Callaghan Engineering

- Multi-discipline engineering & project management company
- Established in 1990
- Offices in Dublin and Cork, Ireland
- Provide a High Quality, Personalised, Flexible, Professional and Competitive Service to our clients
- Excellent Client Relationships - Repeat Business
- Markets: Datacentres, Biopharmaceuticals, Education, Commercial, Healthcare, Food/Drink, Consultancy
- Currently designing projects in Germany & Netherlands
Callaghan Engineering

- Project Scope
  - Take project from concept through to completion
  - Masterplanning - Front End Studies
  - Detailed Design
  - Project & Construction Management
  - Procurement
- Project Services
  - M&E Engineering
  - Fire Protection
  - ICT
  - Commissioning & IST
  - PSDP & PSCS
## Callaghan Engineering

### Datacentre Experience

**Confidential Client, Dublin**

$1 Billion Data Centre Investment Programme through 2016 - 8 Datacentres (59 datahalls when complete) – Ireland & Germany

<table>
<thead>
<tr>
<th>No.</th>
<th>Location</th>
<th>No. of Datahalls</th>
<th>Area per hall m²</th>
<th>Power per hall MW</th>
<th>Total critical power MW</th>
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<td>Total on completion</td>
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Datacentre Experience Overview

Callaghan Engineering DC experience to date:

- 32 Datahalls constructed and handed over
- Services Provided:
  - Full M+E design
  - Masterplanning
  - Shell & Core
  - Datahalls
  - Project Management
  - Procurement
  - FATs/SATs
  - Commissioning/Handovers

- Datahall build value approx. €10-12m each
- Aggressive, changing timelines – always met handover dates
- Design and integration of 3 no. 110kV substations
DC Electrical Systems

- Incoming 110kV Utility supply to transformer switchyard
- Client 20kV/25mVA Metering & protection building
- 20kV dual feeders to clients MV substation boards
- MV substation dual feeds to Data Halls. Unit Subs. 2.4/3.0mVA
- MV substation feed to standby Unit Sub. 2.4/3.0mVA.
- Data Halls standby automatic start generators 400V 50Hz 2.5mVA.
- Critical Distribution Boards, 400V 50Hz incorporating inline UPS & Master static switches. Typical autonomy of 10 Minutes at full load
- Data Hall power distribution panels feeding rack distribution units
- Data Racks Power distribution boards, 400V 50Hz dual sided incorporating Automatic Transfer Switches
DC Electrical Systems

- Cabling & Busduct power distribution systems. 400V 50Hz 2000/4000A
- Power distribution boards for mechanical cooling & air conditioning
- House services distribution boards with dual supplies
- Building Management System for control and monitoring of facility, environmental conditions and power energy meters
- Lighting, Small Power, Fire Alarm, Security and Access controls
- Main building lightning protection and earthing, site lighting, offices & storage fit-out
- Diesel storage tank farm. Distribution, pumping and valving to emergency generators and fire water pumps
- Water storage, treatment and distribution system for AHU free cooling
DC Mechanical Systems

- **Datacentre Ventilation systems** (2 concepts have been used - AHU & CRAHs)
  - AHU forced ventilation
    - Air distributed in floor void
    - High level extract ducting to AHU return fans
  - CRAH forced ventilation
    - Cold corridor fresh air intake
    - Air distributed in floor void
    - Roof level extract fans
    - Mixing box for air recirculation

- Hot or Cold aisle containment regimes used
- Datahall/electrical room extract fans
- Battery rooms DX systems + extract system
- BMS control of all mechanical plant to maximise free cooling and minimise PUE
- Office M&E systems
DC Mechanical Systems

• Fire Protection
  • Pumphouse and tanks layout
  • Pre-action and wet systems
  • Interface with BMS and security
  • Vortex system for MV rooms

• Diesel Systems
  • 24 hr storage vessels including containment bund to EPA requirements
  • Underground distribution main & distribution pumps
  • Supply to individual generators (containerised or skid mounted sets)
  • Environmental monitoring of system and all bunding to BMS

• Humidifier water
  • Humidifier water tanks, pumphouse and distribution system, including water treatment and recirculation
DC Security Systems

- **External Security Systems**
  - Closed Circuit Television.
  - Perimeter Detection.
  - Voice Alert Perimeter Alarms.

- **Internal Security Systems**
  - Pedestrian Access Control.
  - Closed Circuit Television.
  - Pedestrian Metal Detection.
  - Intercoms.
  - Monitoring of Exit Doors.
  - Centralised Monitoring of External and Internal Areas.

- **Fire Alarm & Detection Installation Design**
  - Very Early Smoke Detection Alarm (VESDA) in Electrical Rooms and Data Halls.
  - Hydrogen Gas Detection in Battery Rooms.
  - Fire Alarm System Interface with Other Systems – BMS, Security, Sprinkler, Gas Detection etc.
  - Centralised Monitoring via Front End Graphics.
Industry Trends

- Mechanical DX Cooling ► Free Cooling ► CRAHs
- Raised floors ► Racks on slab (air contained in hot aisle)
- Energy Monitoring
  - BMS (High level) ► dedicated system monitoring to each rack
- Temperature monitoring
  - Aisle temp sensor ► now monitoring each server
- Datahall size increasing ► Ballroom 2.4-7.5 MW
- Increased security - Physical and Virtual
- Increased environmental awareness
Why Callaghan Engineering?

- Proven capability of delivering datacentre projects
- Reputable Engineering Consultancy – established 25 years
- Fully aware of confidentiality requirements
- Depth of resources with relevant experience
- Competitive, flexible, reliable service offered
- Innovative solutions drawn from broad breadth of experience
Callaghan Engineering
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