



Advanced Technological Systems
International Ltd

Bringing Power Management into the 21st Century

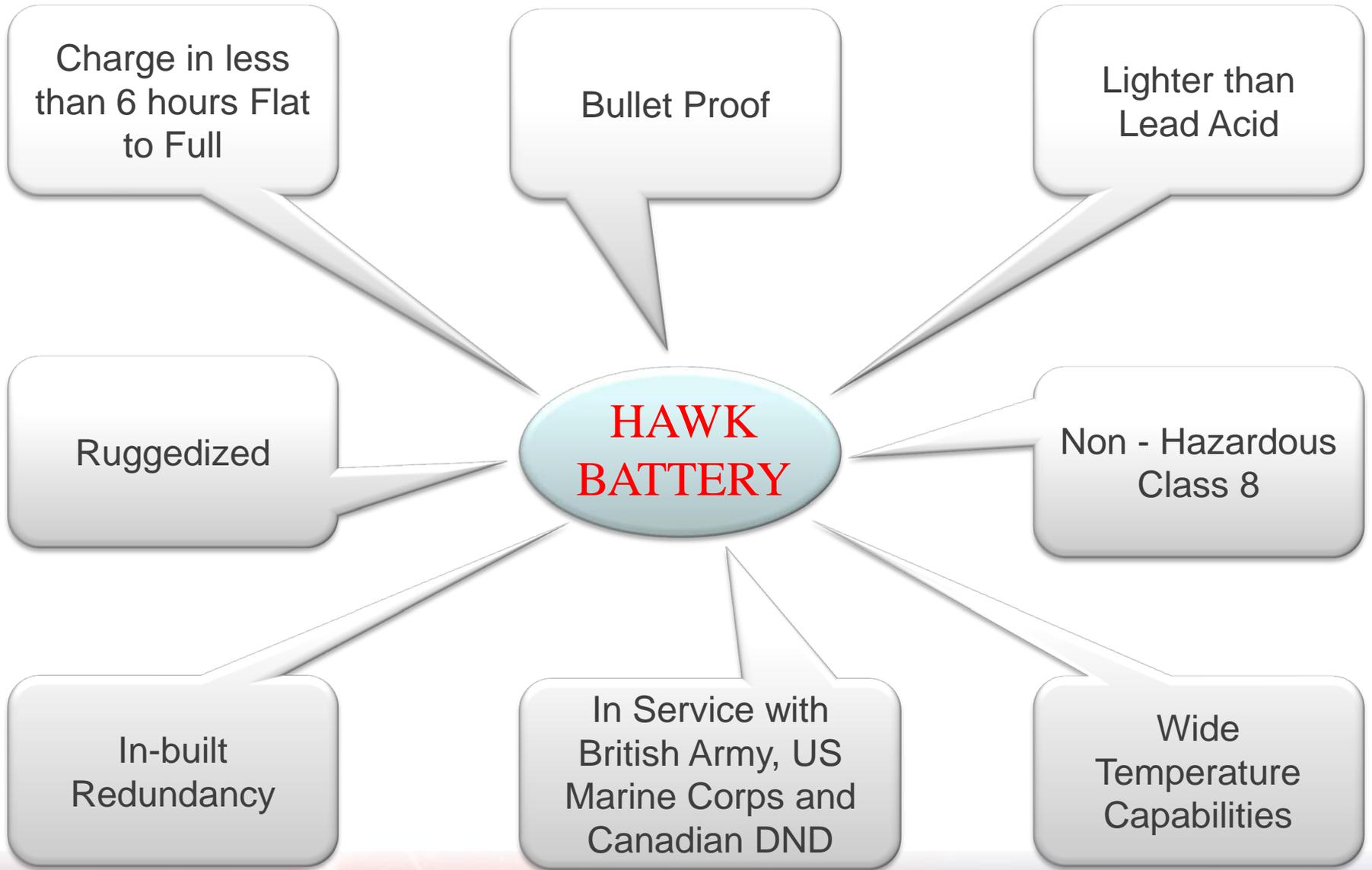


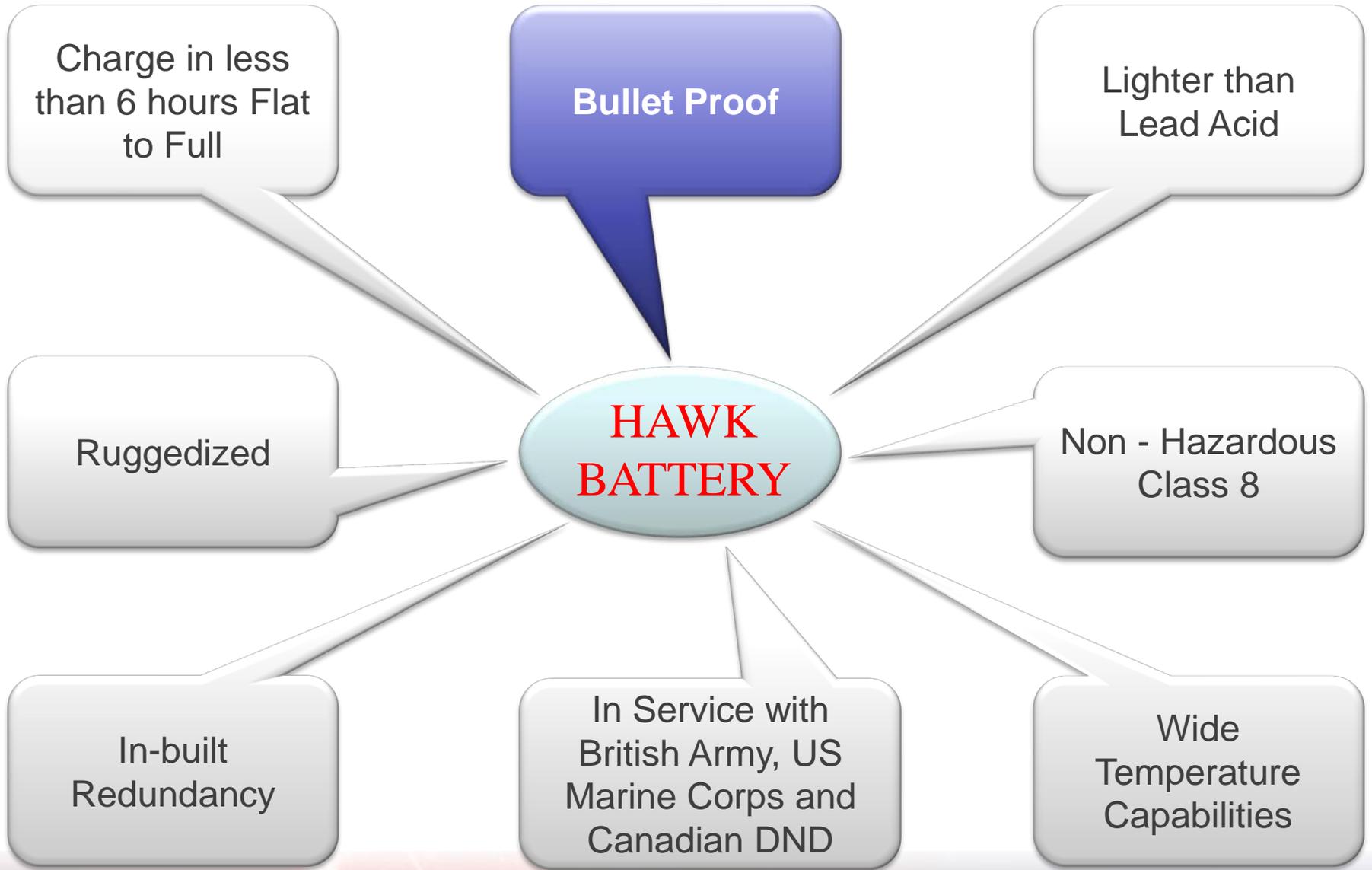


HAWK
Ni-MH Battery



RMBC64
Battery Charger



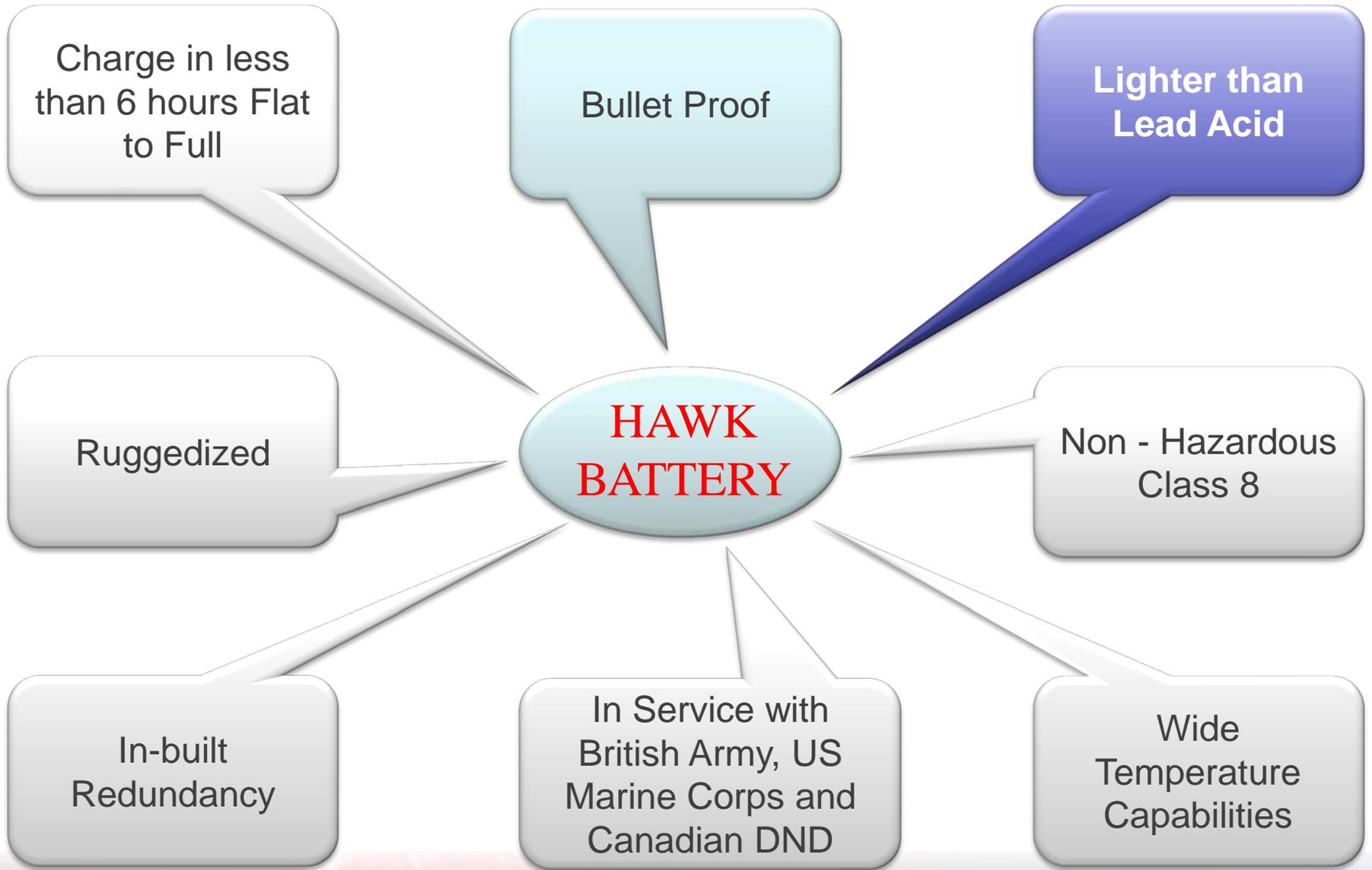


RMBP Ni-MH Battery



- **Bullet Proof**

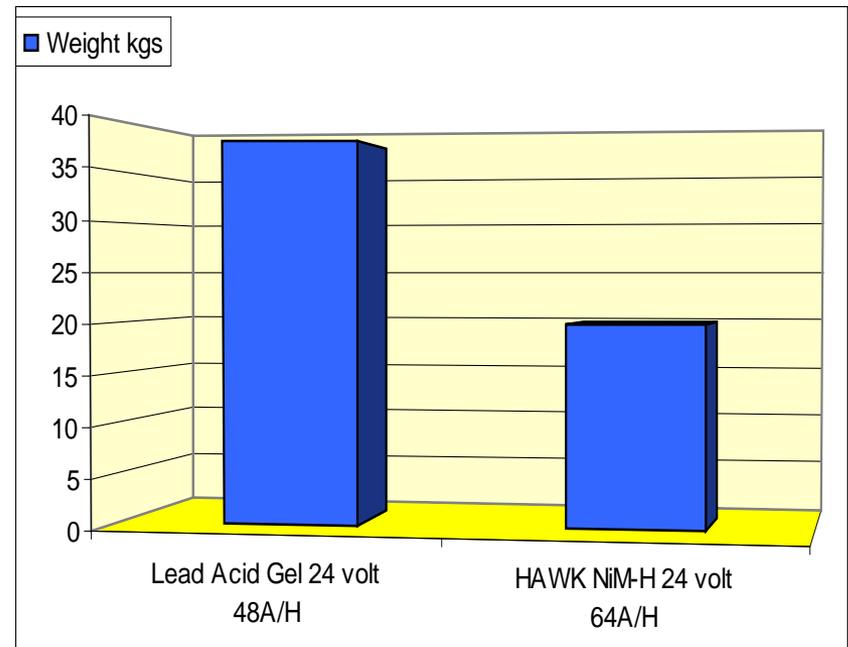
- All military A.T.S.I batteries contain our unique patented series parallel electronic separation circuitry
- The Hawk battery contains 16 individual 4AH Ni-MH 24 volt packs housed in an armoured aluminium case
- In the event of either a bullet strike or shrapnel damage only the packs that have suffered damage will cease to operate
- In the past 5 years the batteries returned to A.T.S.I only required case and pack replacement



RMBP Ni-MH Battery



- **Lighter and Smaller than Lead Acid**
 - The current Lead Acid Gel battery currently being offered to HALO is a 24 Volt 48Ah unit with a weight of 38KGs
 - The Hawk battery is a 64Ah unit weighing just 21Kgs



RMBP Ni-MH Battery



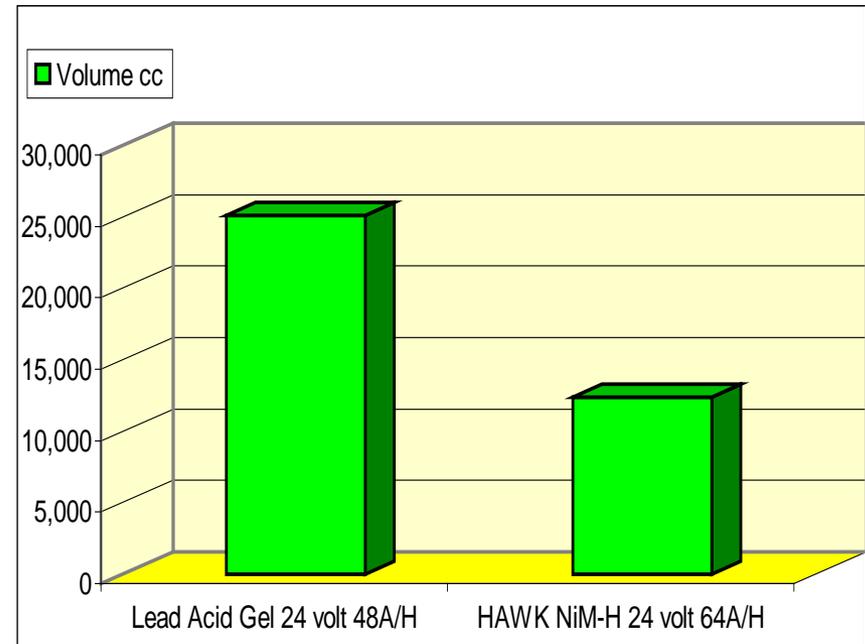
1. Less manpower required
2. More Hawk batteries can be transported at any one time
3. More Power Density than Lead Gel Acid (LGA)

RMBP Ni-MH Battery



- **Lighter and Smaller than Lead Acid**

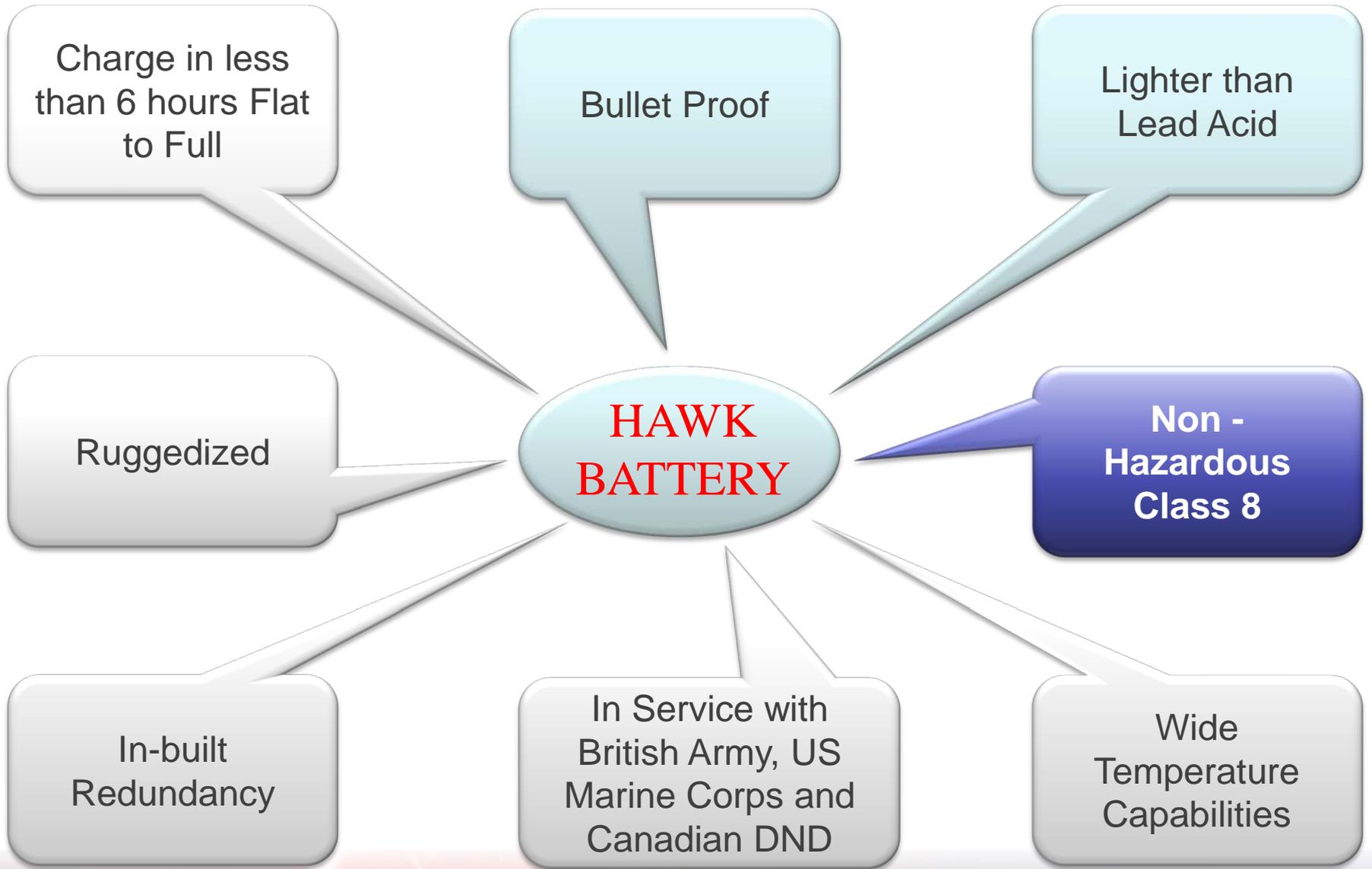
- The Acid Gel battery being offered to HALO is 275 x 215 x 425mm
- The Hawk battery is 192 x 152 x 425mm



RMBP Ni-MH Battery



1. Less storage required
2. One third the size of the L.G.A.
3. More Hawk batteries can be transported and stacked in holds



RMBP Ni-MH Battery

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Chalfont St Giles
Bucks
HP8 4SU

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TRANSPORT CERTIFICATE

Certificate Number: TDG-HAWK-RMBP64-24
Date: 02 February 2008
Issue: 3

Part Number: Hawk RMBP64-24 (24 volt Ni-MH rechargeable battery)
(A.T.S.I Ltd.)

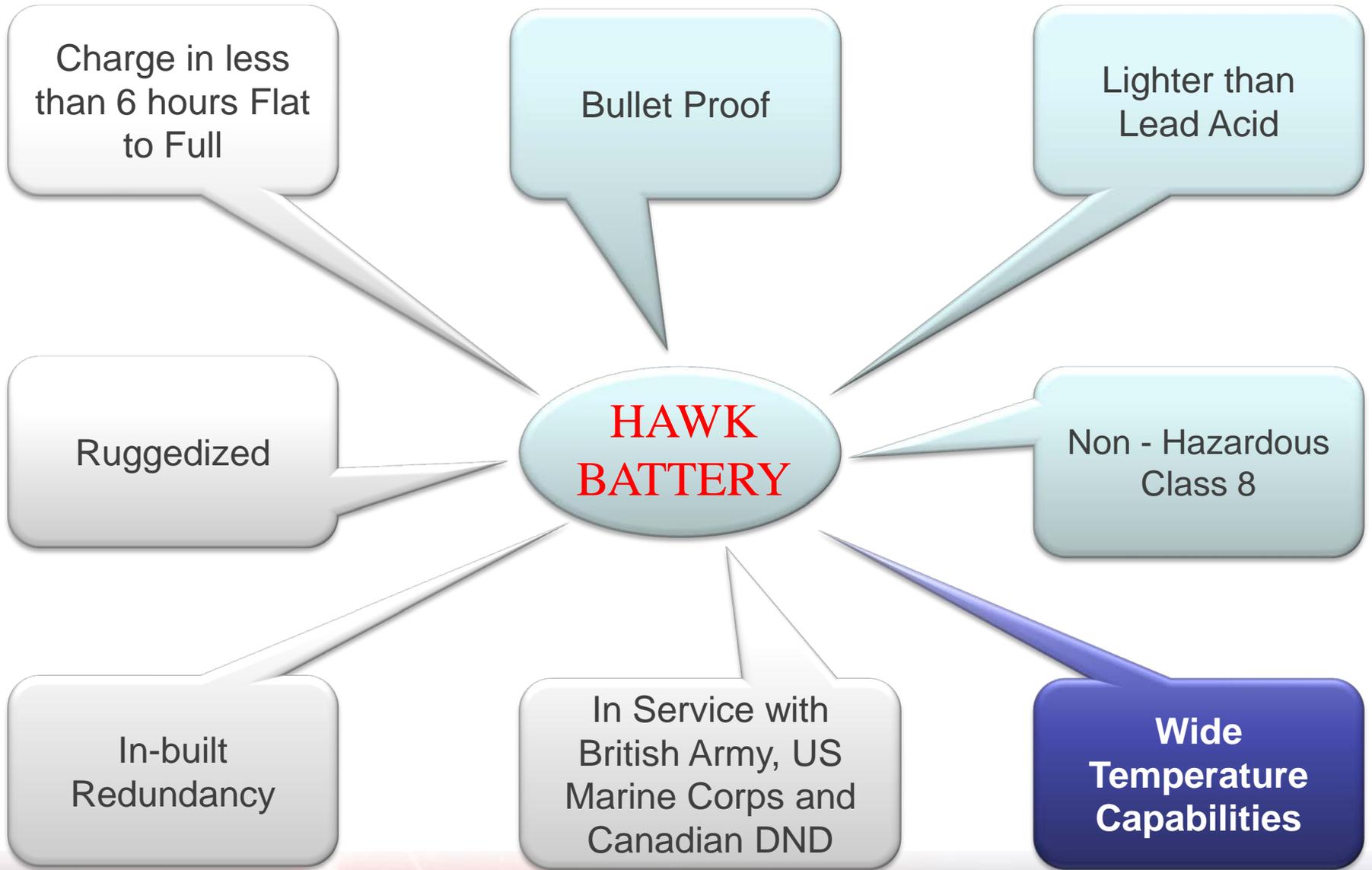
Regulations:

A.T.S.I. Nickel Metal Hydride batteries are considered to be "dry cell" batteries and are unregulated for the purposes of transportation by the US. Department of Transportation (DOT), International Civil Aviation Administration (ICAO), International Air Transport Association (IATA) and the International Maritime Organization (IMO). The only requirements for shipping these batteries by DOT is Special Provision 130 which states: "Batteries, dry are not subject to the requirements of this subchapter only when they are offered for transportation in a manner that prevents the dangerous evolution of heat (for example, by the effective insulation of exposed terminals). The only requirements for shipping these batteries by ICAO and IATA is Special Provision A123 which states: An electrical battery or battery powered device having the potential of dangerous evolutions of heat that is not prepared so as to prevent a short-circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals; or in the case of equipment, by disconnection of the battery and protection of exposed terminals) is forbidden from transportation."

This certifies that the A.T.S.I. Ltd. Product part number HAWK RMBP64-24 satisfies the Special Provisions applicable to IATA and ICAO A123 and DOT Special Provision 130 in that all exposed terminals have effective insulation and protection so as to prevent a short-circuit.

Certified on behalf of A.T.S.I. Ltd by
Richard Morgan
Managing Director
A.T.S.I. Ltd.

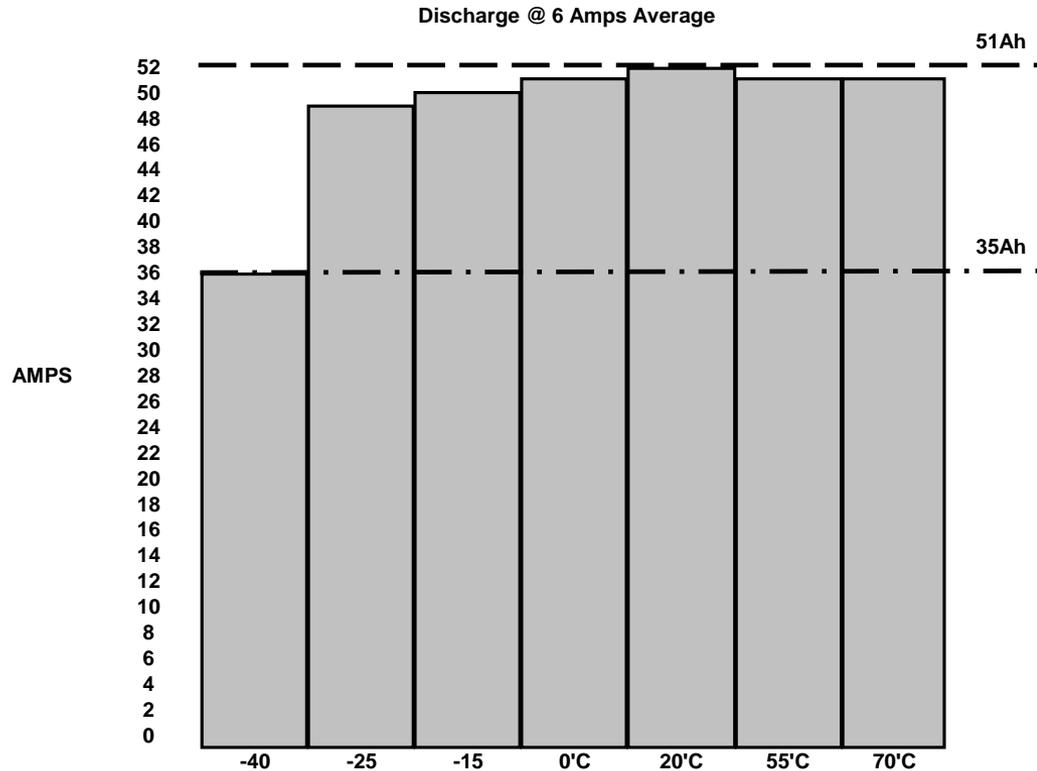




RMBP Ni-MH Battery



- **Wide temperature Capabilities**

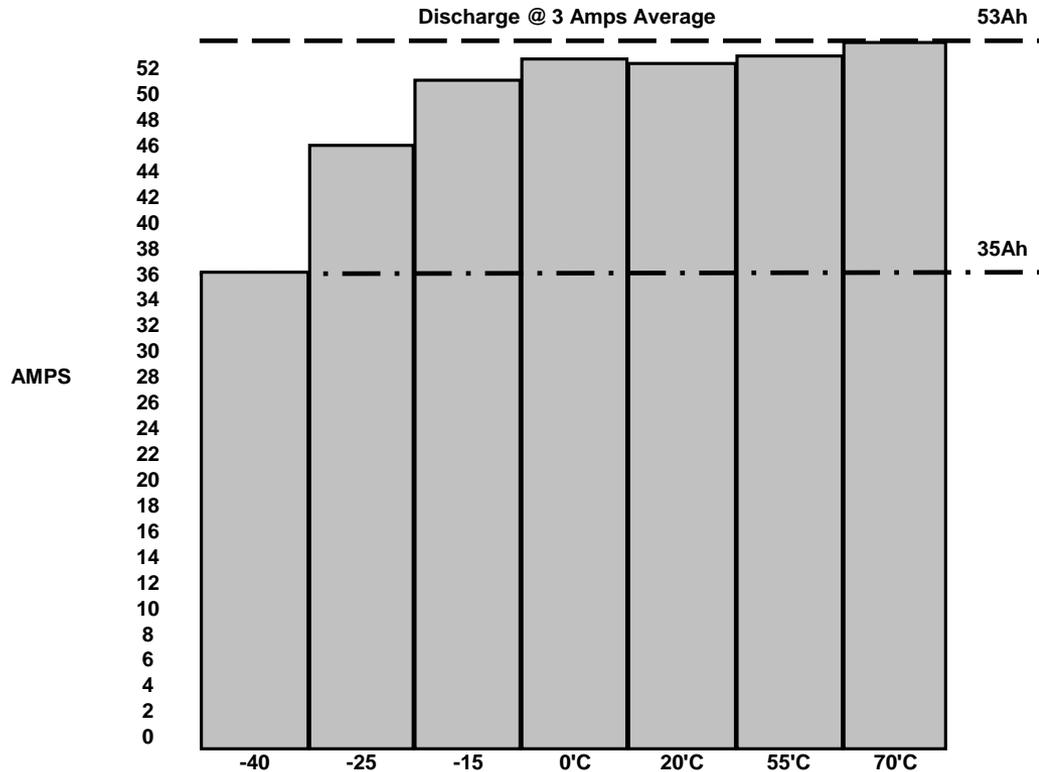


HAWK 50Ah Battery without heater mat.

RMBP Ni-MH Battery



- **Wide temperature Capabilities**

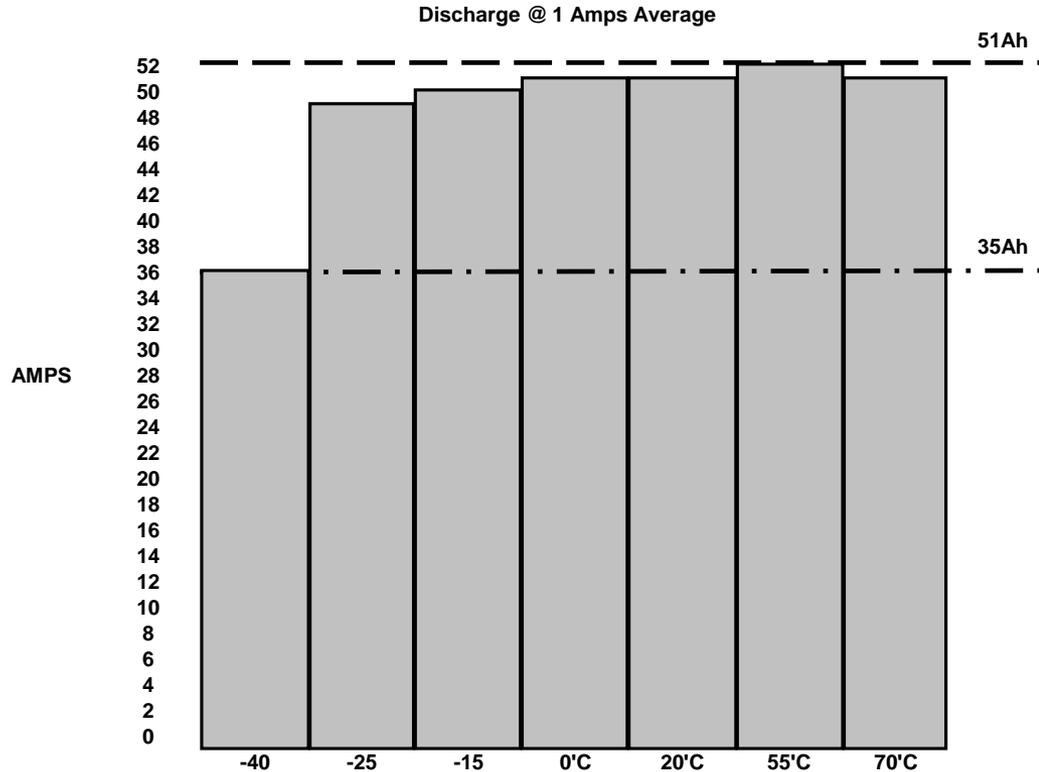


HAWK 50Ah Battery without heater mat.

RMBP Ni-MH Battery



- **Wide temperature Capabilities**



HAWK 50Ah Battery without heater mat.

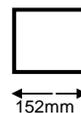
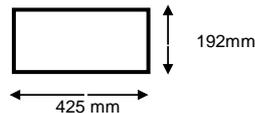
RMBP Ni-MH Battery



- **Wide temperature Capabilities**

Chemistry: Ni-MH

Product Name: HAWK No heater mat.



NSN 6140-99-957-9171

Battery Rating **50Ah @ 24 volts**

Min. No Load Voltage **20 volts**

Note. Battery has electronic cut-out switches set to 20 volts to protect deep discharge

Discharge End Point **0 volts**

Note. At 20 volts battery will latch to zero output.

Weight: 20Kg

Width: 152mm

Height: 192mm

Length: 425mm

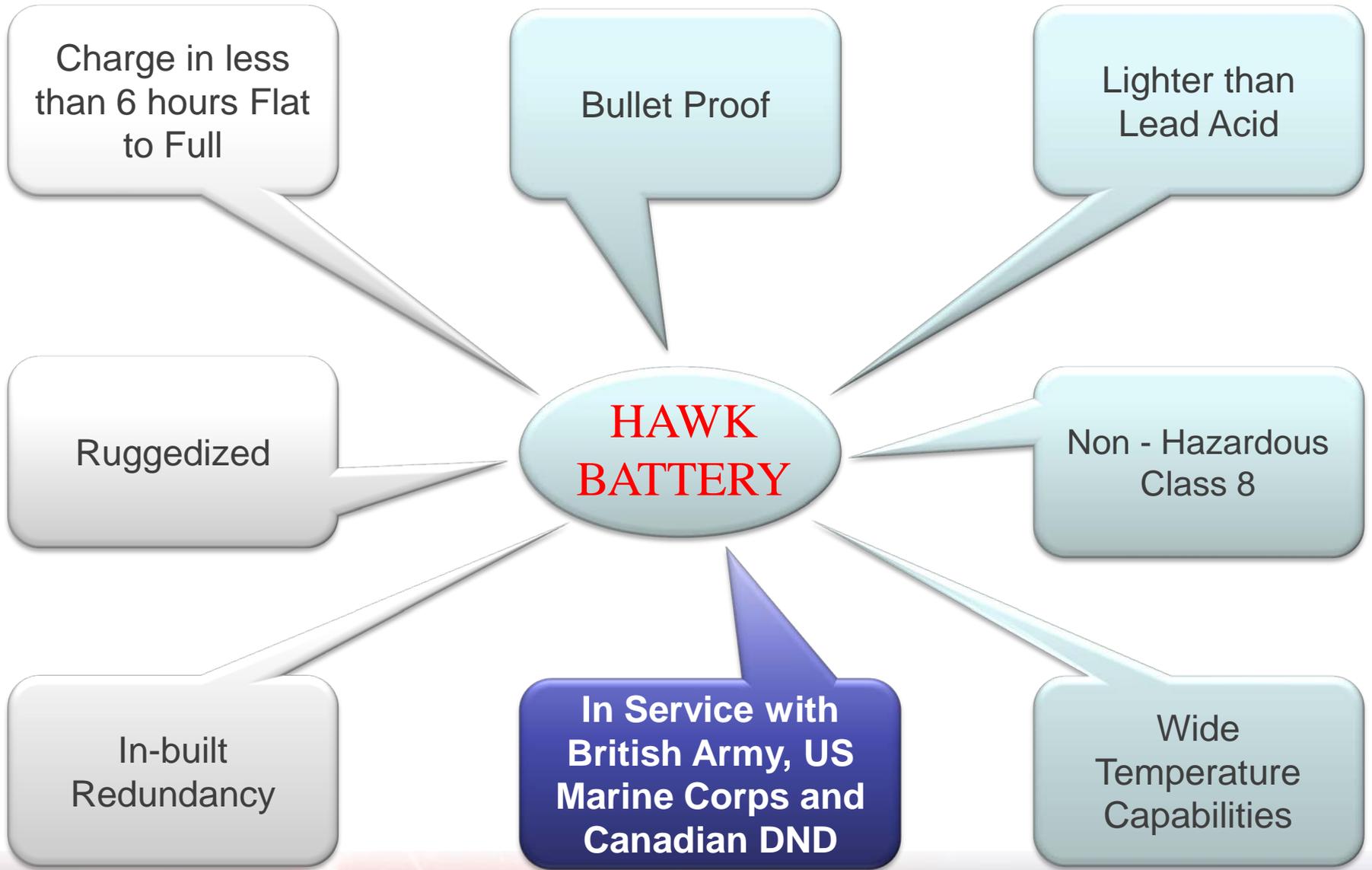
Capacity (Ampere Hours)						
Temperature		300mA	1A	3A	6A	10A
Charge	Discharge					
20°C	70°C	46.00	49.40	52.00	46.20	38.00
20°C	55°C	47.00	51.00	50.40	49.80	50.00
20°C	20°C	49.30	49.50	51.50	52.00	47.50
20°C	0°C	49.80	50.00	51.00	50.40	48.50
20°C	-.15°C	46.90	49.50	48.00	46.80	47.50
20°C	-.25°C	46.30	48.30	45.00	47.60	45.00
20°C	-.40°C	39.00	34.50	31.00	36.00	40.00
Discharge Duration (Hours : Minutes)						
Temperature		300mA	1A	3A	6A	10A
Charge	Discharge					
20°C	70°C	153:18	49:24	17:18	07:42	03:48
20°C	55°C	156:36	51:00	16:48	07:45	05:00
20°C	20°C	164:18	49:30	17:15	08:30	04:45
20°C	0°C	166:00	50:30	17:00	08:22	04:45
20°C	-.15°C	156:18	49:30	16:00	07:48	04:45
20°C	-.25°C	154:18	48:18	15:00	07:56	04:30
20°C	-.40°C	130:00	34:30	10:24	06:00	04:00

All results have been monitored by MOD DPA. ABBEY WOOD

Specified performance and characteristics are included in:

MOD DPA/Temp trial/Time trials/Stats Abbey Wood





RMBP Ni-MH Battery



- **In service with the British Army, US Marine Corps and Canadian DND**
 - Total time of 11 years with the British Army
 - Deployed in parts of Iraq, Afghanistan and the UK
 - All feedback has been positive
 - No major faults whilst on deployment
 - British Army contract growing

RMBP Ni-MH Battery

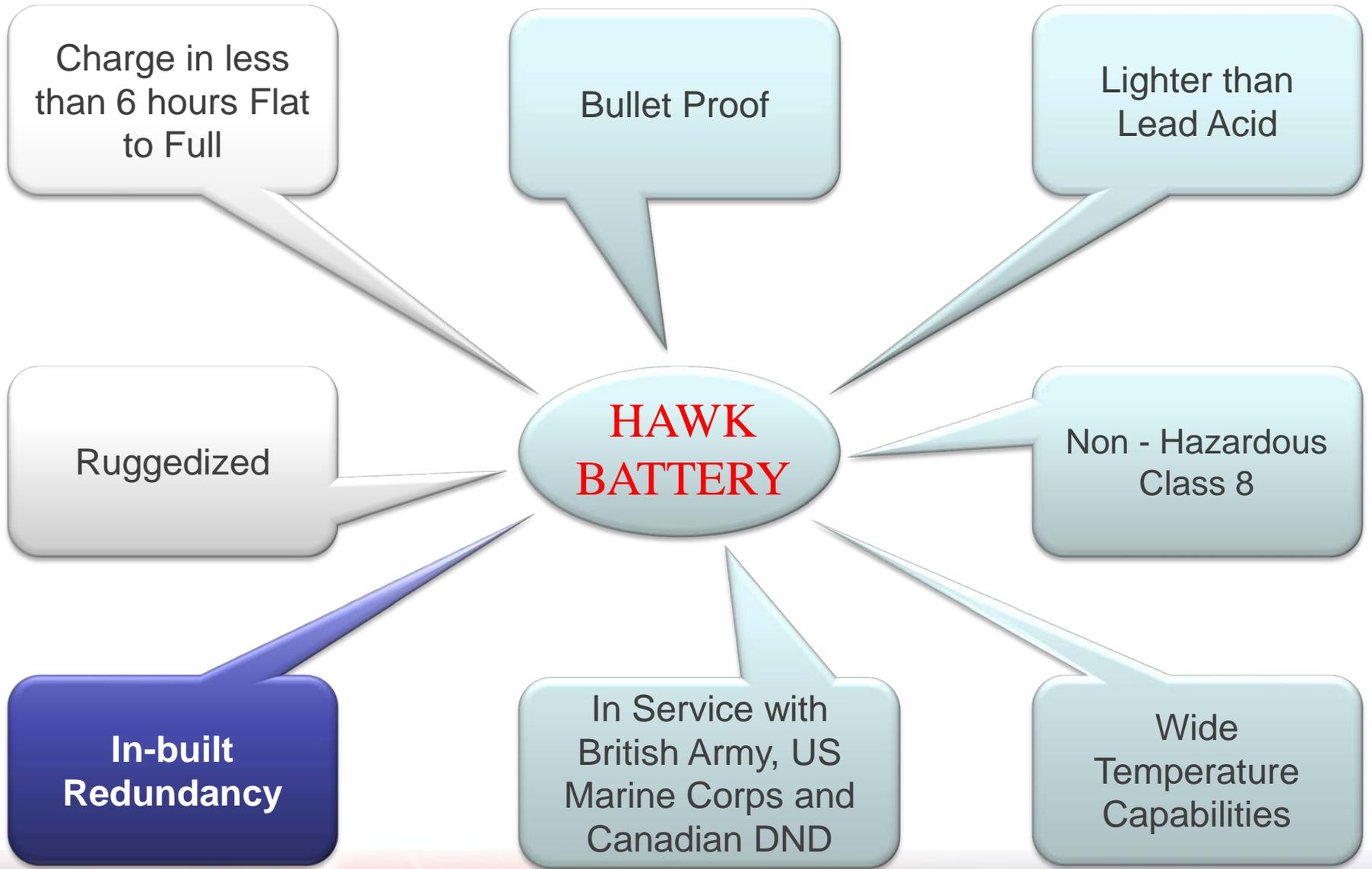


- **In service with the US Marine Corps**
 - Total time of 5 years
 - Deployed in parts of Iraq, Afghanistan and the USA
 - All feedback has been positive
 - No major faults whilst on deployment
 - US Marine Corps contract growing

RMBP Ni-MH Battery



- **In service with the Canadian DND**
 - Total time of 5 years
 - Deployed in parts of Iraq, Afghanistan and Canada
 - All feedback has been positive
 - No major faults whilst on deployment
 - Canadian DND contract growing

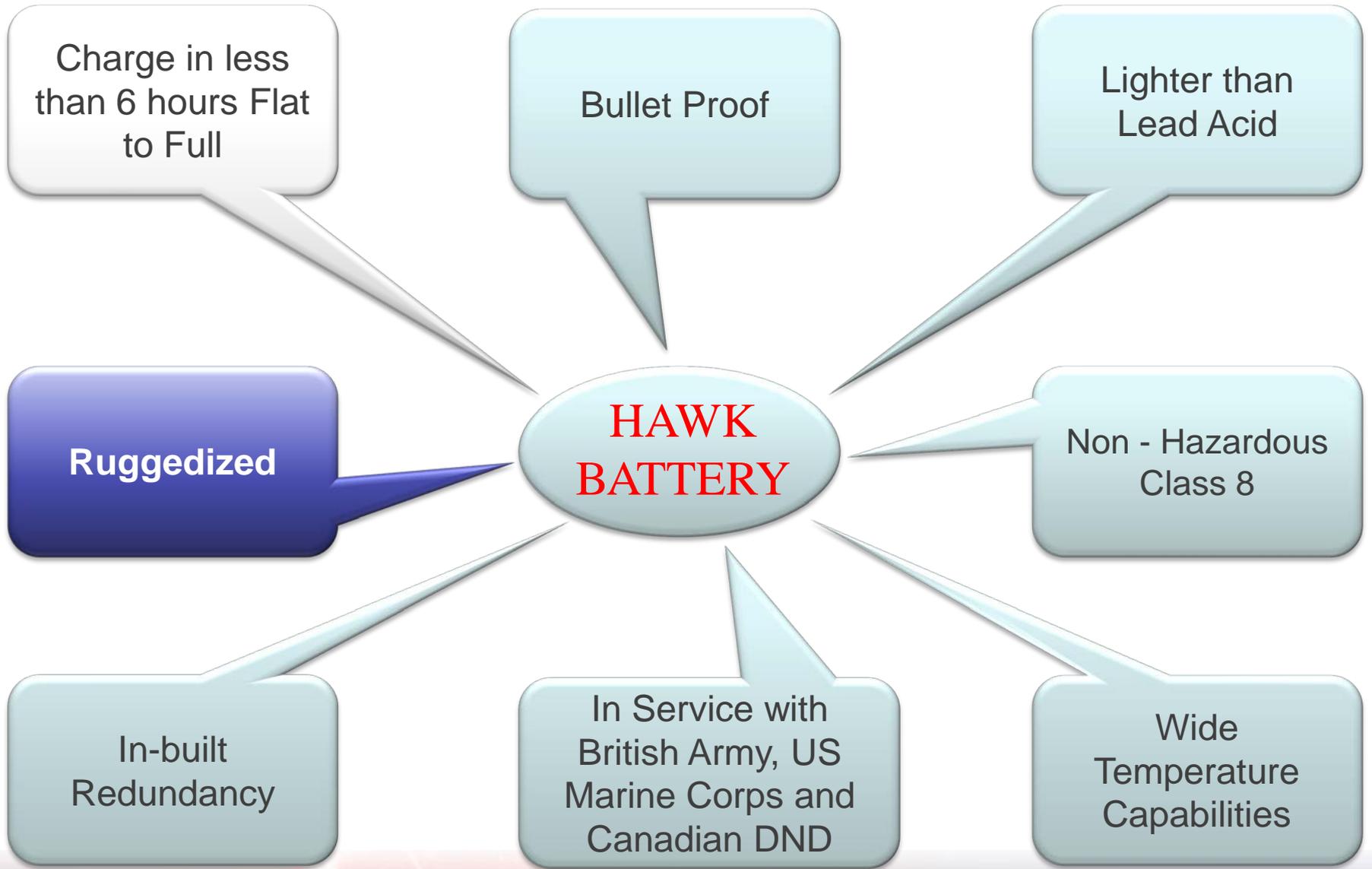


RMBP Ni-MH Battery



- **In-built redundancy**

- Covers electronics and battery packs due to method of construction
- Sixteen 4Ah battery packs are grouped into four quarters with individual 21 volt cut out switch creating a quadruple back-up against deep discharge or component failure
- Each pack is individually charged and controlled by a 100g rated high quality aircraft relay which separates the packs for charging. The hawk battery will continue to operate down to the last pack

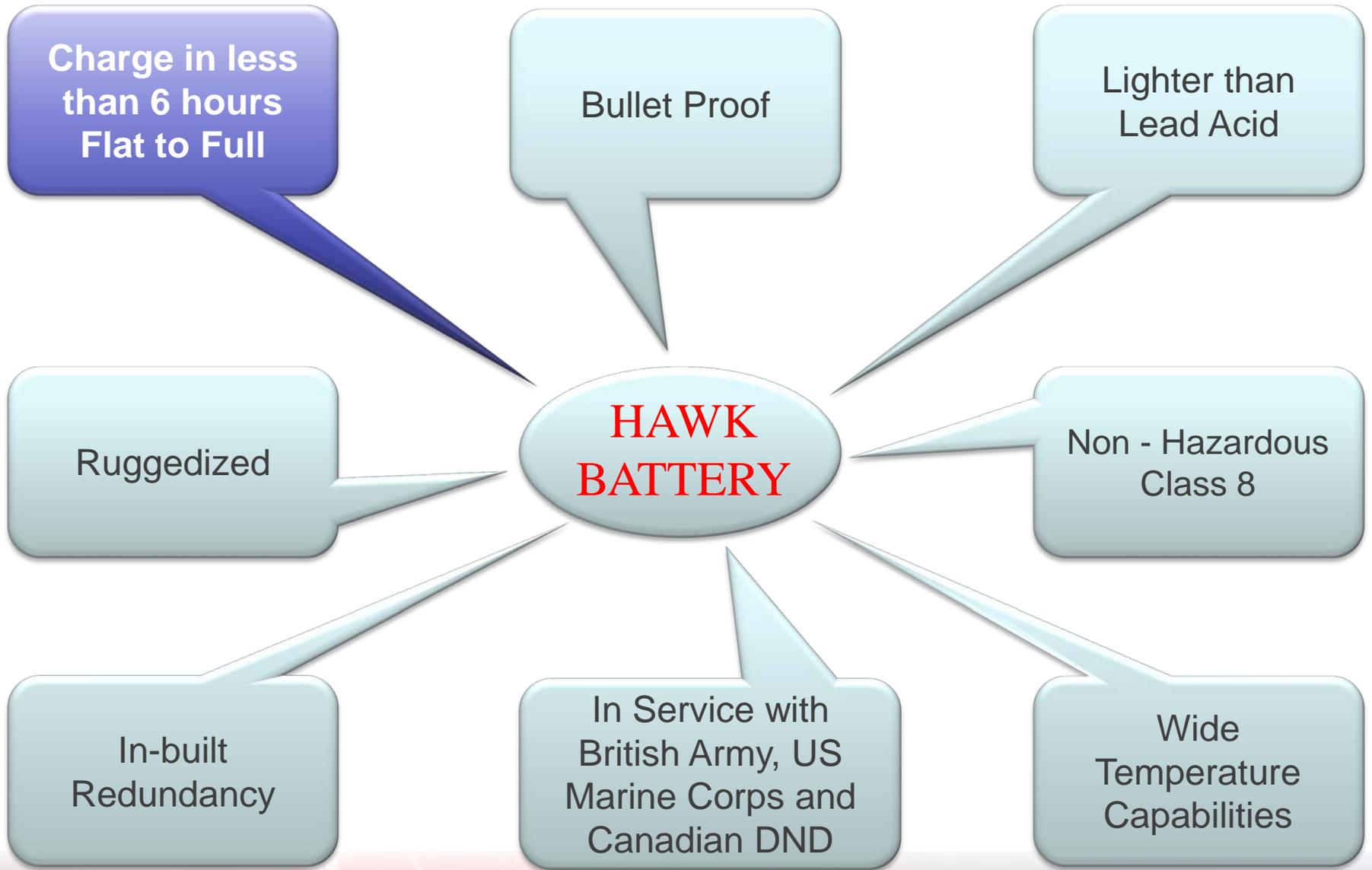


RMBP Ni-MH Battery



- **Ruggedized**

- The case is constructed from rigidized aluminium and coated with a nylon coating resistant to all forms of acid
- All plugs and sockets are Military spec AMPHENOL supplied with dust caps



RMBP Ni-MH Battery



- **Charge in less than 6 hours**

- Using it's unique charging unit with a 41 pin charging plug the HAWK battery can be charged from flat to full in less than six hours
- The charging unit contains 16 separate cards, one for each battery pack and provides a balanced supply

10 Year Life Cost



Actual figures for 5 Years.***

Cost of Battery in 2007 £4250.00

Allowing for an actual loss of performance of 2Ah

48Ah per day x 1095 days = 52,560 Ah @ 24 volts

$4250.00/52,560 = 8.08\text{p per Amp @ 24 volts} = 3 \text{ Years}$

Allowing for a re-cell at this stage at a cost of 2100.00 UK Pounds the battery will give an extra 730 days (2 years)

48Ah per day x 730 days = 35,040 Ah

$210000/35,040 = 5.99\text{p per Amp @24 volts}$

10 Year Life Cost



$4250.00 + 2100.00 = 6350.00$ UK Pounds

$52,560 + 35,040 = 87,600$ Ah

$6350.00/87,600 = 7.24\text{p}$ per Amp @ 24 volts
over 5 years.

Allowing for a re-cell at this stage at a cost of 2100.00 UK Pounds the battery will give an extra 730 days (2 years)

$6350.00 + 2100.00 = 8450.00$ UK Pounds

$87,600 + 35,040 = 122,640$ Ah

$8450.00/122,640 = 6.89\text{p}$ per Amp @ 24 volts
over 7 years.

10 Year Life Cost



Allowing for a re-cell at this stage at a cost of 2100.00 UK Pounds the battery will give an extra 730 days (2 years)

$8450.00 + 2100.00 = 10550.00$ UK Pounds

$122,640 + 35,040 = 157,680$ Ah

$10550.00/157,680 = 6.69\text{p}$ per Amp @ 24 volts over 9 years.

Allowing for a re-cell at this stage at a cost of 2100.00 UK Pounds the battery will give an extra 730 days (2 years)

$10550.00 + 2100.00 = 12,650.00$ UK Pounds.

$157,680 + 35,040 = 192,720$ Ah

$12,650.00/192,720 = 6.56\text{p}$ per Amp @ 24 volts over 11 years

Allowing for an increase of 25% across the board to bring figures up to 2012, the Ah cost would be $6.56 \times 25\% = 8.2\text{p}$ per Amp.

Lead Gel Acid Battery



These figures show performance losses due to deep discharge .

L.G.A. Battery cost = 500.00 UK Pounds

48Ah per day x 60 days = 2880 Ah

$500.00/2400 = 17.36\text{p}$ per Amp @ 24 volts over 2 months.

15 x 500 = 7,500.00 UK Pounds required for batteries over 2.5 years to achieve
43,200Ah

Capital cost 7,500.00 UK Pounds.

Lead Gel Acid Battery



No calculations have been accounted for in the likely event that the Ah would not achieve 48Ah per day over the 60 day period.

Assuming battery deterioration due to temperatures above 40'C the figures could be as follows:-

48Ah per day reducing by 10% per day = 43.2Ah on day 2

43.2Ah per day reducing by 10% = 38.8Ah on day 3

25.5Ah per day reducing by 10% = 25.5Ah on day 7

6.48Ah per day reducing by 10% = 6.48Ah on day 20

2.48Ah per day reducing by 10% =2.48Ah on day 30

Lead Gel Acid Battery



On day 30 there would be insufficient power to run HALO for more than one Hour.

48Ah per day reducing by 10% per day over 30 days = 469Ah

$500.00/469 = 1.06$ UK Pounds per Amp@ 24 volts over 1 month

30 x 500 = 15,000.00 UK Pounds required for batteries over 2.5 years to achieve 14,070Ah

60 x 500 = 30,000.00 UK Pounds required for batteries over 2.5 years to achieve 28,140Ah

97 x 500 = 48,500.00 UK Pounds required for batteries over 2.5 years to achieve 45,600Ah

Capital cost 48,500.00 UK Pounds.

Manufacturing Process Battery and Charger Cases



CAD CAM Department

Manufacturing Process Battery and Charger Cases



Pressing the metal

Manufacturing Process Battery and Charger Cases



Metal Boxes

Manufacturing Process Battery and Charger Cases



Foam Out

Manufacturing Process

Battery Packs and Final Assembly



Parts Stores

Manufacturing Process

Battery Packs and Final Assembly



Selecting Batteries

Manufacturing Process

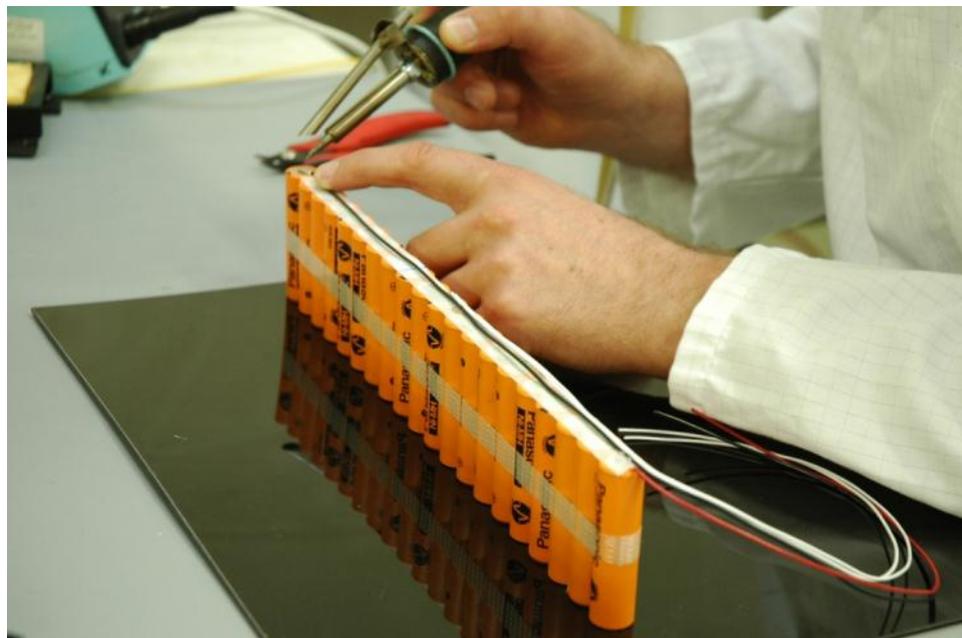
Battery Packs and Final Assembly



Connecting the batteries

Manufacturing Process

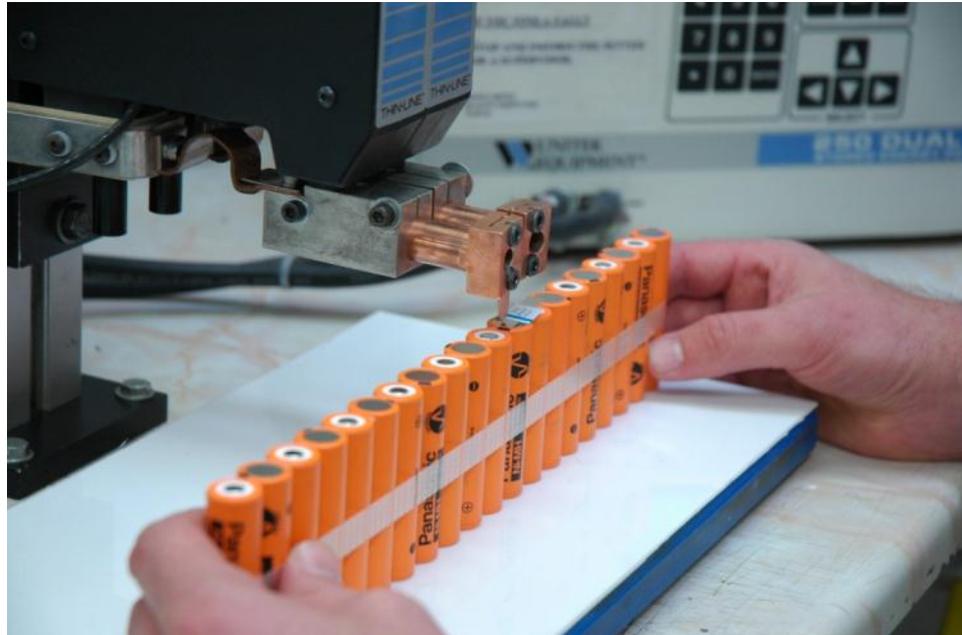
Battery Packs and Final Assembly



Connecting the batteries

Manufacturing Process

Battery Packs and Final Assembly



Connecting the batteries

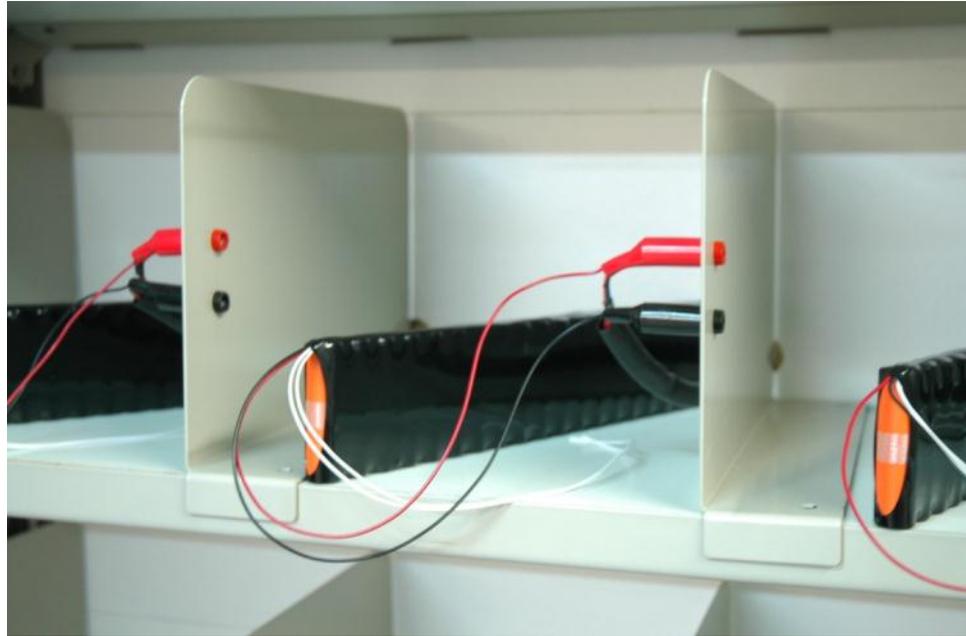
Manufacturing Process

Battery Packs and Final Assembly



Pack Assembly

Manufacturing Process Battery Packs and Final Assembly



Cycle Process – 5 Times

Manufacturing Process

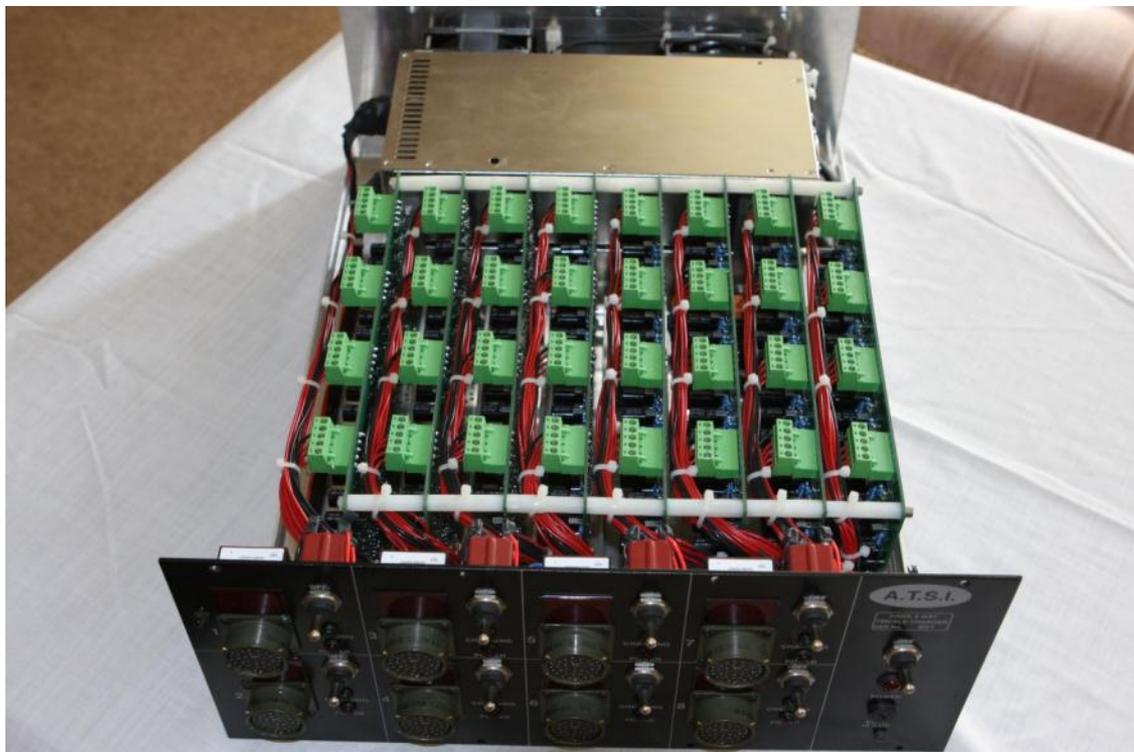
Battery Packs and Final Assembly



Cycle System



Internal view of the 8 Way Charger



24v DC Mobile HAWK Double Charger



Accessories- HAWK Electronic Parallel Coupler



Applications



A.T.S.I. Ltd. specialises in the design and manufacture of bespoke batteries for either internal or external application.

Internal batteries are usually protected against short circuit, cell damage, fire risk and connectivity via battery compartments contained within the equipment. Battery control circuitry is usually housed within the battery compartment designed specifically for that particular battery pack to achieve maximum protection.

The main drawback with internal batteries, is the limitations of operational time, due to the size of battery compartments and therefore the size of the batteries (ampere hour) that can be fitted within the equipment.

External batteries present their own problems, in that they are susceptible to physical damage, connectivity due to external cables, transportation, safety, environmental and charging issues.

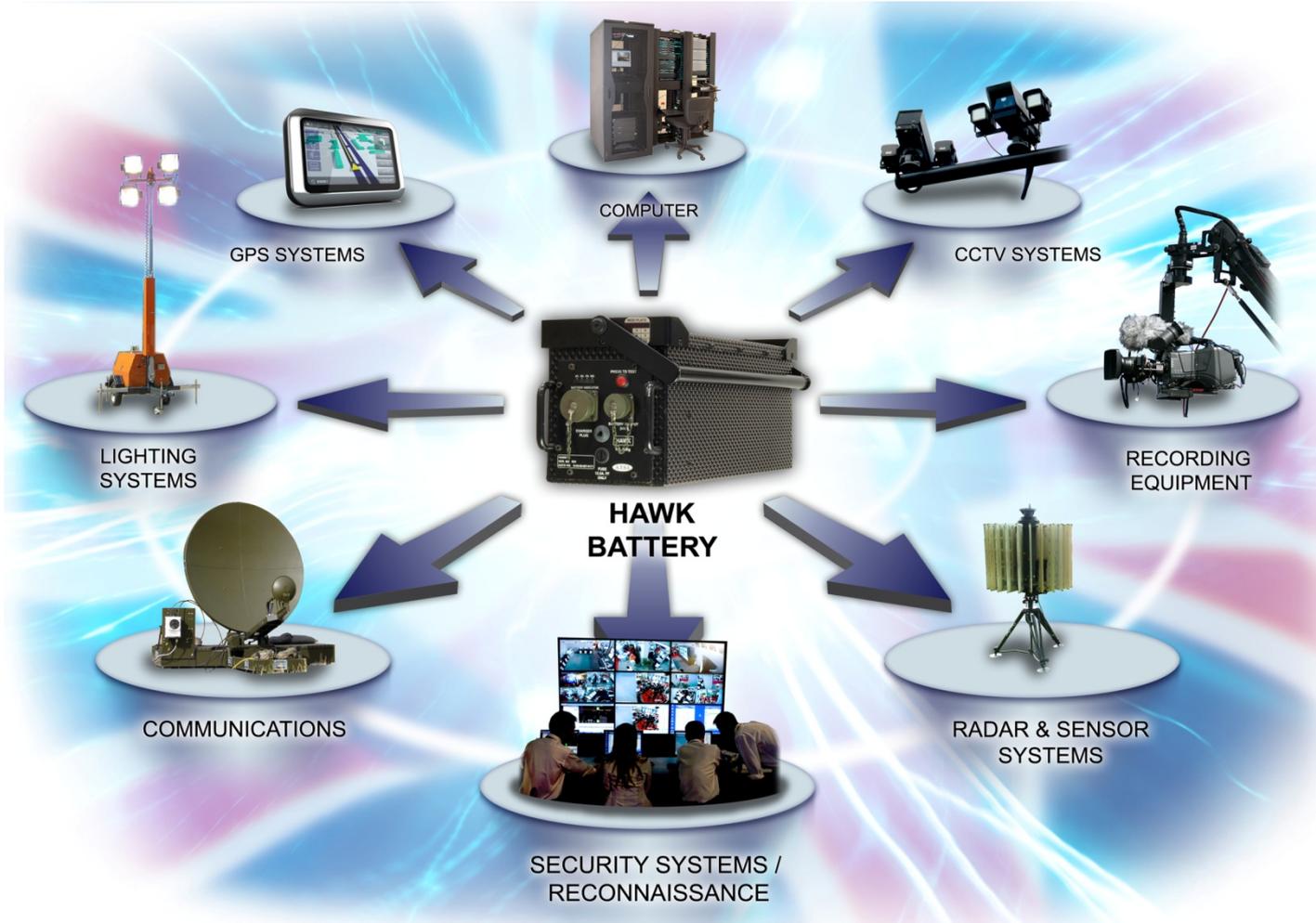
A.T.S.I. has been in the forefront of external battery development, eradicating all issues surrounding these products. Resulting in one of the first purpose built range of external batteries, capable of powering a wide range of electrical and electronic equipment, which include:

Security systems	Acoustic systems	CCTV Systems	Number plate recognition
Communication systems	Medical support equipment	Portable lighting	Police external power systems
Critical mission systems	Military external power systems	Portable Radar systems	Perimeter protection systems

A.T.S.I. has developed a wide range of battery to equipment interfaces, allowing external battery power to be used extensively on virtually any electronic equipment.



Applications





Thank you