Engineering buildings that are better, faster, stronger

John Brough
Director of Operations, Northern Europe
Delta Controls International
Independent Manufacturer of Building Controls

Founded 1980

Employ 550 people, HQ in Vancouver, BC

Leading BACnet Manufacturer

20%+ average annual growth
24 UK & Ireland Partners (31 Offices)
Building Performance

Engineering buildings that are better, faster, stronger

John Brough
Director of Operations, Northern Europe
Delta Controls International
It was so much easier back then...
So what changed?
## Performance & Efficiency (Petrol)

<table>
<thead>
<tr>
<th>1976 Ford Cortina 2.0 Ghia</th>
<th>2013 Ford Focus 1.6 Ecoboost</th>
</tr>
</thead>
<tbody>
<tr>
<td>106 mph (170 kph)</td>
<td>139 mph (223 kph)</td>
</tr>
<tr>
<td>0-60 kph (0-100 mph) – 10.5s</td>
<td>0-60mph (0-100mph) – 7.9s</td>
</tr>
<tr>
<td>101 bhp</td>
<td>182 bhp</td>
</tr>
<tr>
<td>37.7 mpg (6.2 L/100km)</td>
<td>47.9 mpg (5.9 L/100km)</td>
</tr>
<tr>
<td>1977 Ford Granada 2100 Diesel</td>
<td>2010 Ford Mondeo 2.0 TDCi</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>78 mph (126 kph)</td>
<td>137 mph (220 mph)</td>
</tr>
<tr>
<td>0-60 mph (0-100 kph) – 26.1s</td>
<td>0-60 mph (0-100 kph) – 8.9s</td>
</tr>
<tr>
<td>63 bhp</td>
<td>163 bhp</td>
</tr>
<tr>
<td>45 mpg (5.2 L/100km)</td>
<td>62.8 mpg (3.7 L/100km)</td>
</tr>
</tbody>
</table>

* estimated
Building Performance Parameters

- Environmental Management
- Energy Management
- Building Intelligence
- Integration
Environmental Management
CHP – Back in Vogue

Combined Heat & Power
You can't keep a good technology down

Green Energy for Fashionistas
**Beware of Refrigerants**

<table>
<thead>
<tr>
<th>ASHRAE Number</th>
<th>Atmospheric Life</th>
<th>ODP</th>
<th>GWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-11</td>
<td>45 years</td>
<td>1.0</td>
<td>4,750</td>
</tr>
<tr>
<td>R-410A</td>
<td>17 years</td>
<td>0</td>
<td>2,087</td>
</tr>
<tr>
<td>R-407C</td>
<td>15.5 years</td>
<td>0</td>
<td>1,774</td>
</tr>
<tr>
<td>R-718</td>
<td>10 days</td>
<td>0</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Trichlorofluoromethane
What’s wrong with Water?

Tri-generation is cool! (and hot)

CHP feeds an Adsorption Chiller

Energy Saving, self balancing, self commissioning Fan Coils
Use of Energy in Buildings

Commercial Facility Primary Energy Use Splits

- HVAC: 41%
- Lighting: 27%
- Other: 14%
- Electronics: 8%
- Computers: 4%
- Kitchens: 6%

Source: 2008 EIA Buildings Energy Data Book
Variable Speed Drive

Pump Control Method

Power Required (%) vs. Flow (%)

- Recirculation
- Throttling
- Cycling control
- VSD
- Pump
EC Motors

Key
- EC control
- Frequency inverter with sine filter
- Phase-angle control without sine filter
- Phase-angle control with sine filter
- Transformer

[Graph showing differences in airflow (m³/h) and power (W) for different control methods.]

- Power (W) on the y-axis ranges from 0 to 1500.
- Airflow (m³/h) on the x-axis ranges from 0 to 10000.
Energy Management

Earthright™ Energy Dashboard

Current energy use at Delta HQ

Current Location:
Delta HQ
160 people, 33000 Sq Feet

Did you know?
Energy efficient double-pane, high reflective, low-E windows are used throughout. We installed aluminum sun-screens to reduce the solar load. And upgraded the insulation of the roof and exterior walls.
Energy Metering
Energy Reporting
Current energy use at HQ Building

Current Location:
HQ Building
280 people, 30000 Sq. Feet

Did you know?
We use compact fluorescent bulbs separately switched and dimmed. Photocells and motion sensors also control the lights to further reduces our energy consumption.
Control Strategy
References

- Delta Controls – www.deltacontrols.com
- ABB Ltd – www.abb.co.uk/energy
- ebm-papst – www.ebmpapst-ec.co.uk
- DAS Business Furniture – www.dasbf.com
- Ability Projects Ltd – www.abilityprojects.co.uk