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Challenges in

Mega

Projects

Passenger Ship



No Of Nozzles = 13000

Total Flow Rate=800 L/M

Projects - from our point of view

Hotel



No Of Nozzles = 1000

Total Flow Rate=600 L/M

Industrial



No Of Nozzles = 800

Total Flow Rate=300 L/M

Data Centre

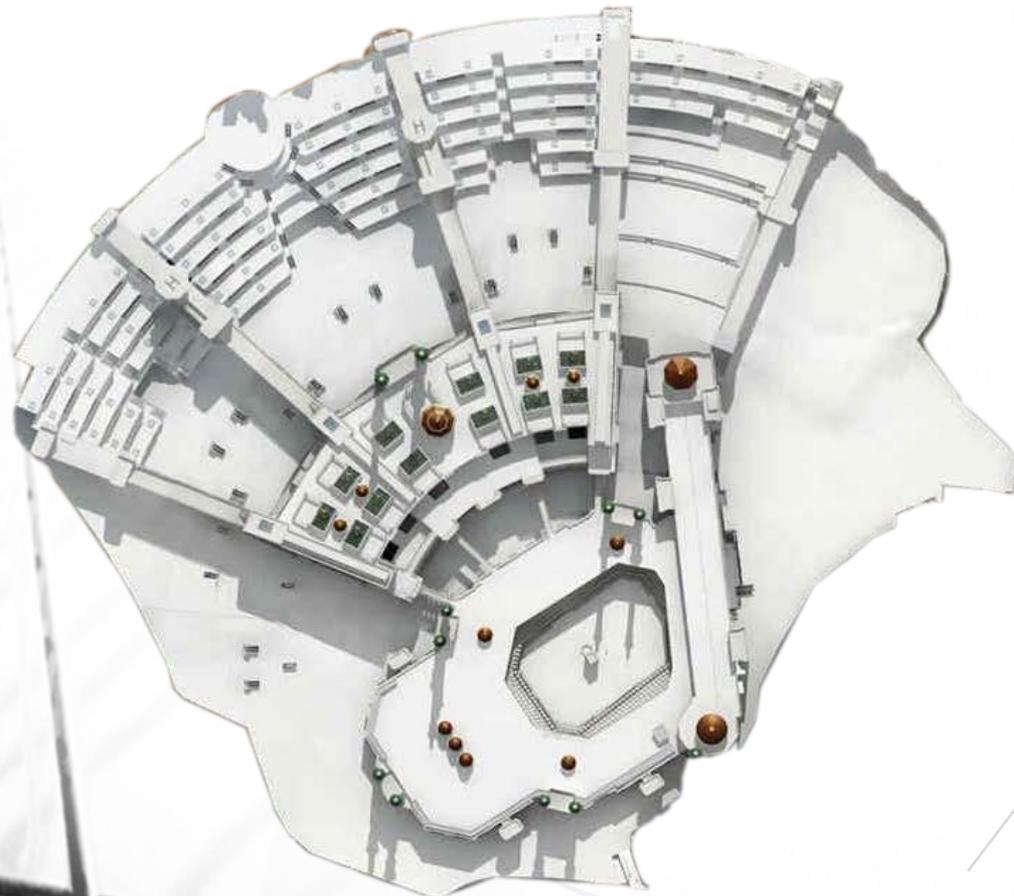


No Of Nozzles = 500

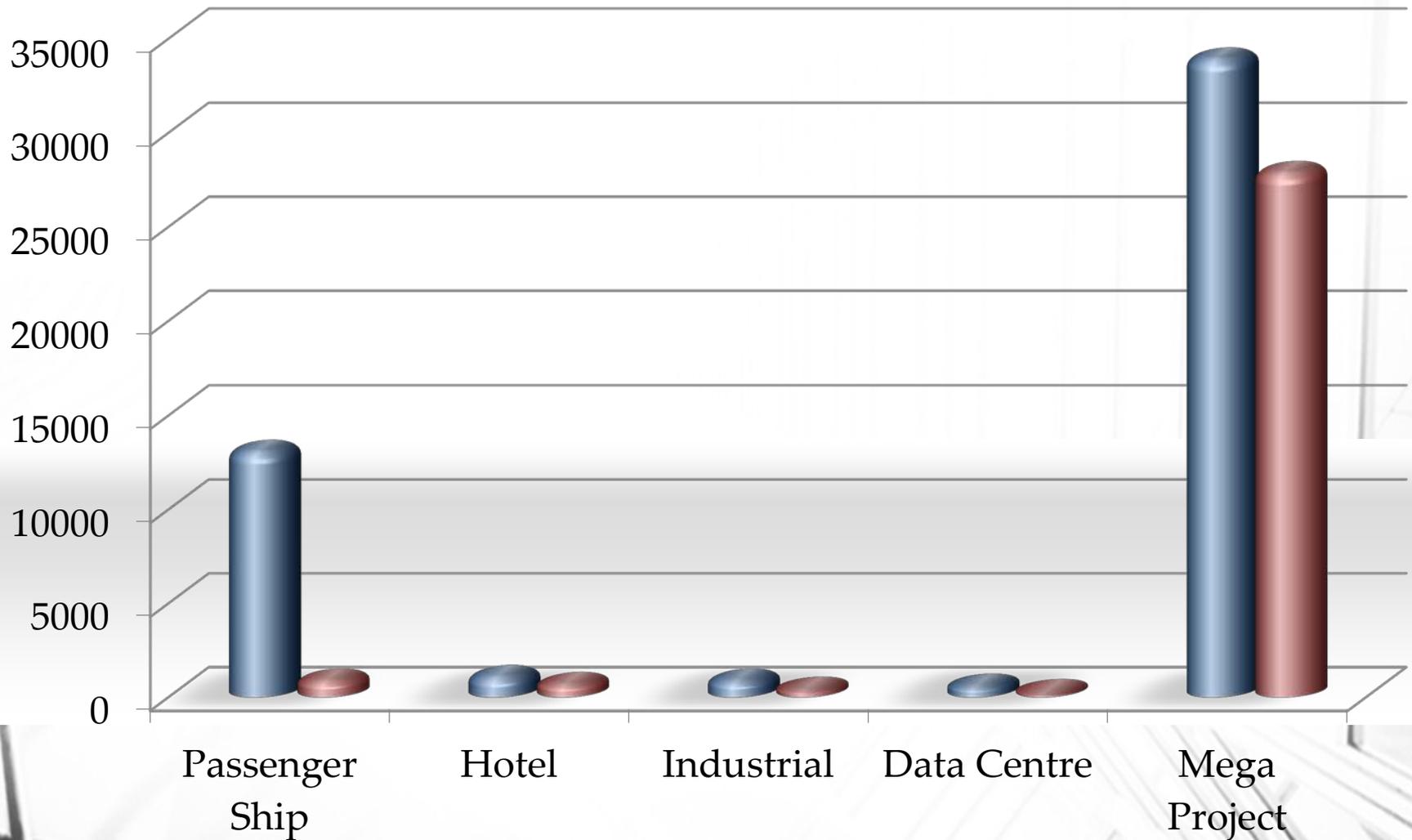
Total Flow Rate=120 L/M

MEGA Project

- No Of Nozzles = **33,826**
- Total Pump Capacity=**27,800 L/M**
- Multiple system configurations: electrical, diesel and gas-driven pump units
- No. of Pump stations : **21**
- Flow rates are based on pump unit capacity, not the dimensioning criteria of single object protection as it was in previous examples.



Projects Overview



Applications



Raised Floor



Culvert



Minarets



Service Tunnel



Stations



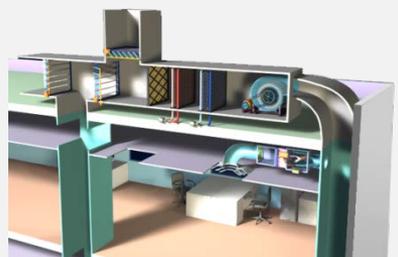
Accommodation



Low voltage



Cable Tunnel



HVAC



Generator

Reliable System = Complex Arrangement

Reliable system

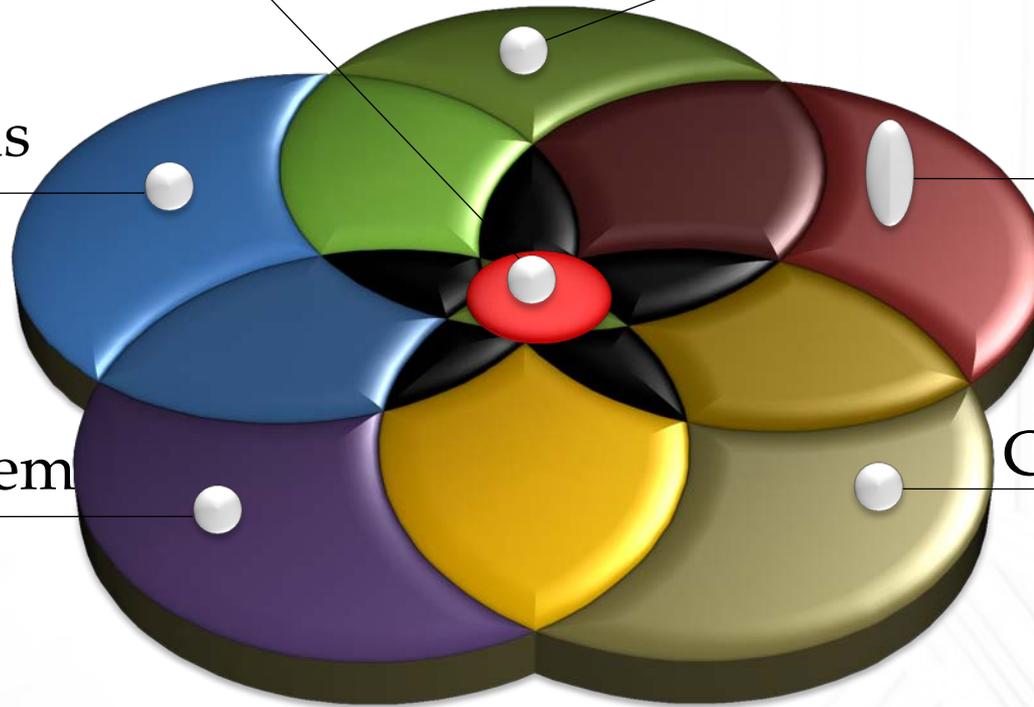
System types (wet, dry, pre-action)

Various
pump rooms

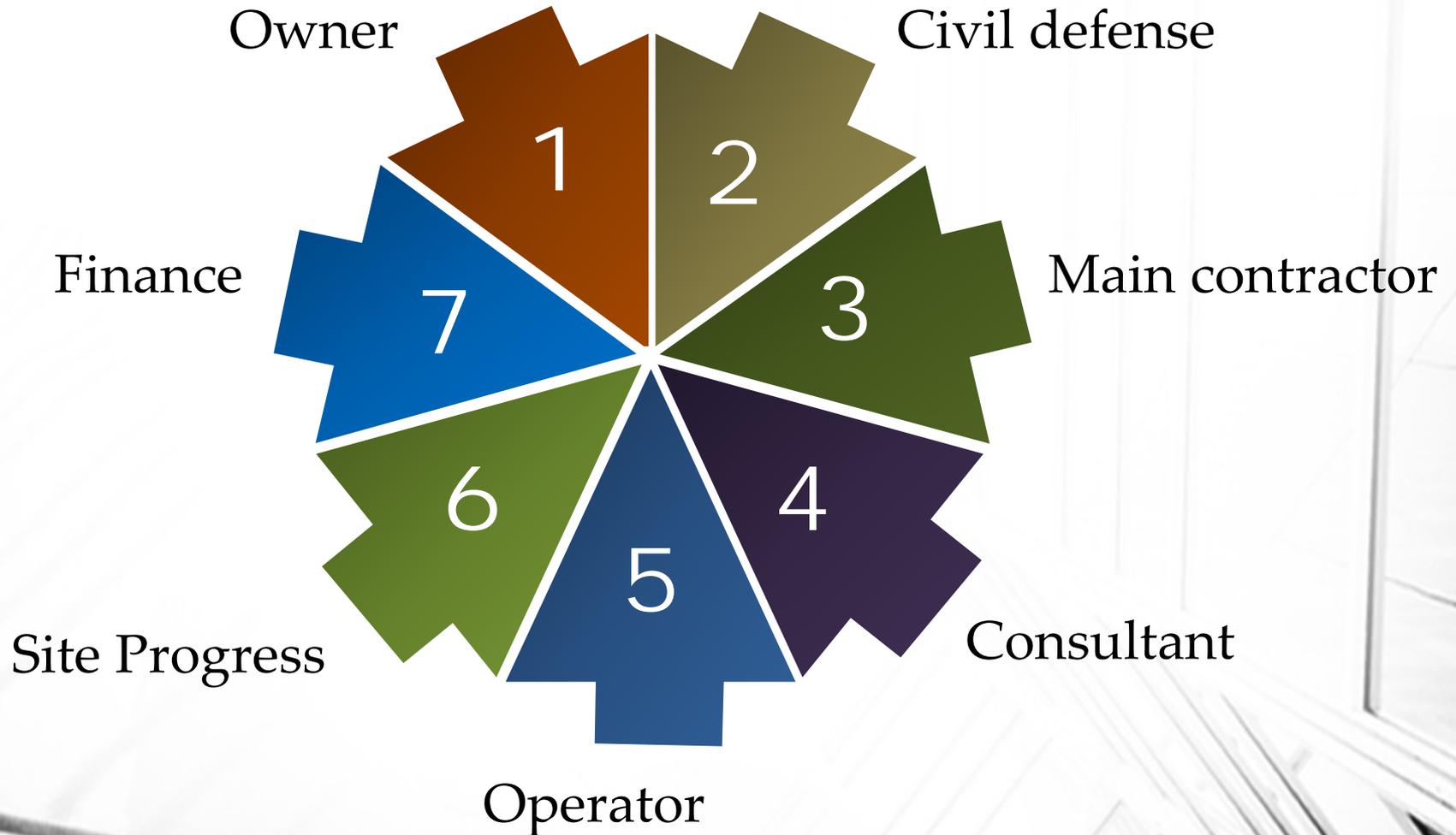
Various
different
applications

Alarm System

Control System



7 contributing factors





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1-System : to be type approved

FM APPROVED

Certificate of Compliance

Water Mist System

This is to certify that the company indicated below is listed in the FM Approval Guide and is eligible to use the FM Approvals mark for approval products on their HI-FOG OPU water mist system, for the protection of combustion turbines, machinery spaces, special hazard machinery spaces, and flammable liquid processing hazards, in enclosures with volumes not exceeding 17945 ft³ (500 m³). See the Marloff Corporation OY listing in the FM Approval Guide - Fire Protection section for further details.

Marloff Corporation Oy
Virtatie 3
FIN-01301
Vantaa, Finland

FM Approvals confirms that the above system was tested and found to comply with the following standards:

FM Approval Standard "Draft Performance Requirements for Fine Water Spray Systems for the Protection of Combustion Turbines, Machinery Spaces, and Special Hazard Machinery Spaces With Volumes Exceeding 19 775 ft³ (560 m³)", Class Number 5549, January 1998 and "Automatic Sprinklers for Fire Protection", Class Number 2000, May 1998.

This system must be installed in accordance with the manufacturer's Design, Installation, Operation, and Maintenance Manual, MOPES/QD/DIOM/FM98, Revision 1.3, June 2001.

Recognition is subject to satisfactory field performance, continued conformance to the listing, as shown in the FM Approval Guide.

Project Identifier: 3000430

Robert A. Allard
Robert A. Allard, Assistant Vice President
FM Approvals

FM Approvals
An FM Global Enterprise

VdS Certificate of Approval of Components and Systems

Marloff Corporation Oy
Virtatie 3
FI-01301 Vantaa

Approvals	No. of Entries	Valid from	Valid to
S 4050002	5	16.06.2010	15.06.2014

Subject matter of the Approval:
**High-Pressure Fire Extinguishing System
Type "NBU Cable Tunnel"**

for the protection of hazards according to annex 3

Procedure Guidelines - VdS 2344en: (2005-12)
Procedures for the approval of new extinguishing technologies, VdS 2462 (06/97) Deut

Köln (Cologne), 11.06.2010

Wolfgang Schilling
Wolfgang Schilling
Managing Director

Wolfgang Schilling
ppa. Wilms-Vahrenholt
Head of the VdS Certification Body

VdS Betriebsunterstützung GmbH
Qualifizierungszentrum
Löhrenstraße 10
D-50670 Köln

Member of the German
Insurance Association (VdS)
of the German Association of
Insurance Companies (VdA)

Accredited by the Deutsche
Accreditation Authority (DIN EN
ISO 9001) as a certification body
for the approval of the products
and services

Type Approval Certificate Germanischer Lloyd

This is to certify that the underlined product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No. 42 445 - 02 044
Company Marloff Corporation Oy
Virtatie 3
01301 Vantaa, FINLAND

Product Description Fine Water Mist Extinguishing System for Deep-Fat Cooking Equipment

Type HI-FOG

Environmental Category None

Technical Data / Range of Application
None
Two different types of system for deep-fat cooking equipment are available:
- self-contained system: - Kitchen Accumulator power Unit (KAU)
- spray head and stainless steel tubing
- pumped system: - pump unit (normally part of the main system)
- sprinkler or spray head, and stainless steel tubing

Nozzle and installation details:
Spray Head Sprinkler
- type 43 11A of A/NF 1000 29 18A of A/NF 1000
- K factor (pumped systems) 1.19 5.64
- pressure [bar] - accumulator 200 - (increasing)
- pump unit 60 (static) - 140 (max)
- location within the hood above the centerline of the burner
- distance [m] (max) from burner surface 1.0 / 1.35 1.2 / 1.35
- max. coverage area [m²] 0.4 0.4

Test Standard ISO 15271:2000

Documents
- Marloff type approval documentation, April 2001
- VTT test report No. RTE/0300 (date 2001-04-25)

Remarks None

2010-01-31 Type Approval Symbol (GL)

1 of 1
01.01
900-11-21
Germanischer Lloyd
W. Vahrenholt
Güter Hülzer
Michael Kämpf

Based on the basis of "Guidelines for the Performance of Type Approval Part 1 - Procedure"

Owner Expectations

**2-Design : to be submitted in advance
before any contractual commitments**

Owner Expectations



3-Installation : with approved tools in accordance with NFPA requirements

Owner Expectations

4-Civil Defense Approvals



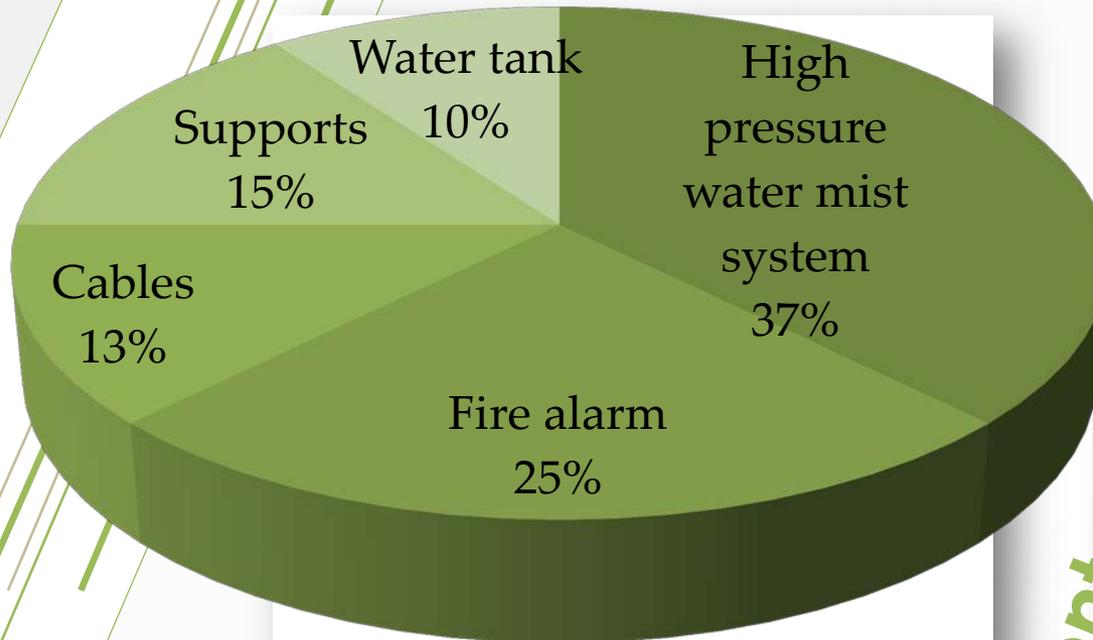
- 1-Company**
- 2-Product**
- 3-Installation**

Owner Expectations

Local Civil Defense Approval

- **SASO certificate in accordance to Saudi standards**
- **Tools inspection**
- **Design office inspection**
- **ISO**
- **Insurance liability**
- **3rd. Party Approval**
- **Reference list in Saudi Arabia !!**
- **Other approvals (i.e. ARAMCO ...)**

2-16 Cooperation with other subcontractors



Main contractor Expectations

Shop Drawings Requirements

- **Coordination with HVAC, lighting , cable tray ,...**
- **Study the expansion of the building structure**
- **Provide extra materials (within the scope of work) i.e. (flow switches , ball valves ...)**

Compliance With Codes

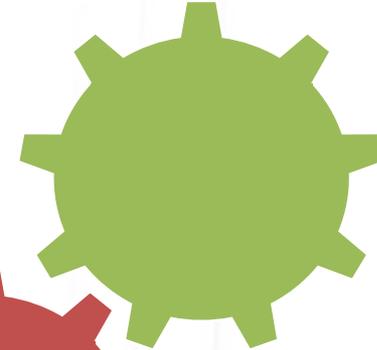
- **Full compliance with NFPA750-NFPA13-NFPA20**
- **Compliance with local fire code**
- **Full compliance with consultant specification**

Consultant Expectations

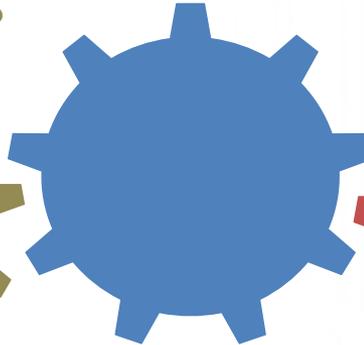
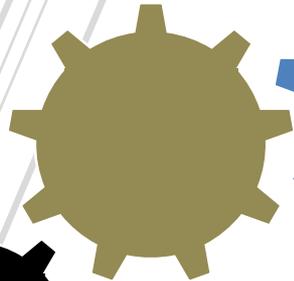
Site Progress

Do you have certified staff ?

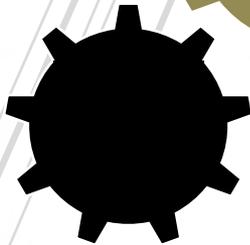
Do you have staff in site
for As-built ?



Do you have sufficient man power ?



Do you have stock of materials ?



Do you have staff on-site
for design modifications?

99%

90%

70%

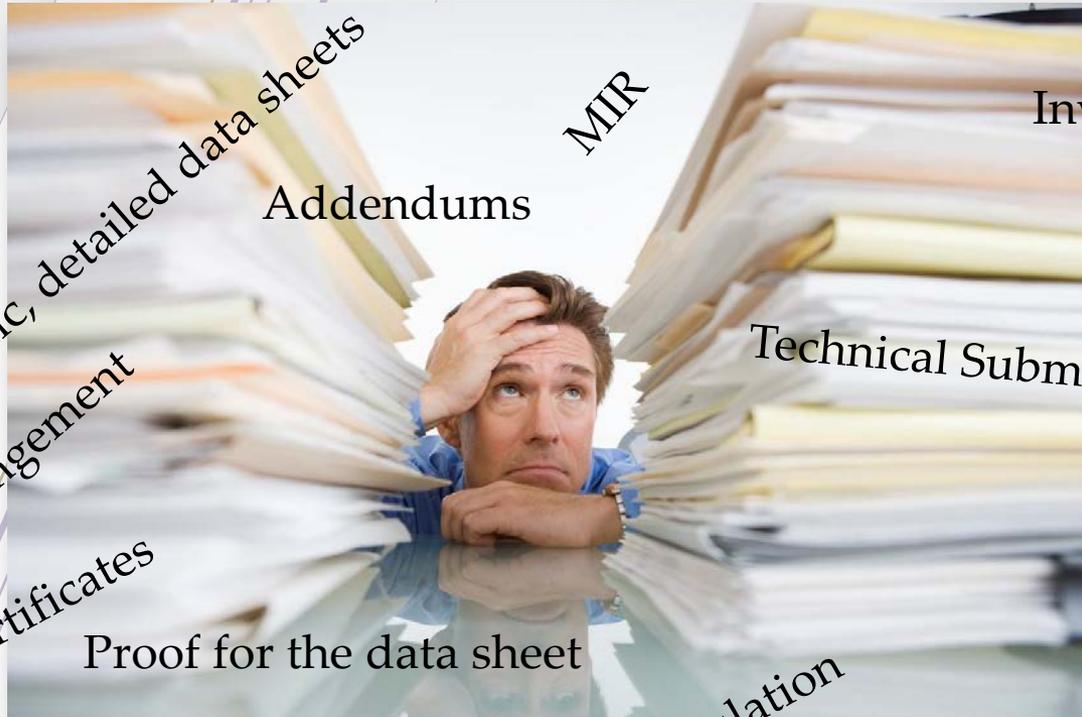
50%

30%

20%

10%

.....
Calculation



Documentation For Mega Projects



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- **Cash flow management in mega projects is challenging**

Finance In Mega Projects



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- **Owner : you are expensive**
- **Civil defense : you must be in compliance with all codes & regulations**
- **Consultant : you have to 100% compliance with every thing**
- **Supplier : I am the key person**
- **Local inspector : you have to certify**

Other things to be Considered

Mega projects require huge designing & engineering resources before the contract

Piping layout drawings & electric plans

Pump room drawings

System specifications & DIOM

Detailed BOQ



FACTS

which may need to be updated many times

Conclusions

- **Mega projects are challenging to execute because of:**
 - Customers and authorities are very demanding.
 - Mega project require a lot of on-site resources.
 - Financial planning is challenging.



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Thank you !