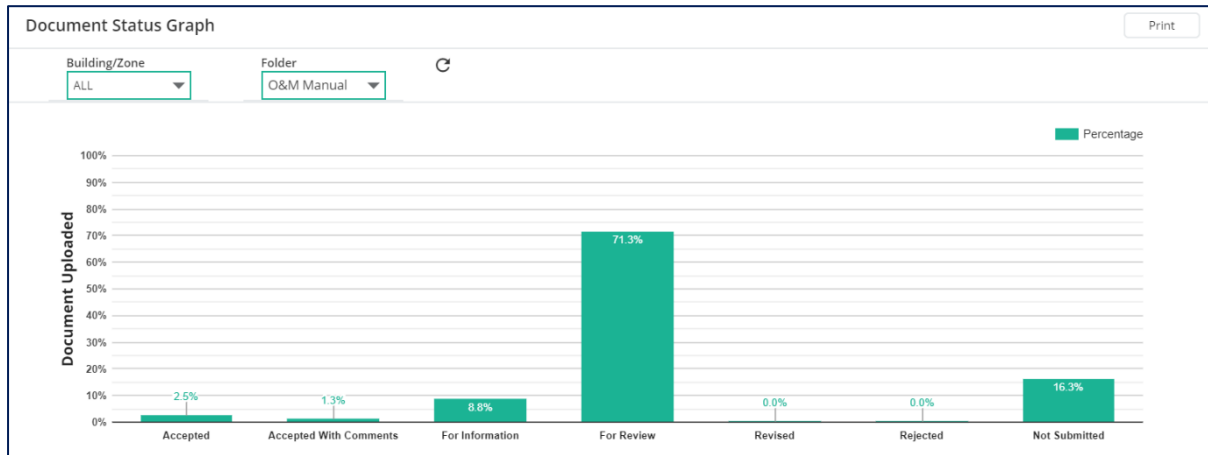**Figure 9 - Document Status Graph**

Figure 17 - O&M Summary Report

2.05 Handover

At handover CML can then issue all of the electronic information to our clients or with a yearly subscription continue to host the system allowing easy and fast

interrogation of the information (manuals, drawings, literature etc.) to be made by the maintenance or facilities teams. All the information for the largest project or property portfolio can be stored without space restriction (or loss of documents) and subsequently accessed simultaneously by more than one user. Storage cost decrease when additional projects are added to a client's portfolio.

3.00 Asset Management System (AMS)

This system is an addition to the CMS & DMS and will be at additional cost to our Commissioning & Document Management Prices. CML Techniques AMS system is a versatile Asset Register database which is bespoke for each client and / or project. The basis of the information initially comes from the CAS but will be expanded out to include additional sub (child) assets and building fabric assets such as furniture, fixtures & equipment (FF&E) if required by the client.
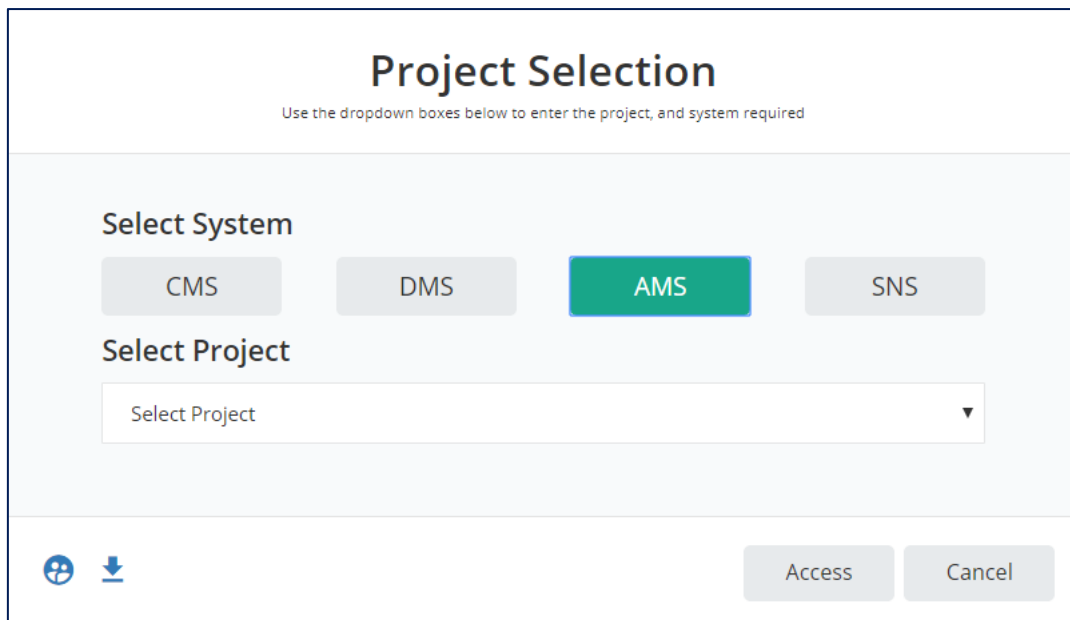
Figure 18 - Asset Management Selection

This asset register will then be utilised for the following tasks:

- **Planned Preventative Maintenance –** from the asset register and agreed maintenance regime, part of O&M production, we can produce a PPM system with the client's own tasks. Each type of system or equipment will be configured for daily, weekly, monthly, 3-month, 6 month and yearly tasks that will be then automatically listed at the start of each day for the FM team to follow.

  Through our experience a major problem we have found is that between approval and final handover systems are often run for long periods of time

with little or no maintenance. This is detrimental to both parties and causes much conflict and delay in the handover of a project, not to mention the additional costs incurred by both sides because of the delays. What we propose is that when a system is accepted by the project team the maintenance tasks commence immediately utilising the contractors' staff, then through the training period the FM teams are brought in to shadow and then eventually take over from them. This allows for a more seamless pass over of duties and ensures systems are not left unmaintained to deteriorate which ends up costing the contractor both time and money to fix.

- **Cost Analysis –** from the asset register we can produce a bespoke cost analysis database for our clients including but not limited to depreciation, spare parts usage and manpower allocation. As stated this can be set up in the format required by the client and can be utilised to streamline the operation year on year.

- **Spare Part Management –** from the asset register and agreed client requirements the management and auto ordering of spare parts is possible. For each type of system an agreed spare parts list will have been produced for the O&M manuals through manually updating the usage of the spare parts the system can determine when stocks have been reduced below prescribed limits. Automatic emails can then be sent to suppliers requesting additional base stocks. Protocols for ordering will be checked with the clients and the system set up to be in accordance with these.

- **Re Commissioning –** this database is a must for clients as it is a time-based procedures guide which puts in place the protocols that ensure that systems are still operating to their correct efficiencies. This system will work in much the same way as the PPM except it lists the tasks that the FM teams must carryout in order to check the systems are still in line with the original commissioning results.
  Depending on the type of system we would suggest checks are carried out at either 6 months or 1 Year from system acceptance, not project handover. Commencing from approval not handover stagers the tests across a wider period which is better for the FM team post completion. On the day a test is required for a system / plant item copies of the signed off commissioning results plus the tasks and test requirements i.e. method statement, test equipment, access etc, will be available at the touch of a button.
  If this system is requested CML will produce, along with the individual re-commissioning method statements, a training manual specifically for the tasks, procedures & use of equipment required for re-commissioning.

Conclusion

CML Techniques serves as a critical reference and repository for all the commissioning related activities executed during each phase of the project.

CML Techniques will be available online anytime in future, post project completion as well. Ultimately CML Techniques is the only source available online for all the commissioning documents facilitating the users to deeply study the projects about processes/methods followed, standards adopted, systems commissioned, legal requirements, inspection reports and so on.