Mechanical Completion and Commissioning Services Ltd. Formed in 1994 To fill a niche market in the area of Mechanical Completion and Commissioning

*M.C.C.S. Worldwide Ltd.* Formed 2000 in the UK


Branch Offices in UK, Spain, Vietnam and Indonesia

What makes *M.C.C.S.* unique?

*M.C.C.S.* comprises a team of people who have specialised in this difficult area for several years.

The principle spin off from this team approach is “The Wheel is not Reinvented”

Maximise cost benefits

*M.C.C.S.* involvement should be sought during the early planning and design phase of a project.

Within schedule and under budget

*M.C.C.S.* team has an enviable record of achieving its tasks within schedule and under budget.
MCCS PROFESSIONAL COMMISSIONING & MAINTENANCE SERVICES

FOR EPCC / EPCIC OIL & GAS PROJECTS

FEBRUARY.2015
BEHNAAM
What is Pre-Commissioning?

* Pre-Commissioning:
IT IS THE GROUP OF STATIC & DE-ENERGIZED VERIFICATIONS TO BE CARRIED OUT IN ORDER TO ENSURE THAT THE INSTALLATION ADHERE TO PROJECT ENGINEERING DOCUMENTS.

Non-operating adjustments and cold alignment checks (such as testing without introducing process and auxiliary fluids prior to equipment energisation)
What is Commissioning?

* Commissioning:

IT IS THE GROUP OF DYNAMIC & ENERGISED TESTS TO BE CARRIED OUT IN ORDER TO ENSURE THAT THE INSTALLATION IS READY FOR START-UP.

Pre-startup, check-out, system adjustment, equipment and system activation to prepare system(s) and/or facilities for operation (by introducing auxiliary fluids and with equipment energisation)
Construction is completed in accordance with drawings, specifications, vendor instructions, applicable codes and regulations and authority requirements.

All inspection, checking and testing works are completed.

System(s) and/or facilities are ready for pre-commissioning and commissioning (Note: Some Clients considered MC before pre-commissioning as a reference for Handover from Construction team to Commissioning Team & some Clients considered MC after pre-commissioning)
This activity includes break-down of systems or areas into Sub-Systems/Work Packages by indicating limits and varying colour codes on design drawings such as Piping & Instrument Diagrams (P&ID’s), Electrical Single Line Diagrams (SLD’s), Instrument troubleshooting loop diagrams (TSLD’s) and Telecoms Layout Drawings and other detailed design documents.

Creating this breakdown will assist in establishing the Mechanical Completion Databases and allocation of Work Packages, Job Cards etc. The breakdown will also assist in establishing construction progress and will form the baseline for the Completion and Commissioning Databases and Handover of the plant to the Client.
PROJECT BREAKDOWN

- **PROJECT**
  - The project or subproject represents one complete installation.

- **SYSTEM**
  - A system is a major subdivision of the project that performs a specific function.

- **SUBSYSTEM**
  - A subsystem is a part of the system that can be completed and commissioned as a separate entity.

- **EQUIPMENT**
  - Equipment represents all of the items, circuits, loops and packages that are contained within the subsystem.
From The Construction To The Routine Operation
Three Punch List Priority Levels Should Be Considered:

- **PL A**: Item Considered As A Block Point For Commissioning Activity Of The Sub-system

- **PL B**: Item Considered As A Block Point For Start-up Activity Of The Sub-system

- **PL C**: Item Not Considered As A Block Point For Start-up Activity, But Linked To A Contractual Performance From The Equipment And Milestone (For Example Partial Acceptance, Hand-over, etc.)
EPCC PROJECTS STAGES

- **ENGINEERING STAGE (MCCS SUB-CONTRACTOR)**
- **PROCUREMENT STAGE (N/A)**
- **CONSTRUCTION STAGE (MCCS SUB-CONTRACTOR)**
- **COMMISSIONING STAGE (MCCS SUB-CONTRACTOR)**

WHAT WE CAN DO FOR ANY STAGE?
TECHNICAL PREPARATION & EXECUTIVE PHASES

Basic Eng.  Detailed Eng.  E  P  C

Procurement

Construction

Pre-comm. - Preparation  Pre-comm. - Execution

Commissioning - Preparation  Comm. - Execution

PUMA 3 SOFTWARE SUPPORT

Equipment Population

Pre-comm - Preparation  Pre-comm. Execution

Comm. - Preparation  Comm. - Execution

Punch List A  Punch List B

RFC

By Sub System

MECH COMP

RFSU

RFH0

STARTUP & OPERATION

& Maintenance

Comm. - Preparation  Comm. - Execution

Punch List C
MCCS SERVICES FOR ENGINEERING STAGE

- TECHNICAL PREPARATION FOR;
  * PRE-COMMISSIONING EXECUTION PHASE
  * COMMISSIONING EXECUTION PHASE

INCLUDED ALL CHECK LISTS, TEST SHEETS, PROCEDURES, PUNCH LIST DATA BASE, MASTER DATA BASE FOR ALL MAINTAINABLE TAG NUMBERS, RFC/RFSU/RFHO DOSSIERS CREATION BASED ON SYSTEM AND SUB-SYSTEM, etc.
MCCS SERVICES FOR ENGINEERING STAGE

✓ MCCS KEY SOURCES FOR SERVICES IN ENGINEERING STAGE ARE AS FOLLOW:

➢ PROFESSIONAL MULTIDISCIPLINE TEAM
➢ PROFESSIONAL SOFTWARE SUPPORT (PUMA 3)
➢ EVALUATE EXPERIENCE OF PREVIOUS SERVICES TO WORLD CLASS OIL & GAS MAIN CONTRACTORS
MCCS SERVICES FOR CONSTRUCTION STAGE

- FLANGE MANAGEMENT SERVICES
  - DATA MANAGEMENT
  - MANUAL BOLT TORQUE
  - HYDRAULIC BOLT TORQUE
  - HYDRAULIC BOLT TENSIONING
  - FLANGE BREAKOUT / DISASSEMBLE
FLANGE MANAGEMENT SERVICES OVERVIEW

- **FLANGE MANAGEMENT SERVICES SEQUENCES** AS FOLLOW;

  - PRE-ENGINEERING
    - JOINT REGISTER
    - PREPARATION OF WORK PACKS
      - DATA SHEET
      - DATA RECORDS
      - JOINT COMPLETION CERTIFICATE (JCC)

  - FLANGE PREPARATION AND INSPECTION
    - INTERNAL LINE WALK
    - FLANGE ALIGNMENT, SURFACE AND CLEANLINESS
    - FASTENERS MATERIALS AND CLEANLINESS
    - GASKET MATERIALS AND CLEANLINESS
FLANGE MANAGEMENT SERVICES OVERVIEW

* ENGINEERING
  - TAGGING SYSTEM PREPARATION
  - VERIFICATION OF FLANGES PRIOR TO ASSEMBLY
  - ASSEMBLY BY COMPETENT PERSONNEL AND SUPERVISE BY MCCS
  - INSPECTION CONDUCTED BY CLIENT QA/QC AND MCCS
    - ALIGNMENT INSPECTION
  - TIGHTENING
    - MANUAL BOLT TORQUE
    - HYDRAULIC BOLT TORQUE
    - HYDRAULIC BOLT TENSIONING
  - ** FLANGE BREAKOUT
    - ** SYSTEM INSPECTION AND HandOVER PRIOR TO FLANGE BREAKOUT
    - ** DATA SHEET / DATA RECORDS / JOINT COMPLETION CERTIFICATE (JCC)
    - ** VERIFY FLANGE DETAILS AND SPECIFICATION PROVIDED BY CLIENT
    - ** REPAIR THE JOINT
    - ** INSPECTION AND APPROVAL FROM CLIENT
    - ** UPDATE JOINT REGISTER

* FINAL INSPECTION AND APPROVAL BY CLIENT
  - ISSUANCE OF JOINT COMPLETION CERTIFICATE (JCC) WITHIN WORK PACKS
  - UPDATE JOINT REGISTER
<table>
<thead>
<tr>
<th>PHASE</th>
<th>ACTIVITIES</th>
<th>MILESTONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-COMMISSIONING</td>
<td>CONFORMITY CHECKS</td>
<td>MECHANICAL COMPLETION (MC &amp; RFC)</td>
</tr>
<tr>
<td></td>
<td>STATIC TESTING</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N2/He LEAK TESTING</td>
<td></td>
</tr>
</tbody>
</table>

MCCS SERVICES FOR PRE-COMMISSIONING STAGE
N2/He LEAK TESTING

PROCESS PLANT IN ONSHORE & OFFSHORE
N2 / He Leak Testing Based On Specified Test Packages

☞ Step 1:
Pre-Engineering/Engineering
- Provision of **Mark-up P&ID**
- Provision of **System boundary / limit**
- Provision of **Isolation valve list/ Critical valve list (UVT, if required)**

Generation of test packs prior to submission for review
- Submission to Client/Main Contractor for Approval
- Amendments to be updated if any, in test packs, verified and pack/s must be resubmitted & reapproved following changes made

☞ Step 2:
Onsite Preparation
- Application of **Permit & Isolation Tagging. Rig up preparation work (Installation Tagging, Injection Point, OPP & Monitoring point)**
N2/He LEAK TESTING

☞ Step 3: TRI-PARTY LINE WALK BEFORE TEST.
(Final walk with client / Main Contractor For Confirmation of System readiness)

☞ Step 4: Introduction of N²He gas into system to 100% Test Pressure based on 90% of PSV Set point / Piping design pressure with quarter percentile stoppages, checking system/pressurization stability. Perform UVT (Client request) and Probing to Leak check for each joint
Step 5: REPORTING
- Leak Report
- Identification/Recording of leak points & rates tied in with related Marked-up P&IDs
- Verification of rectification order based on leak rates followed by given instruction (Clients) of system readiness for retest

Step 6: Retest
Re-test, following rectification of leaking joints in close accordance to working procedures

Step 7: Test Completion
- Client/Main contractor Approval and Handover of related Test Package Dossier with complete sign off.
MCCS SERVICES FOR PRE-COMMISSIONING STAGE (MECHANICAL COMPLETION)

- PRE-COMMISSIONING EXECUTION (MULTIDISCIPLINE)
  - Visual inspection of Equipment (PG, Motors, Cables...). Quality of installation Compliance with Project Specifications, Safety rules, codes,...
  - « Cold Testing »: Calibration of Instruments, Machinery alignment, Setting of safety valves,... (De-energised Tests)
  - Pipes and Vessels N2/He Leak Testing

(MCCS will follow approved Client/Company Procedures)
PRE-COMMISSIONING DOSSIER

One Dossier Per Sub-System

Compiled RFC Certificate
<table>
<thead>
<tr>
<th>PHASE</th>
<th>ACTIVITIES</th>
<th>MILESTONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMISSIONING</td>
<td>ENERGISATION DYNAMIC TESTS EQUIPMENT RUNNING-IN PRESTART-UP ACTIVITIES</td>
<td>READY FOR START-UP (RFSU)</td>
</tr>
</tbody>
</table>
COMMISSIONING EXECUTION

- Electrical motors coupled runs, instrument loops test, electrical breakers operation .......
- Running-in and on-line tests of plant utilities, and main process equipment in closed loop (wherever applicable)
- N2/He Final Leak Testing
- START-UP ASSISTANTE

(MCCS Will Follow Procedures Approved By Client)
COMMISSIONING DOSSIER

RFSU Dossier Index

3. SUB-SYSTEM DEFINITION:
   3.1 SUB-SYSTEM DESCRIPTION / LIMITS
   3.2 SUB-SYSTEM TECHNICAL DATABASE / LIST

2. READY FOR START-UP DOCUMENTATION:
   2.1 READY FOR START-UP CERTIFICATE
   2.2 `EXCEPTION` PUNCH LISTS (PER DISCIPLINE)
   2.3 `AS-COMMISSIONED` DRAWINGS / SLP / DET / OCD
   2.4 `AS-COMMISSIONED` BID LIST
   2.5 PRESERVATION RECORDS
   2.6 KEY LIST REGISTERS

3. PRE-START-UP ACTIVITIES:
   3.1 LUBRICATION SCHEDULE INDEX
   3.2 CHEMICAL LOADING & FIRST FILL RECORDS
   3.3 LIQUID TEST / DRYING / INERTING / VACUUM TESTING RECORDS
   3.5 FINAL MECHANICAL / VESSEL INSPECTION CHECK
   3.6 CHEMICAL CLEANING REPORTS & RECORDS

4. SITE / OPERATIONAL / ENERGIZATION PROCEDURES, SAT / OTP / ETP / UAT / PAT:
   4.1 SITE / OPERATIONAL / ENERGIZATION TEST PROCEDURES INDEX (SAT / OTP / ETP / UAT / PAT)
   4.2 OPERATIONAL DEMONSTRATION TEST PROCEDURES (SAT / OTP / UAT / PAT)
   4.3 ENERGIZATION TEST PROCEDURES (ETP)

5. FUNCTIONAL TESTS & `AS-COMMISSIONED` DRAWINGS:
   5.1 ELECTRICAL TECHNICAL DATABASE & FUNCTIONAL TEST SHEETS
   5.2 ELECTRICAL `AS-COMMISSIONED` INTERCONNECTION DIAGRAMS
   5.3 INSTRUMENTATION TECHNICAL DATABASE & FUNCTIONAL TEST SHEETS
   5.4 INSTRUMENTATION `AS-COMMISSIONED` TROUBLE SHOOTING DIAGRAMS
   5.5 TELECOMMUNICATIONS DATABASE & FUNCTIONAL TEST SHEETS
   5.6 TELECOMMUNICATION `AS-COMMISSIONED` ICD / TSL / D

6. VENDOR:
   6.1 VENDOR PACKAGE SUMMARY INDEX
   6.2 VENDOR FAT / SITE REPORTS & DRAWINGS
   6.3 VENDOR SPARES & SPECIAL TOOLS LIST
   6.4 VENDOR DATA / OPERATIONS / MAINTENANCE MANUALS

7. PRELIMINARY CHECKS:
   7.1 PRELIMINARY CHECKS (PER DISCIPLINE)

8. MODIFICATIONS:
   8.1 MODIFICATION APPROVALS & CONTROL SHEETS

9. SUPPORTING DOCUMENTS:
   9.1 OTHER SUPPORTING DOCUMENTS (AS APPLICABLE)

One Dossier Per Sub-System
WHAT WE NEED FOR MAINTENANCE SERVICES?

1) MULTI-DISCIPLINE PROFESSIONAL TEAM

2) SPECIAL & GENERAL TOOLS

3) PROFESSIONAL SOFTWARE FOR COMPUTRIZED MAINTENANCE MANAGEMENT SYSTEM (CMMS)
COMMISSIONING TEAM IS BEST OPTION FOR MAINTENANCE SERVICES OF THE PLANT

WHY MCCS IS BEST OPTION FOR MAINTENANCE?

BECAUSE ALL DISCIPLINES (Elect., Inst., Telecom, Mechanical, Piping, etc.) HAVE STRONG BACKGROUND OF THE PLANT TECHNICAL DATA AS PER EXPERIENCE OF THE PLANT COMMISSIONING OPERATION
MCCS IS PROFESSIONAL IN;

SELECT AND PROVIDE THE APPROPRIATE TOOLS BASED ON TASK & EQUIPMENT TYPE FOR EACH DISCIPLINE:

ELECTRICAL, INSTRUMENT, TELECOM, MECHANICAL...
WHY WE NEED TO SOFTWARE FOR THE MAINTENANCE?

- TO MANAGE TECHNICAL DOCUMENTS
- TO MANAGE SPADE PARTS
- TO MANAGE MAINTENANCE SCHEDULE

DURING COMMISSIONING OPERATION
MCCS WILL PROVIDE ALL OF THE DATA BASES AND WILL MANAGE UPLOADING OF THE TECHNICAL DATA FOR MAINTENANCE SERVICES.

MCCS will support your projects for creation of pyramid data base for CMMS & EDMS.

CMMS: Computrise Maintenance Management System
EDMS: Electronic Document management System
THANKS FOR YOUR ATTENTION