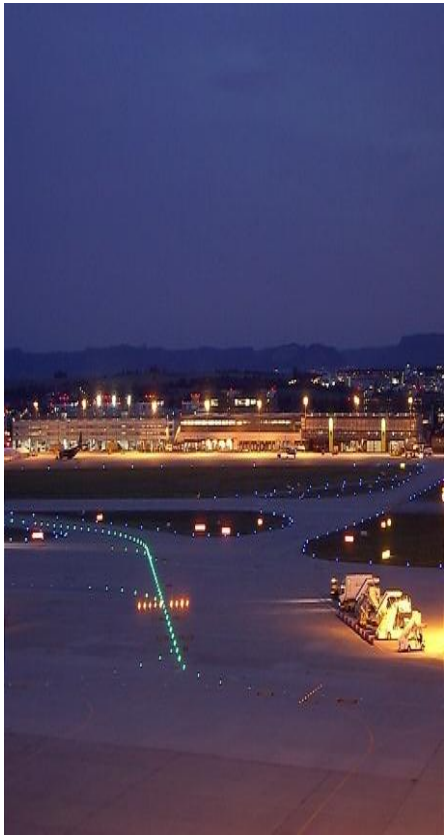
The application of LED's in runway lighting systems

Introduction



- Airfield Ground Lighting is a tough environment in which shocks, vibrations and great changes in temperature (frost or intense heat from the sun and surrounding tarmac).
- Currently the main provision for AGL is still in the form of incandescent lamps using a filament.
- These suffer from a number of weaknesses, in particular a relatively short average life as filaments are burnt out after 1 000 to 2 000 hours.
- Other weakness of incandescent lights is their "poor spectral emission”

LED Light Source

BENEFITS

- Service Life extended from 1 to 7 years!
- Reduced Power Consumption
- Low maintenance
- Lower Voltages to improve safety
- No Filters- LED's create the required colour!
- Better Colour – narrow spectrum
- Low temperature operation
- Resistance to Vibration – Robust

Advantages of LED

- Average Lifespan
- Operating Costs
- Light Spectrum Characteristics

Taxiway Edge

- Elevated Fittings
- Low Candela Output
- Inset Fittings

Taxiway Guidance Signs

Taxiway Centreline and Stop Bars

Higher Light Output

Wide Angle Coverage

Runway Applications

High Intensity

Inset

Elevated

LED High Intensity RGL

ICAO compliant High Intensity > 3.000 cd

Service Life without lamp change > 5 years

New LED Developments

PEARL LED SYSTEM — Medium Intensity LED Lighting System

POLARIS — Portable LED Lighting System

IRIS — Low Profile High Intensity Runway Airfield Lighting

The Clear Approach to Airports

PEARL LED SYSTEM

atg airports

PEARL LED SYSTEM

Airfield lighting system using LED lights

For Operations in Visual Meteorological Conditions.

Targeting :

- General Aviation airports
- Private Airfields
- Jungle strips
- Military Forward Support Bases

The Clear Approach to Airports

Features

Easy to install.

- Pug & Play
- No specialized skills required
- Limited civil works

One or Two circuit DCR Regulator

1,4 Amp DC Power Supply

3 Step Light Dimming & Remote Control Option

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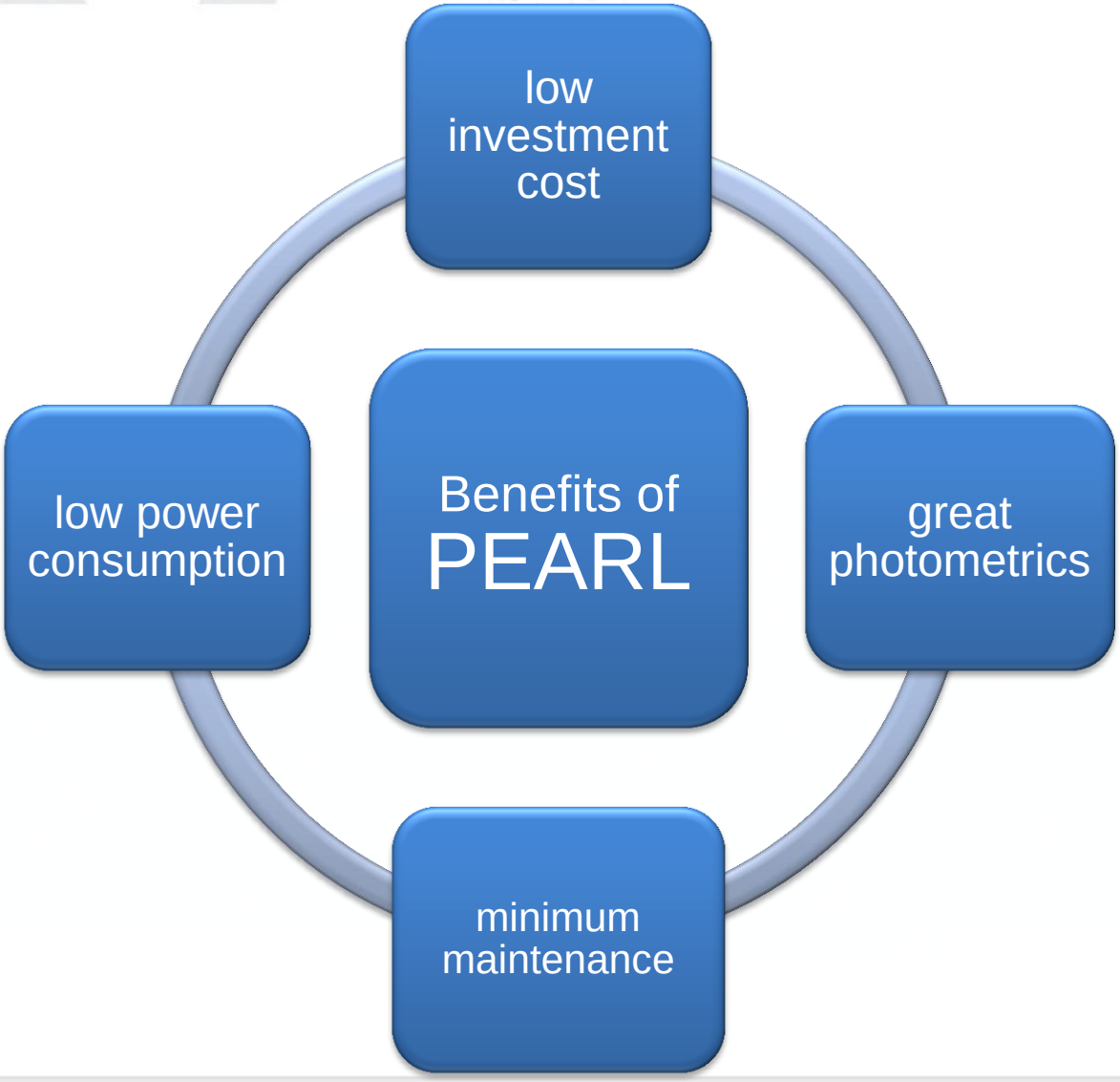


Light Intensities

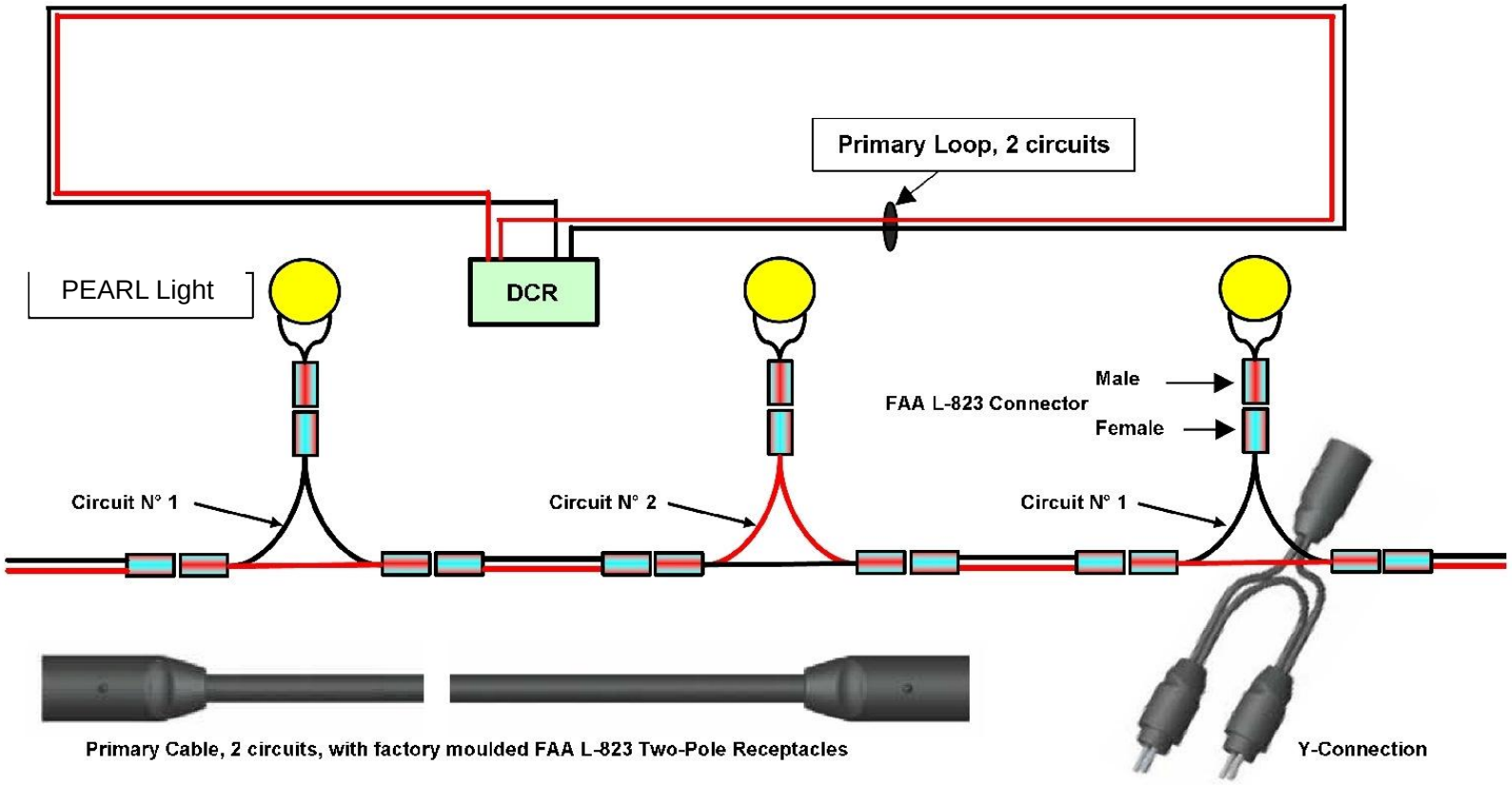
Application	Colour	Peak	Main Beam			Secondary Beam		
		cd	Horizontal	Vertical	Average cd	Horizontal	Vertical	Average cd
Approach	White	1500	-5°/+5°	1°/5°	1370	-10/+10°	0/8°	1100
Thresh. Uni	Green	1300	-5°/+5°	1°/5°	1120	-10/+10°	0/8°	900
Threshold	Green	650	-5°/+5°	1°/5°	550	-10/+10°	0/8°	450
R/W Edge	White	1100	-5°/+5°	1°/5°	900	-10/+10°	0/8°	690
R/W End	Red	350	-5°/+5°	1°/5°	300	-10/+10°	0/8°	250
R/W End Uni	Red	2000	-5°/+5°	1°/5°	1500	-10/+10°	0/8°	900
T/W Edge	Blue	36	360°	0°/45°	25	360°	45/90°	15

Installation

Two interleaved Circuits - Using Standard Components

FAA L-823 Factory moulded connectors.

Installation



DCR

- 1.4 A DC Power Supply – One or Two 500 W outputs
- Low output voltage below 400 Volts
- Brightness control in 3 steps
- Open Circuit Protection
- Over Current Protection
- Input Power 120/220 VAC 50/60 Hz
- EMI compatible
- Efficiency at full load higher than 90%
- Air Cooled
- Local/Remote selection switch
- LCD display for display of status information
- Optional Remote control by Radio Control L-854 or multi-wire

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PEARL LED SYSTEM

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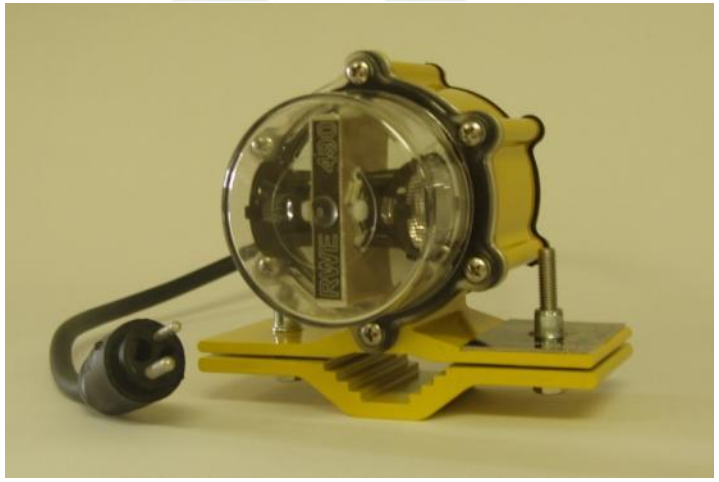
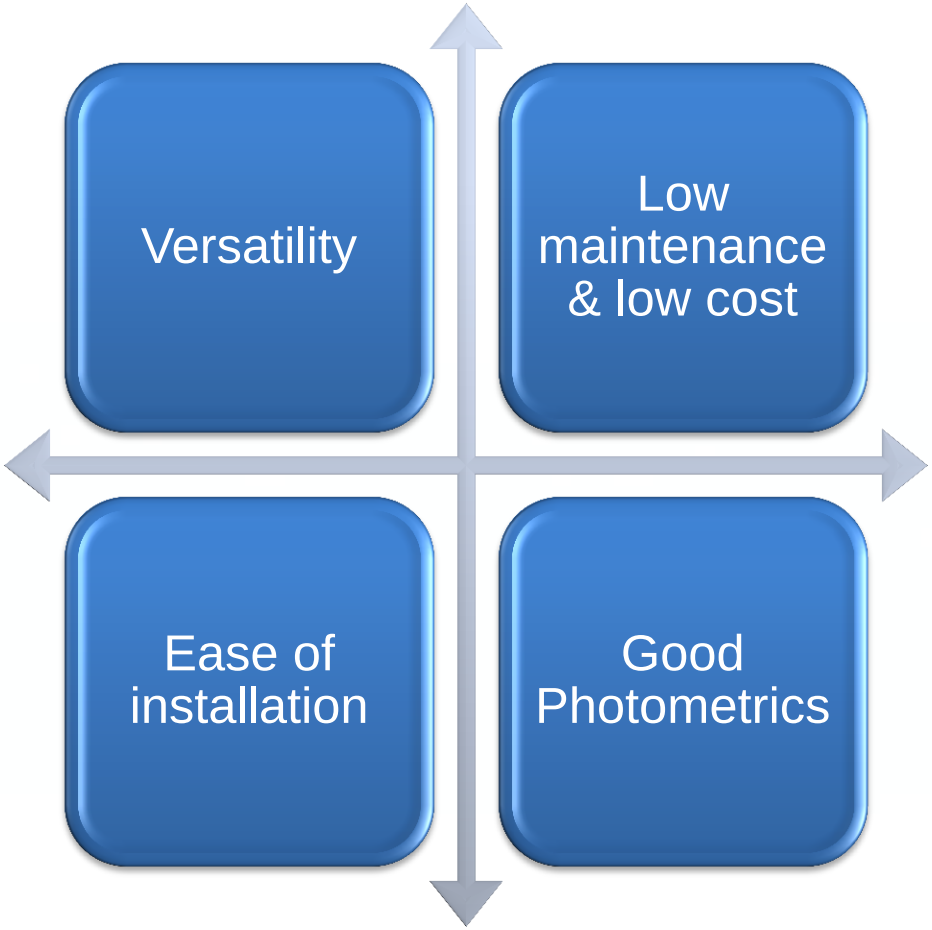


SOLAR VERSION

Mounting Options

Mobile Systems

Summary


Versatility
Low maintenance & low cost
Ease of installation
Good Photometrics

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POLARIS

POLARIS

Portable Airfield Lighting System

POLARIS

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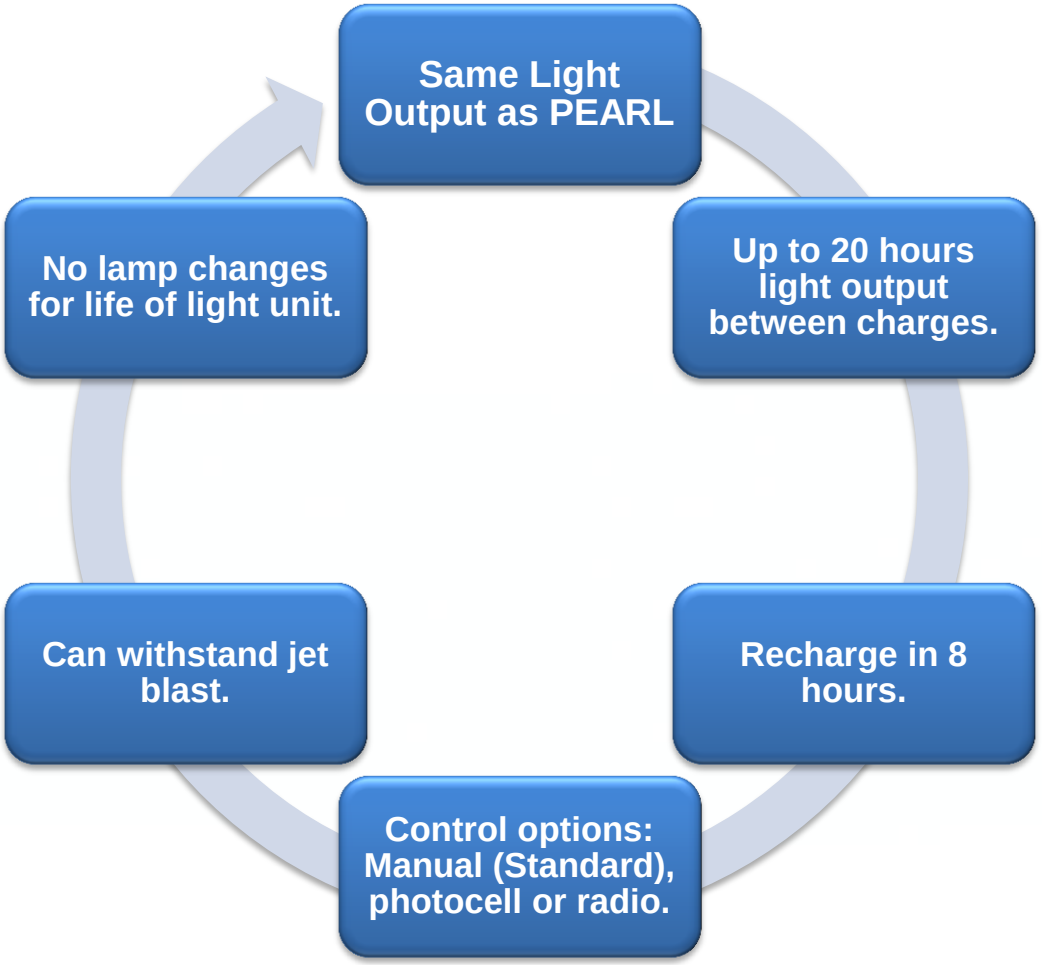
Features



Applications

The POLARIS is available in any aeronautical colours for different applications:

- Runway Edge (White)
- Taxiway Edge (Blue)
- Approach (White)
- Runway End (Red)
- Threshold (Green)
- Temporary Taxiway Closure or Obstruction Lighting (Red)
- TLOF Heliport Light (Green)
- FATO Heliport Light (White)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at the future
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Iris – LED Centre Line Fitting

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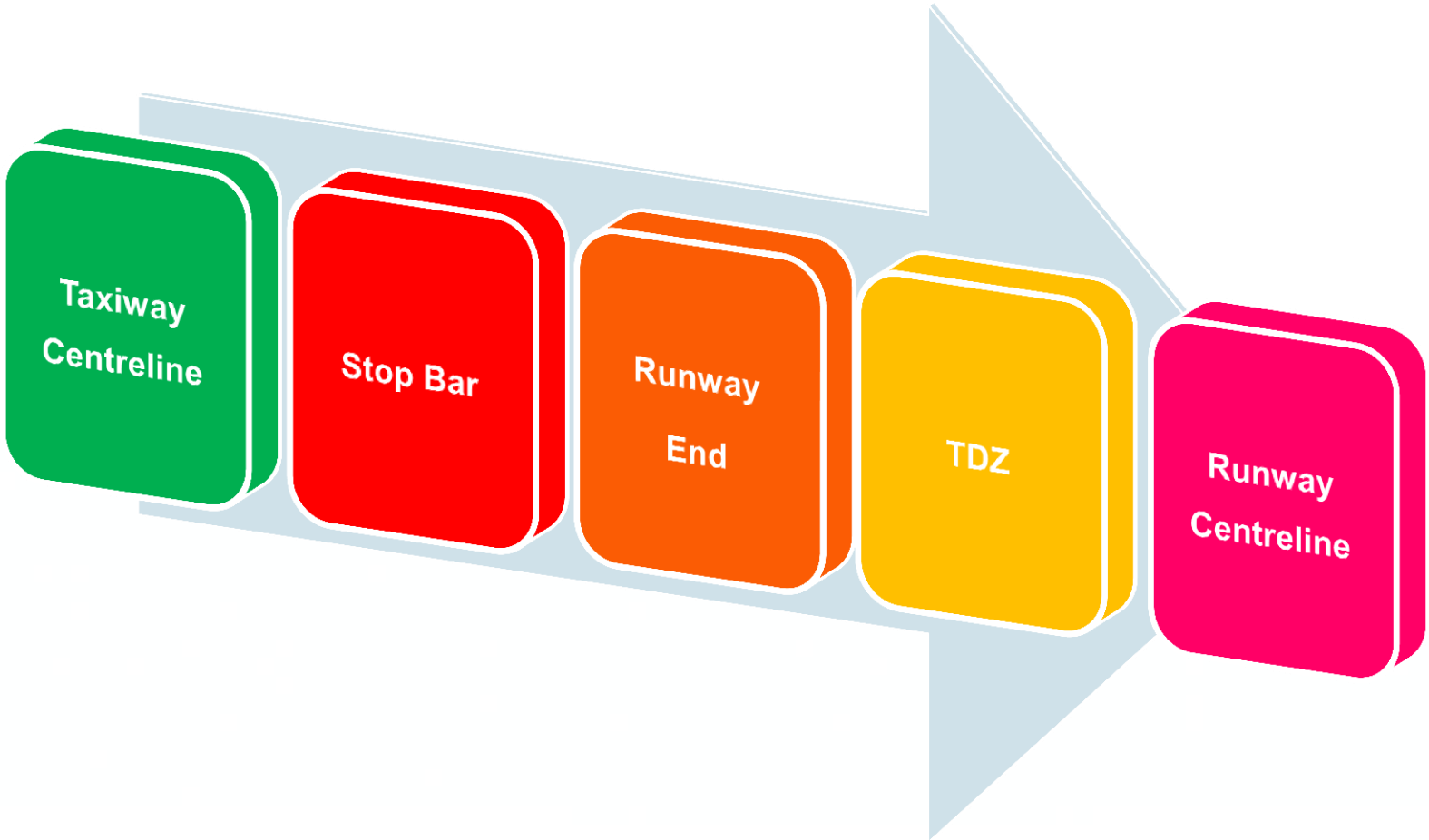

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IRIS

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Eco friendly design

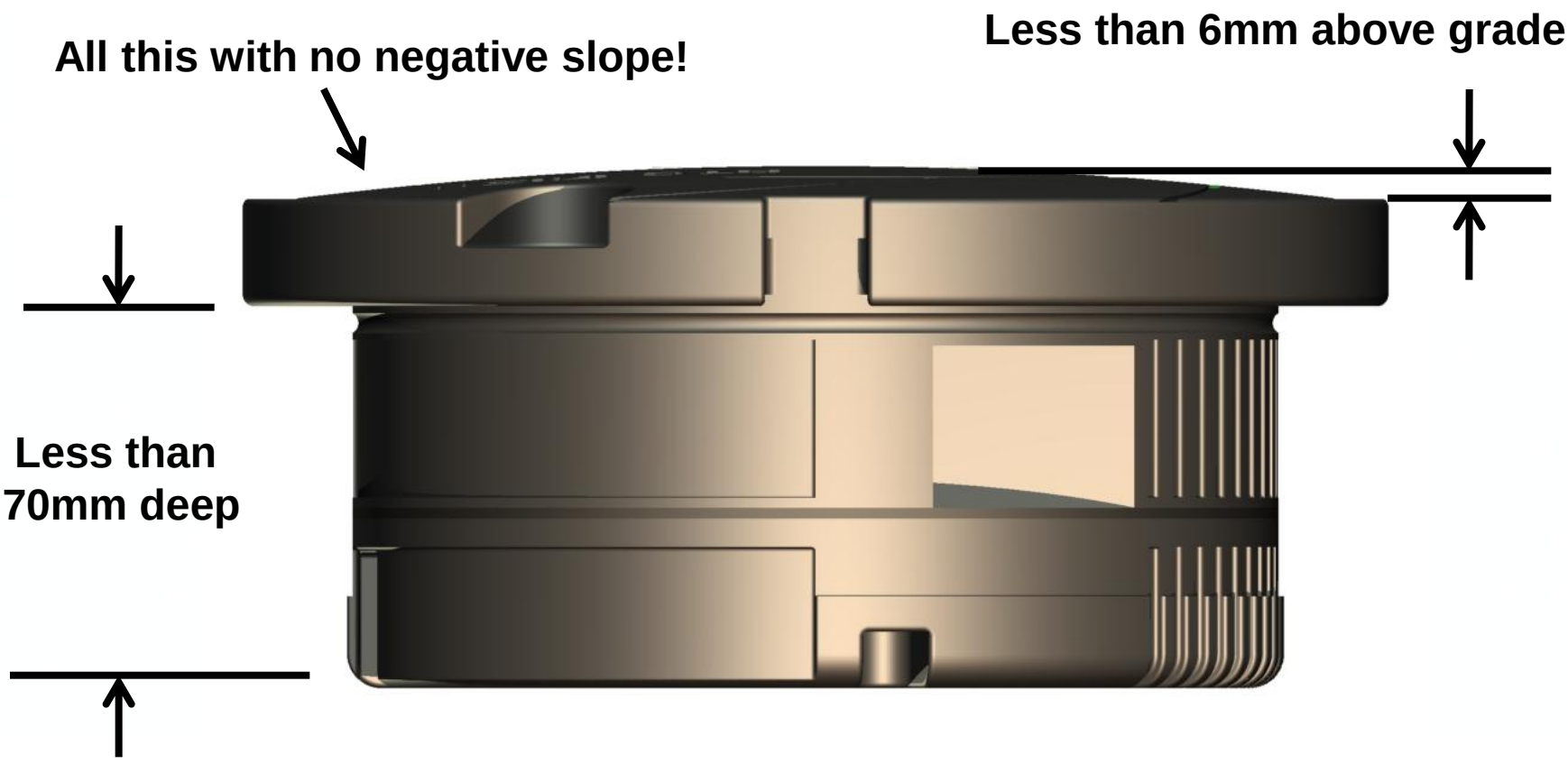
Total airfield uniformity

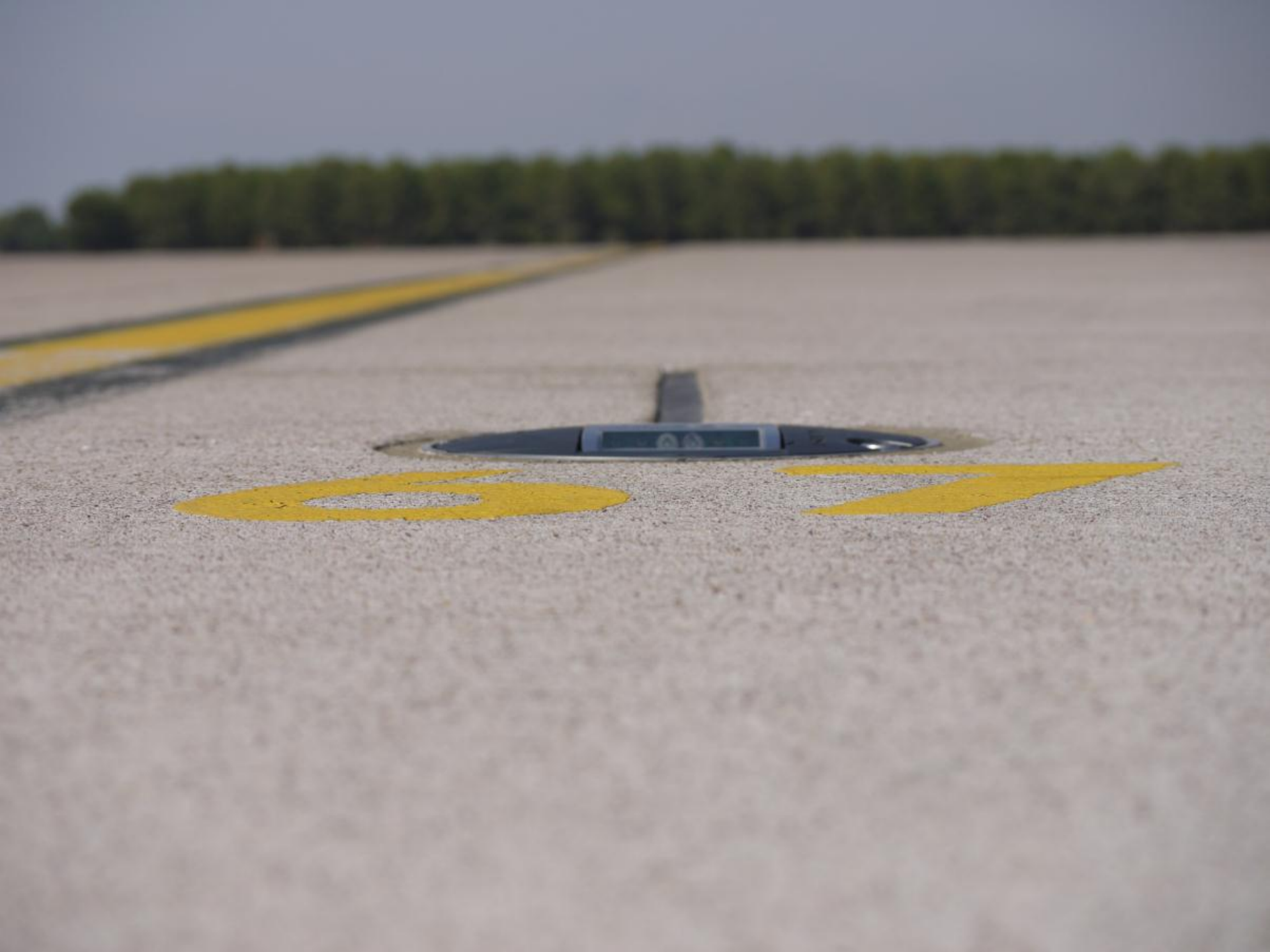
< 6 mm profile with no negative slope

Optimised power consumption maximises life span of the fitting

Active monitoring of actual light output to maintain a selected brilliancy

IRIS – Features





Iris – Optical cartridge

Clear / Clear

Clear / Blank

IRIS – Features

- Self contained electronics package
- Monitor - Presents an open circuit on the AGL power input when the light output falls to 50% or when more than 25% of the LEDs have failed
- Manufactured with 80% recycled material
- RoHS compliant

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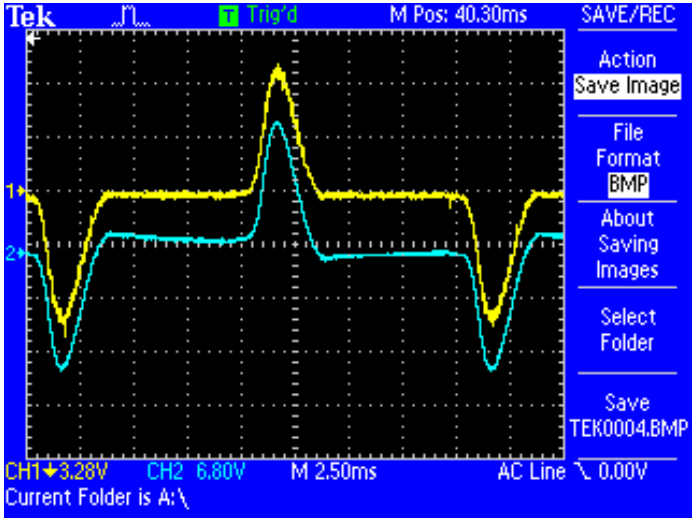
D.L.O

Dynamic Light Output

DLO - Features

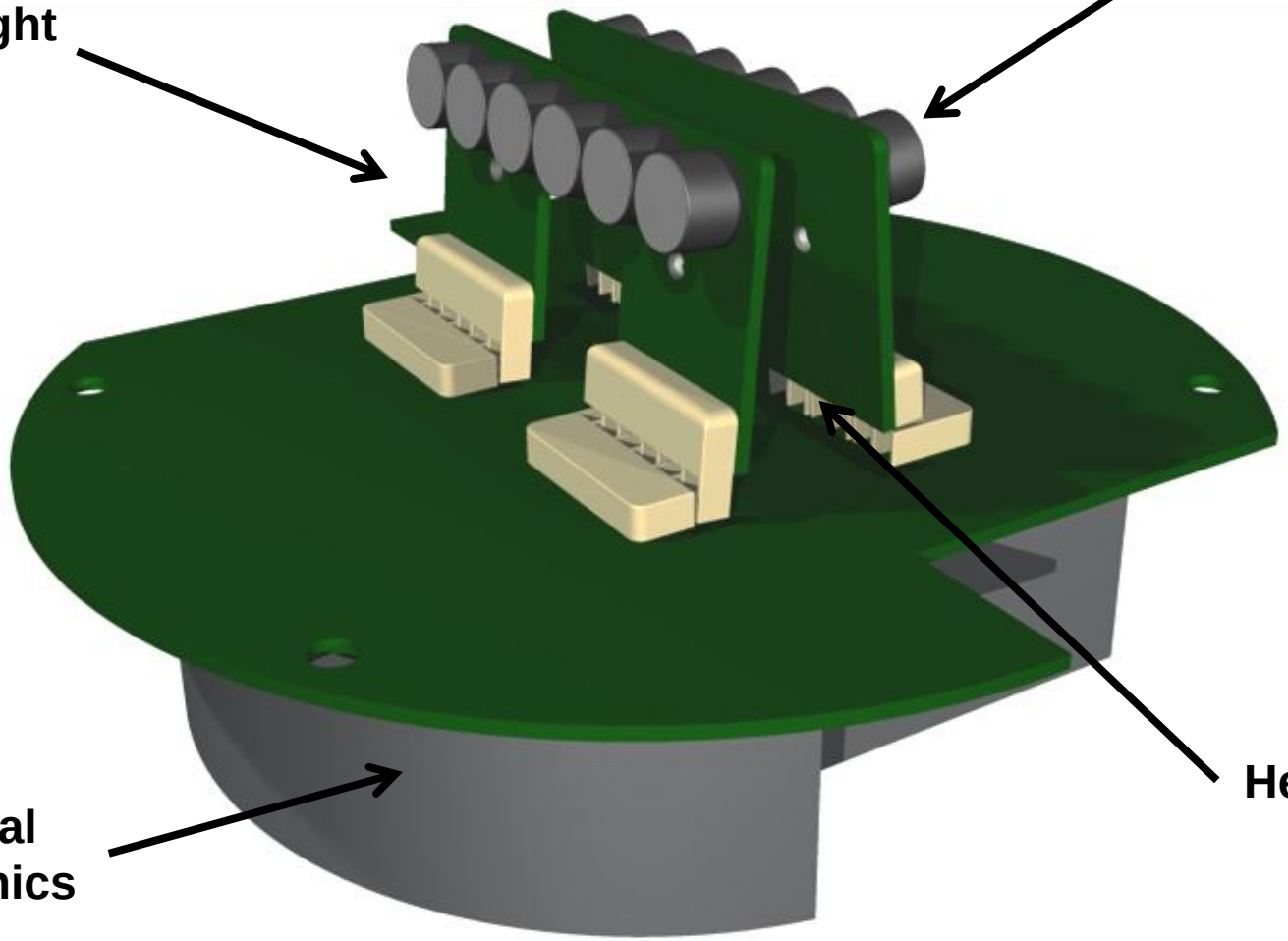
- Removes any LED binning issues with supplier
- Protects the ability to supply spares in the future
- Manage temperature changes effect on the operation of LED
- Manages LED's degradation over time
- Monitored photometric performance
- Even illumination across the airfield
- Greater energy efficiency

DLO - Features

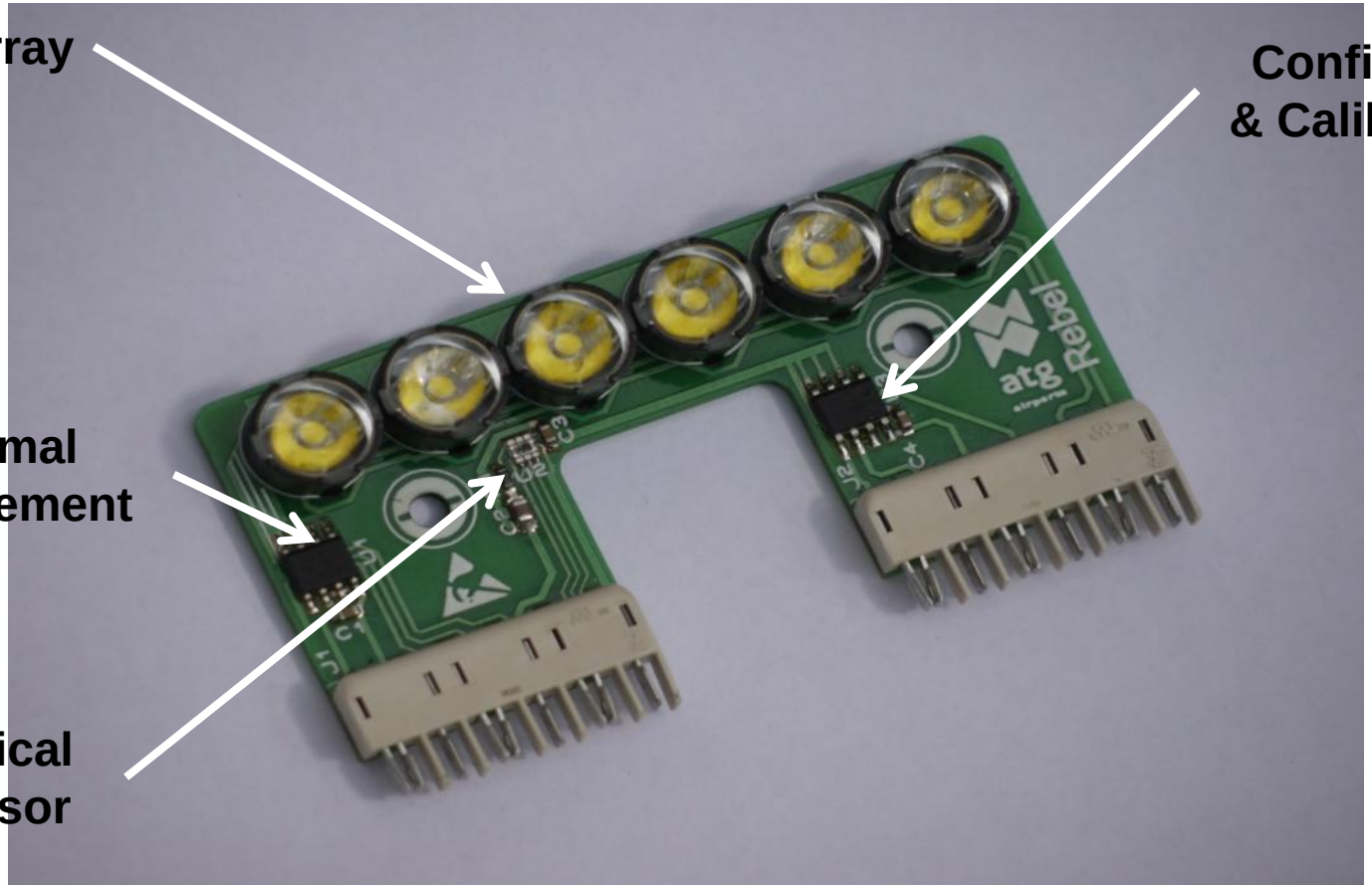


- Uses efficient state-of-the-art microprocessor-based switched-mode power supply technology which results in efficient conversion of input power to light output.
- Active power factor correction (>0.95) is employed so that the ground transformer secondary load is effectively purely resistive
- Figure shows the relationship of the A.C. supply voltage (yellow trace) and current (blue trace)
- Open-circuit functionality is incorporated so that fittings work with existing PLC systems

Looking Inside:



Optical light engine assembly



IRIS – Power Consumption

Runway Centreline	• 15 Watts
Taxiway Centreline	• 5 Watts
Stopbar	• 3 Watts

Future Road Map

- **Switch**
  - Integrated ‘switch facility’. Available in Fail ON and Fail OFF configurations
- **SMARTswitch**
  - Integrated SMARTswitch / monitor with true light output feedback and advanced condition monitoring for Total Preventative Maintenance (TPM)
- **Arctic heater kit**
  - For operation in harsh environments. Prevents ice formation on the lenses
- **Asset Tag**
  - Integrated RFID tag for asset tagging

The Clear Approach to Airports

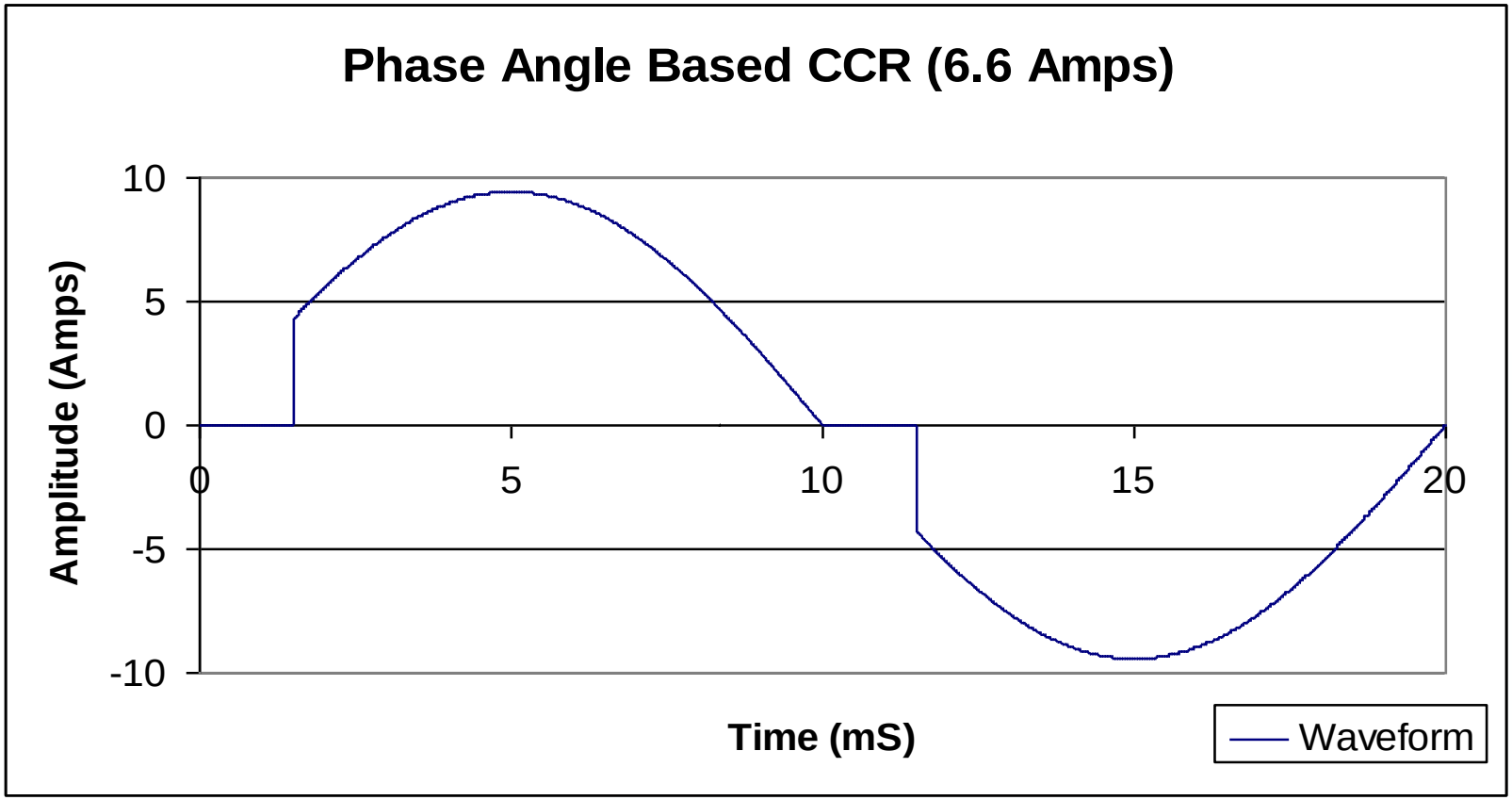
The Micro 200

- ✓ High Power Factor
- ✓ Low Harmonics
- ✓ Low running costs
- ✓ Small Foot print
- ✓ Fast response time
- ✓ LED Technology
- ✓ EN61822 Compliant
- ✓ Optional extras

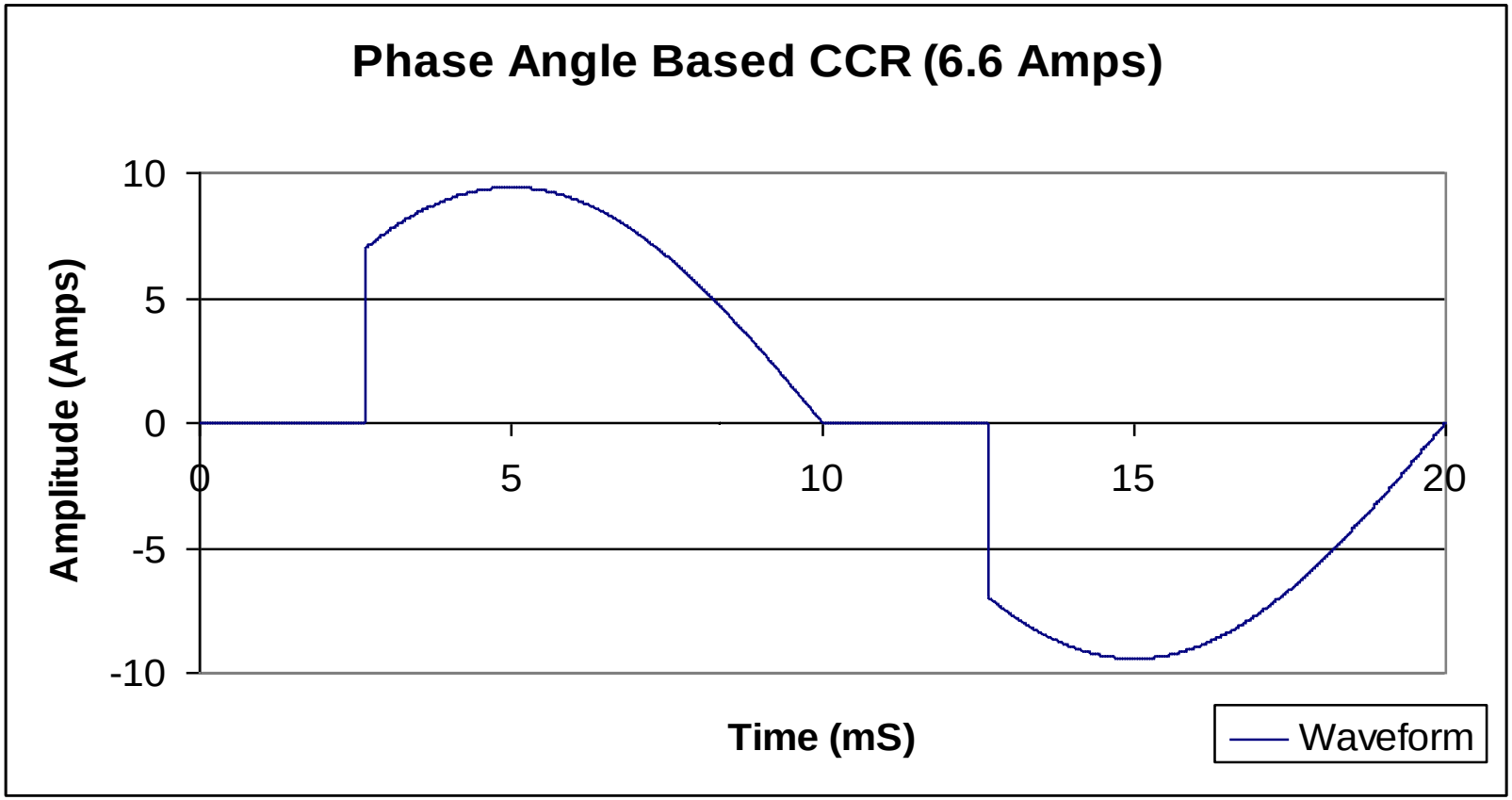
Theory of Operation

- ✓ About 1µS Reaction time to load changes
- ✓ Continuous power to electronic loads
- ✓ Lower Harmonic output

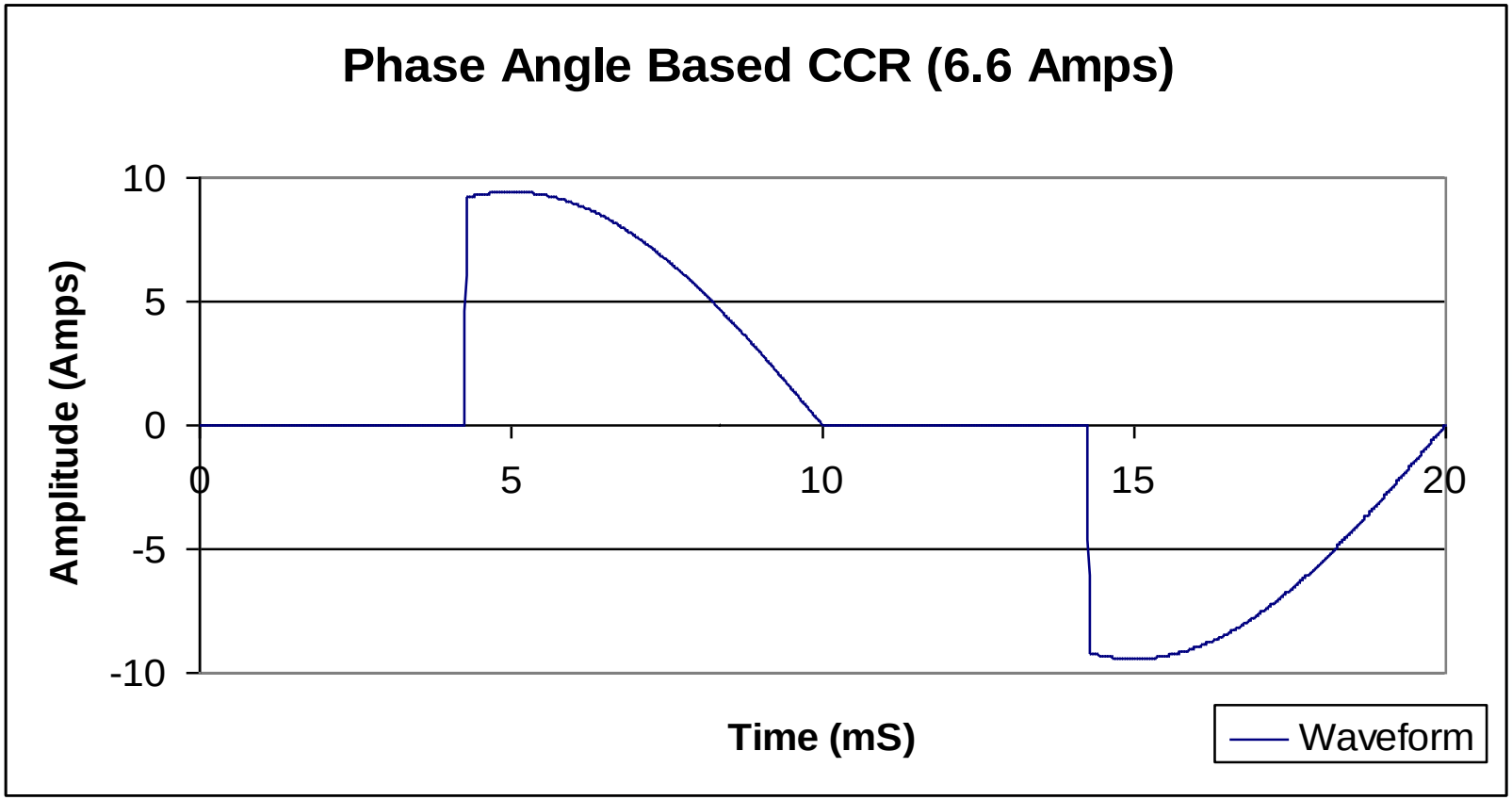
6.60 Amps, 0.99 PF



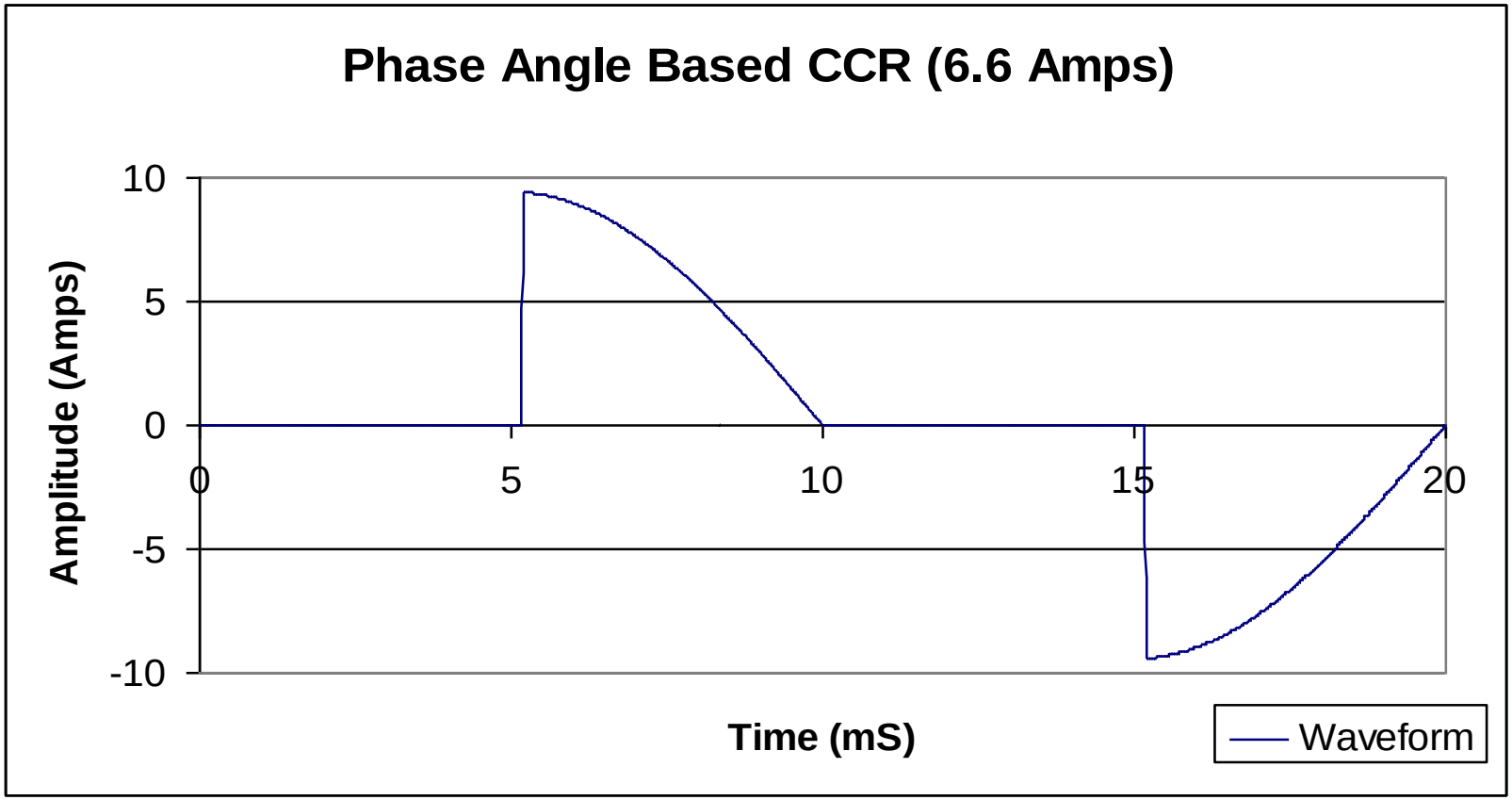
6.30 Amps, 0.95 PF



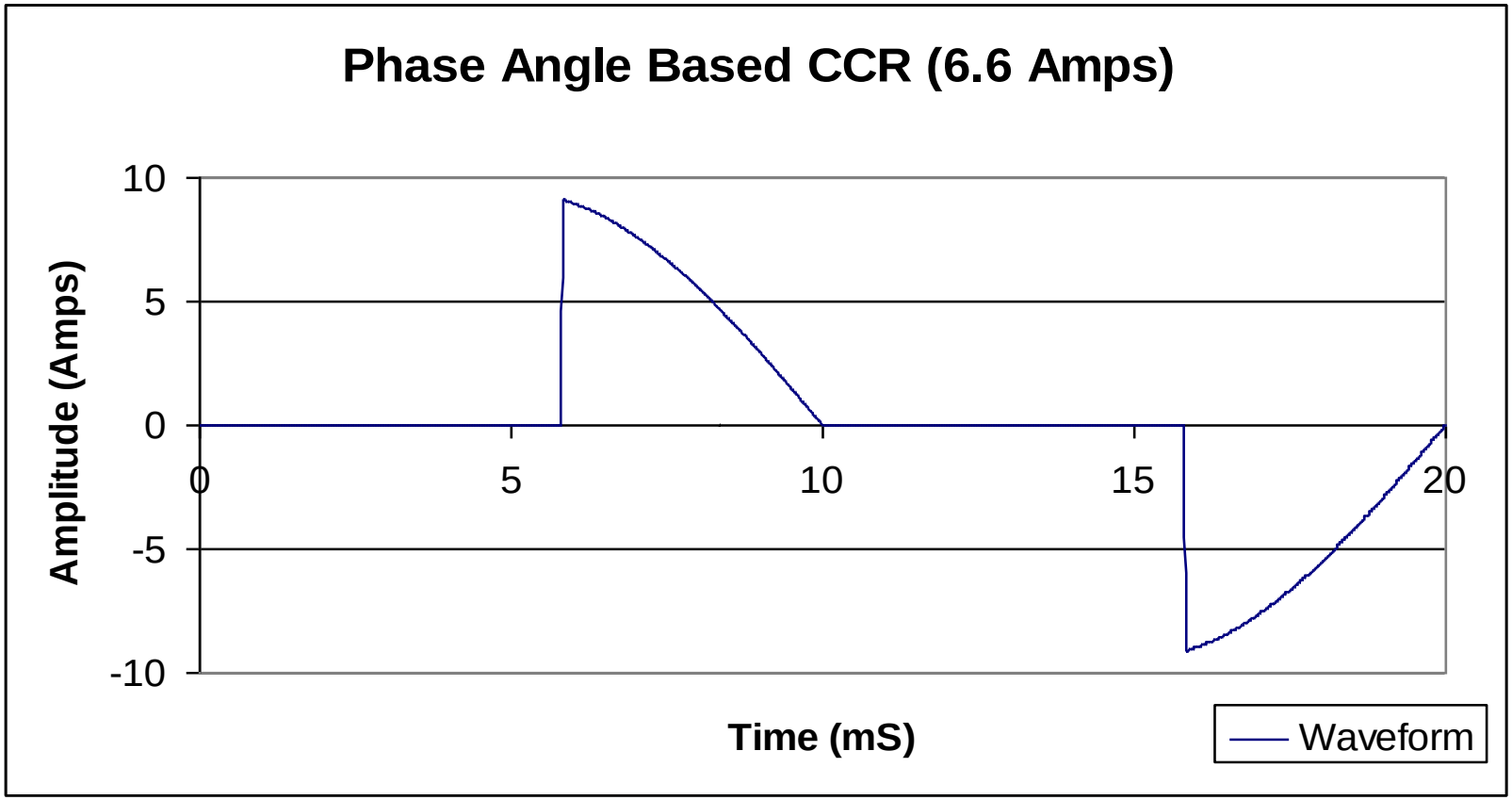
5.35 Amps, 0.80 PF



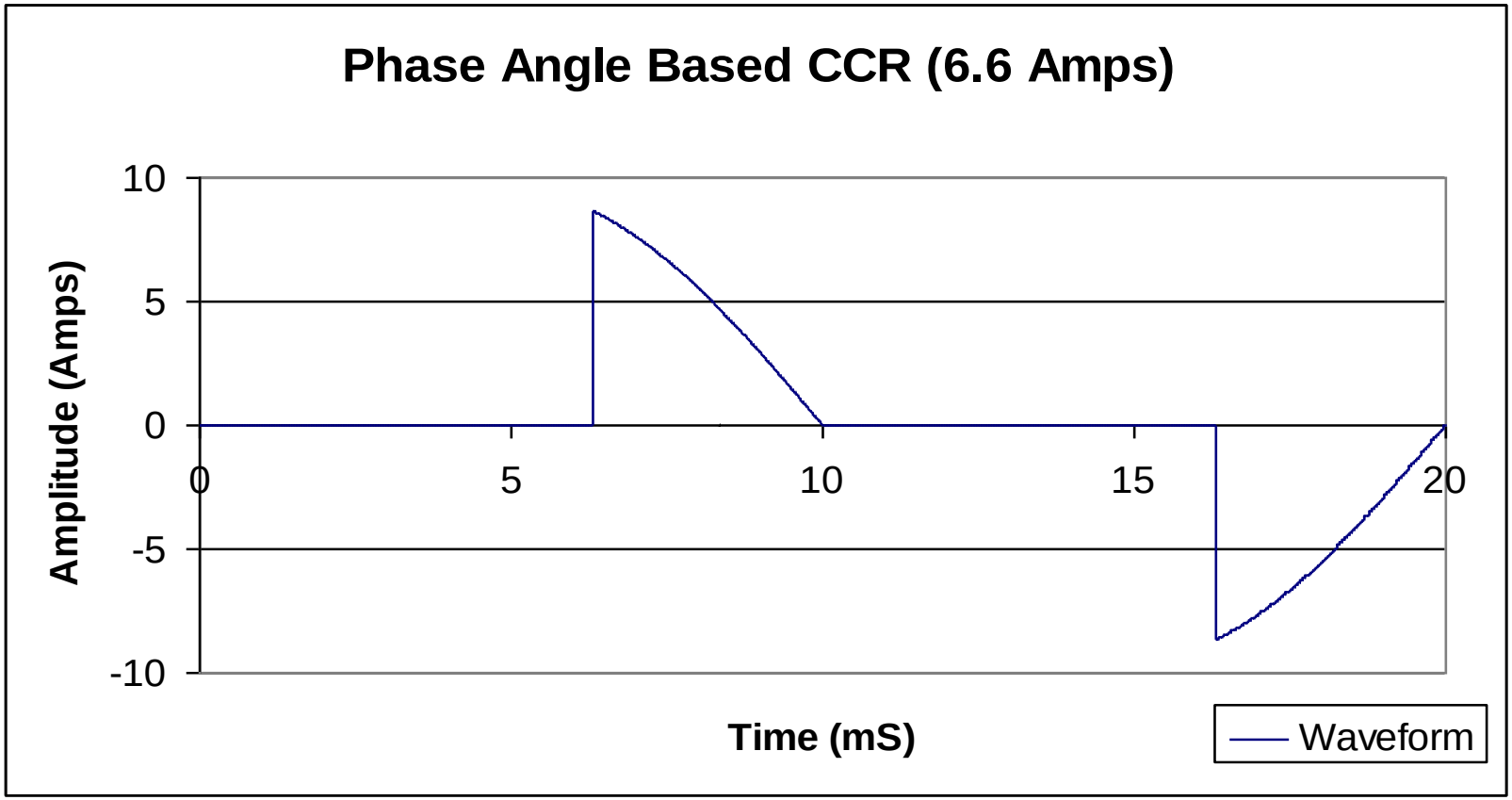
4.55 Amps, 0.68 PF



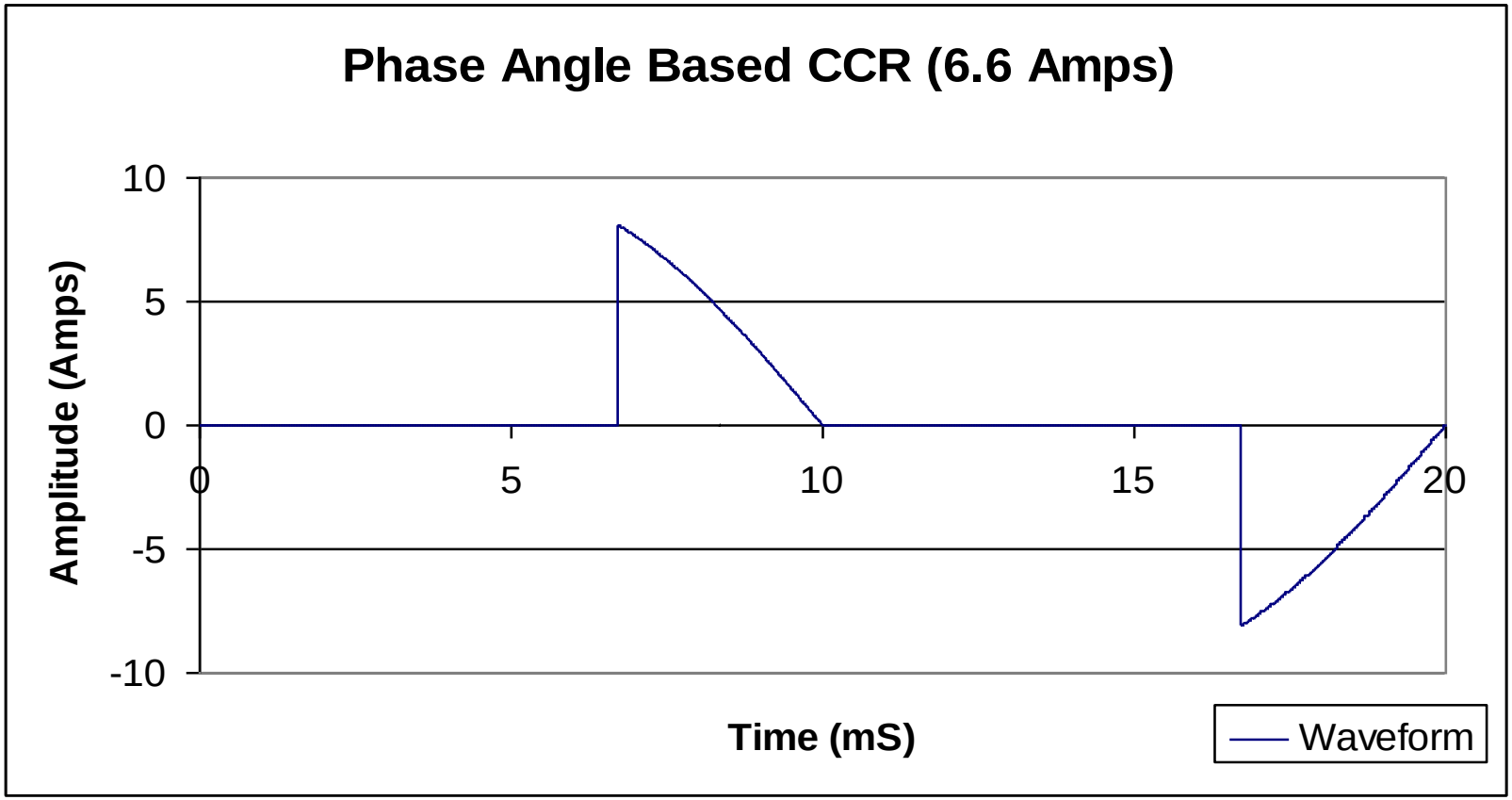
3.89 Amps, 0.58 PF



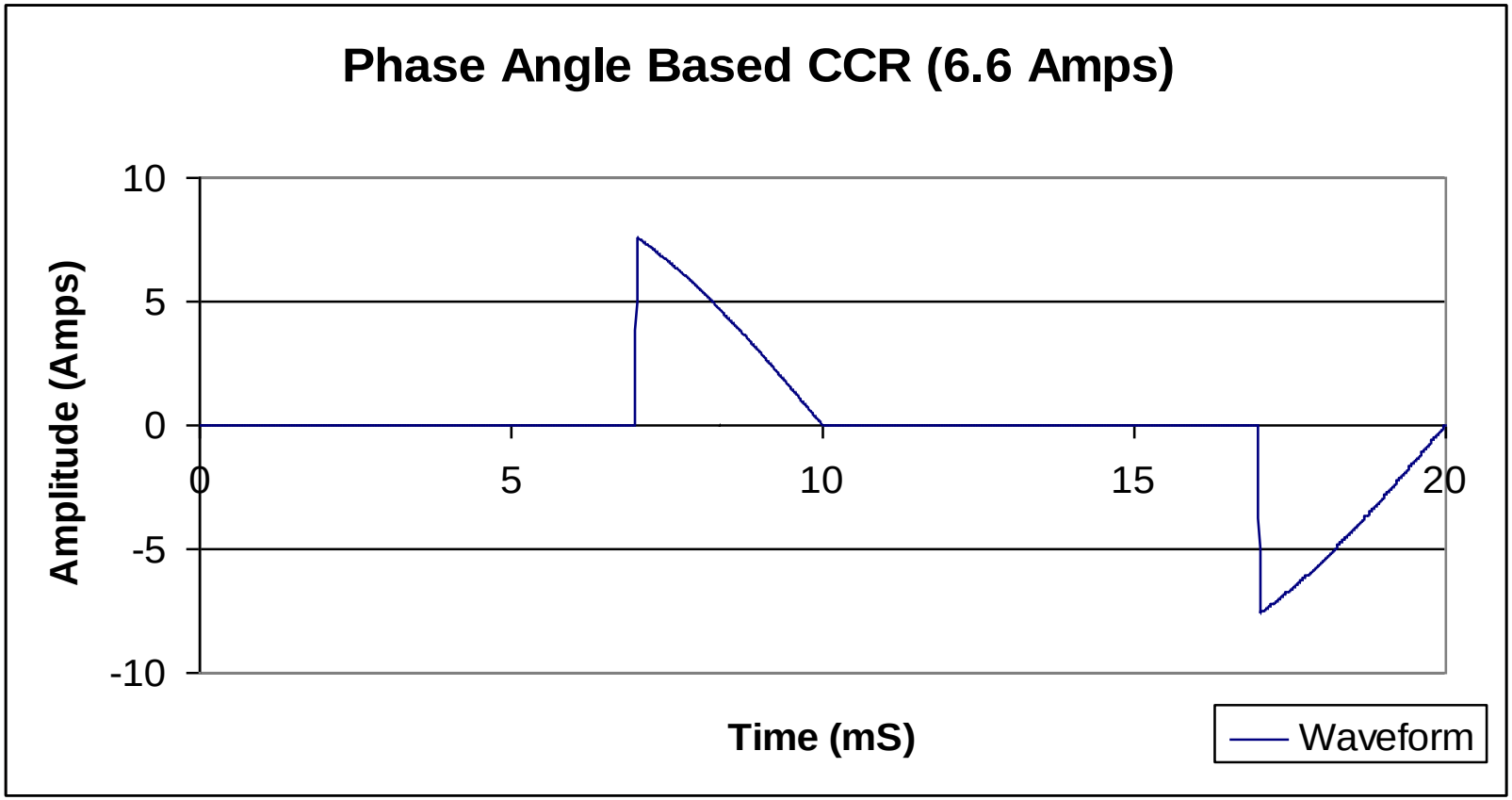
3.37 Amps, 0.50 PF



2.90 Amps, 0.44 PF



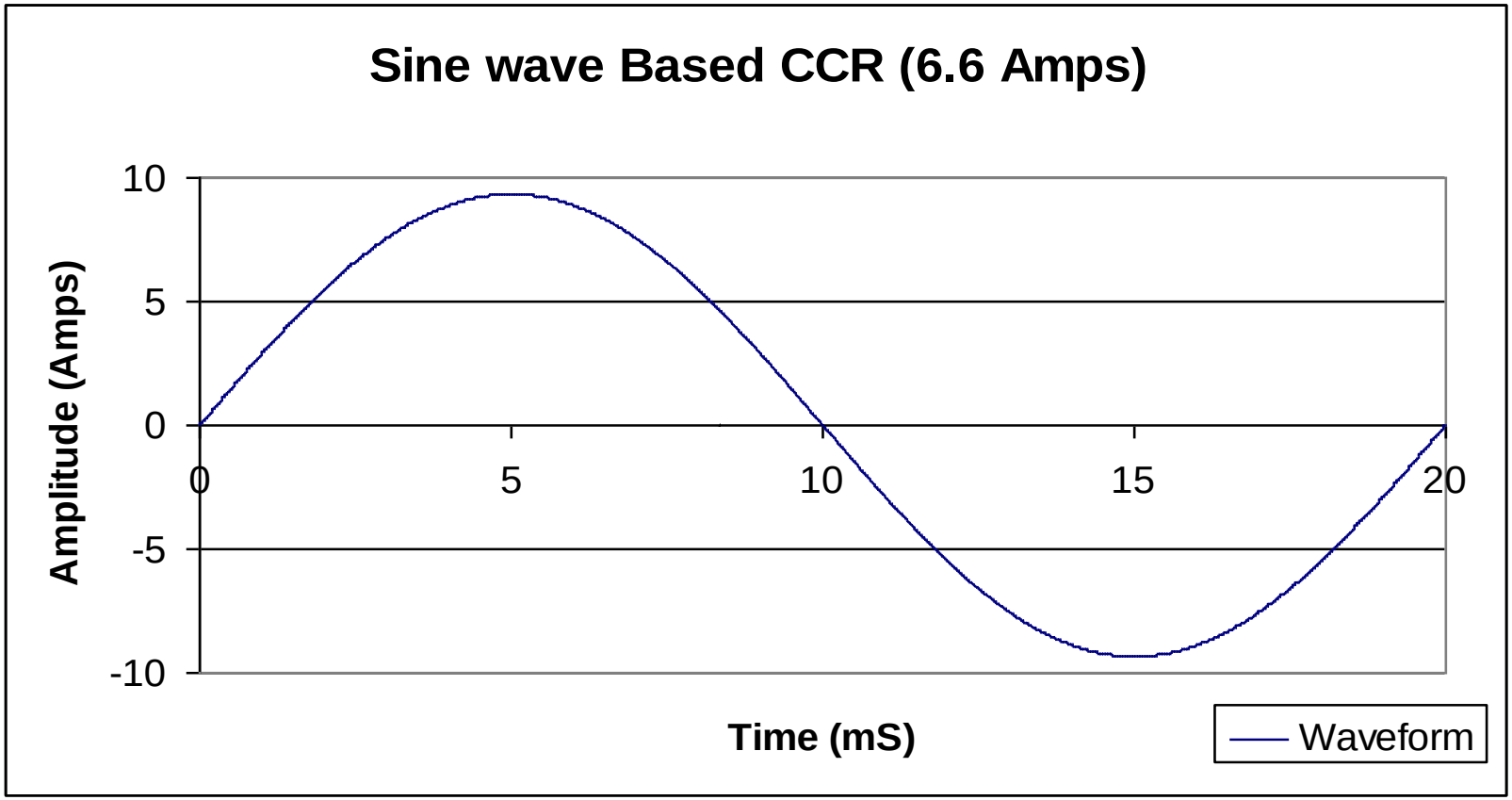
2.57 Amps, 0.38 PF



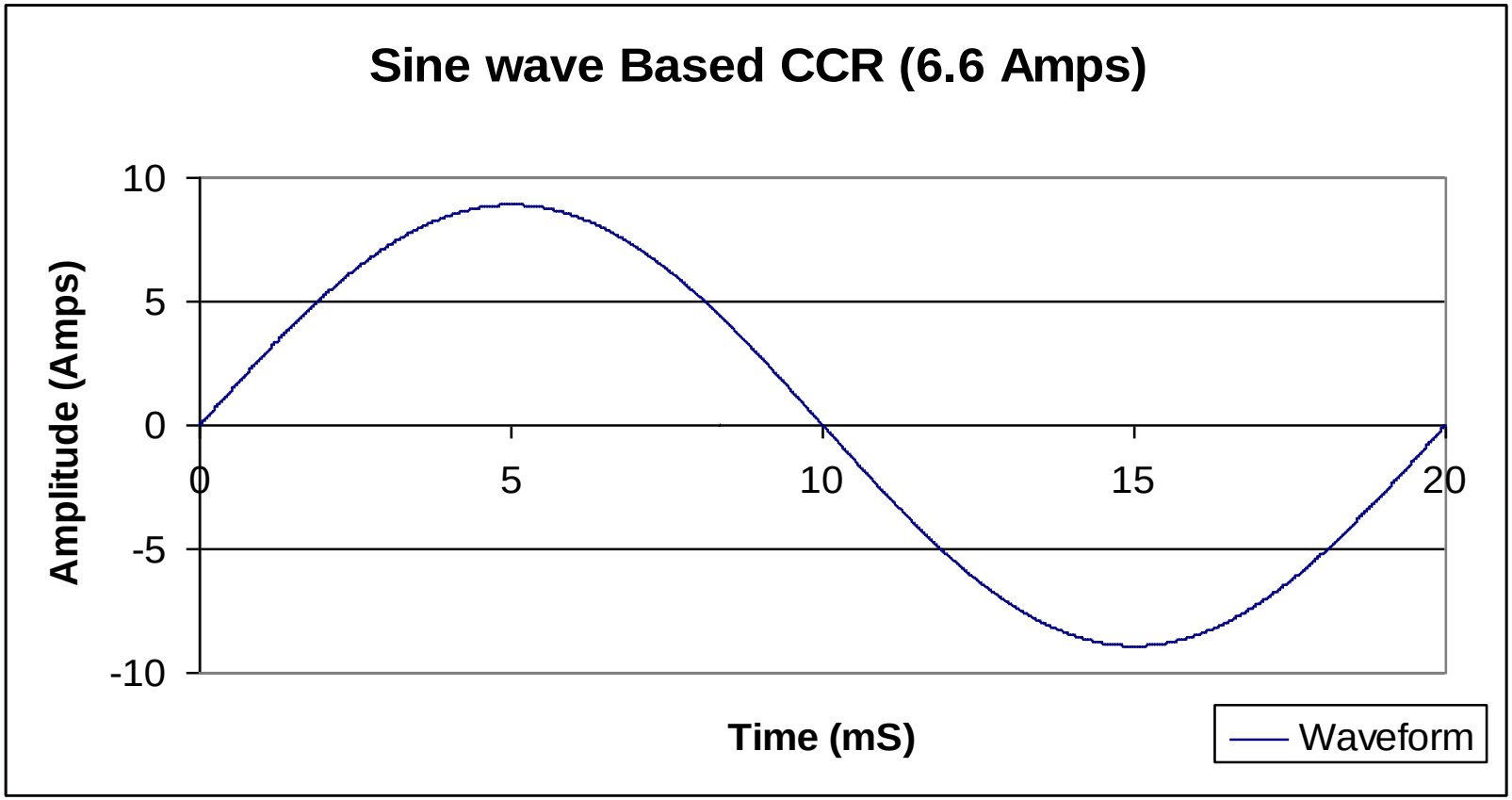
Sine wave CCR

Simulation

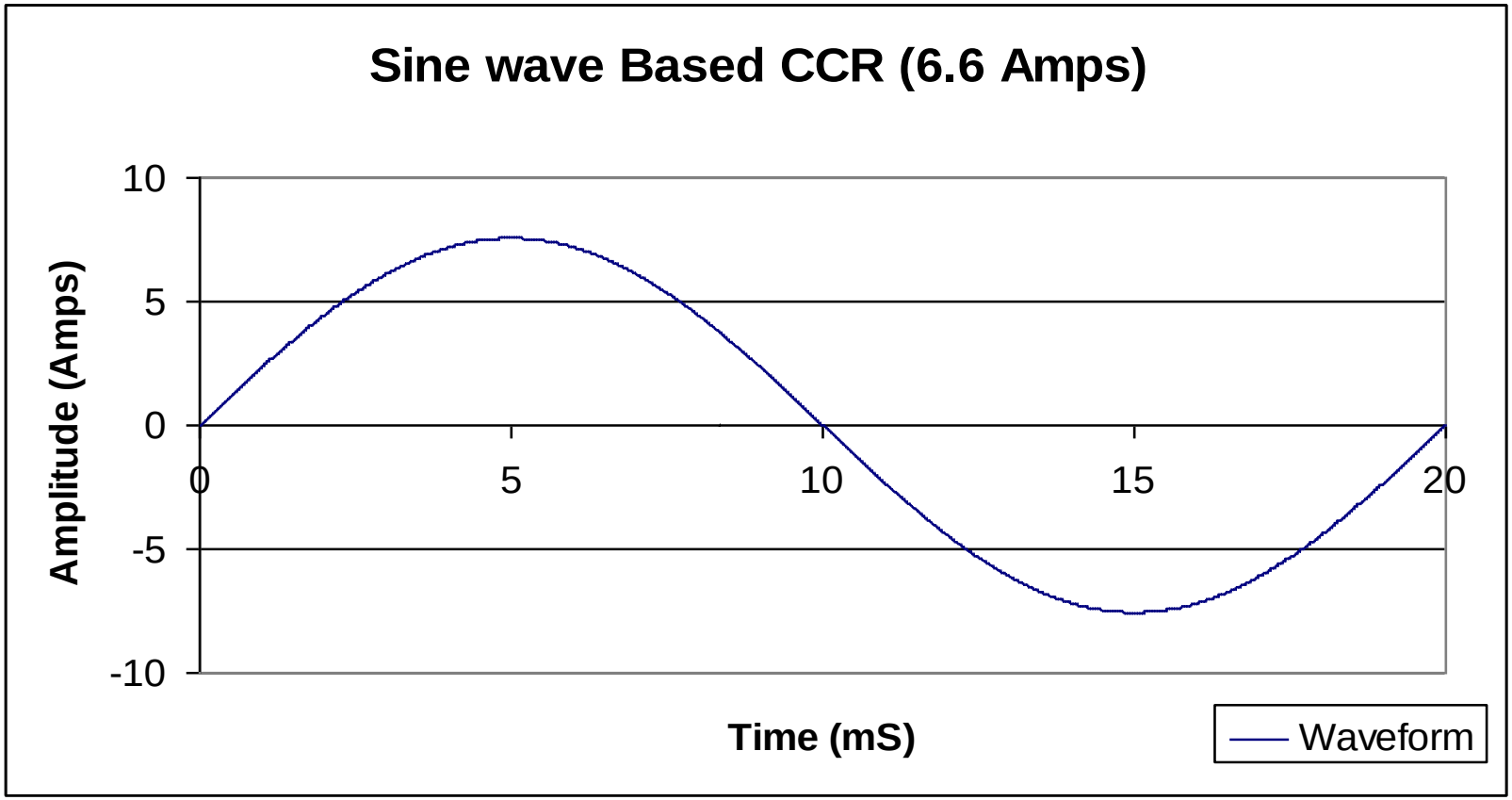
6.60 Amps, 1.00 PF



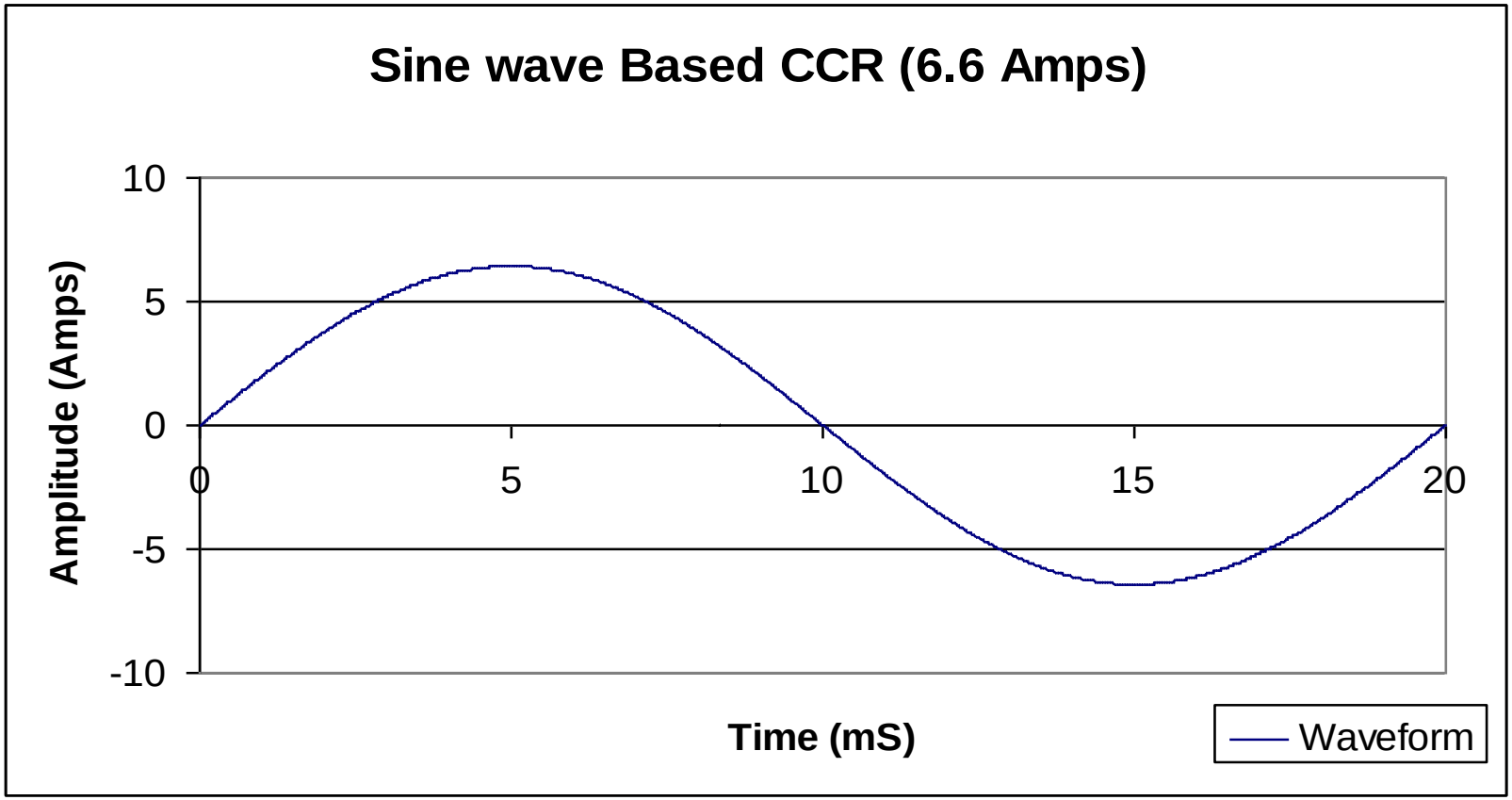
6.30 Amps, 1.00 PF



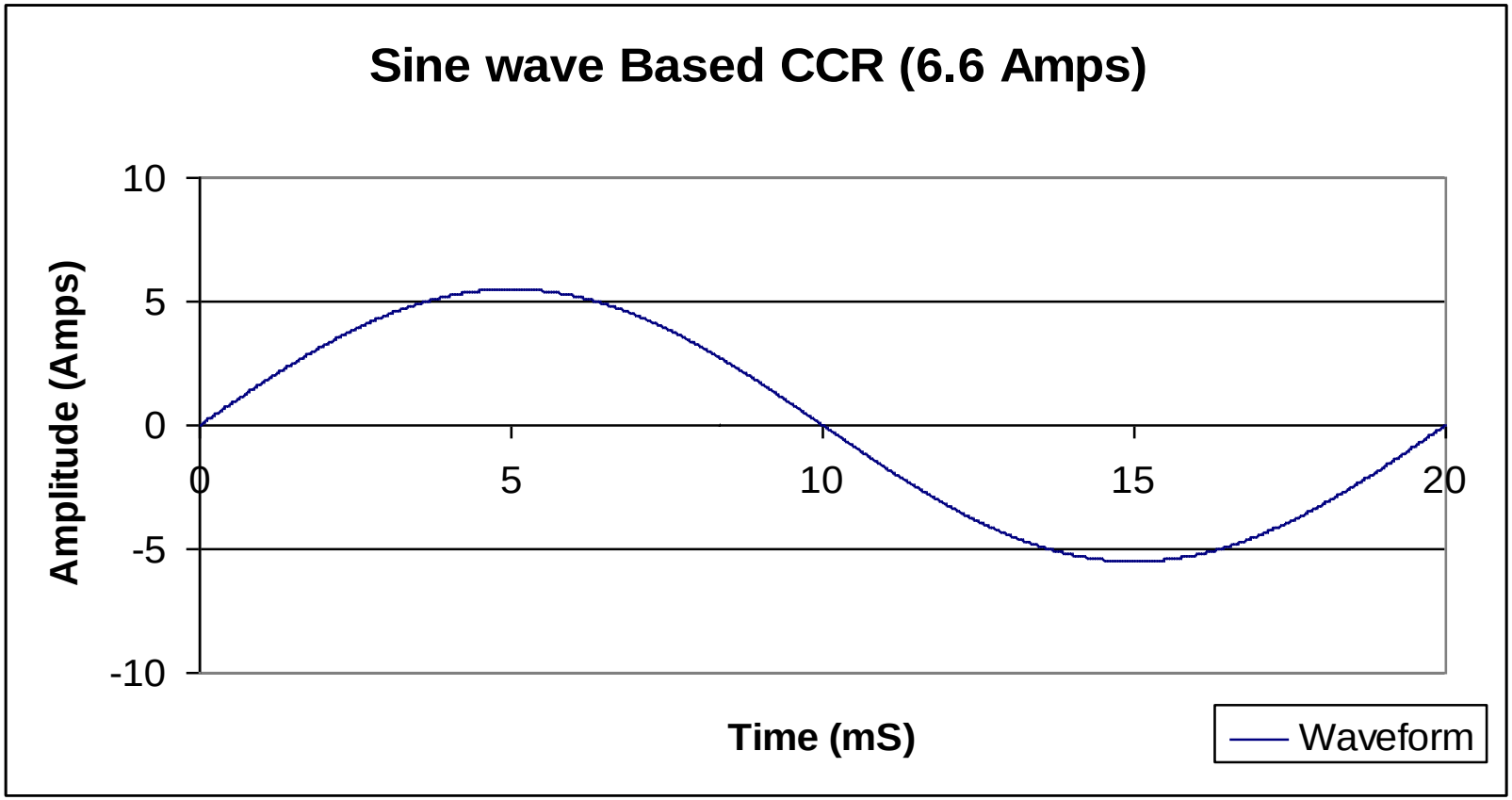
5.35 Amps, 1.00 PF



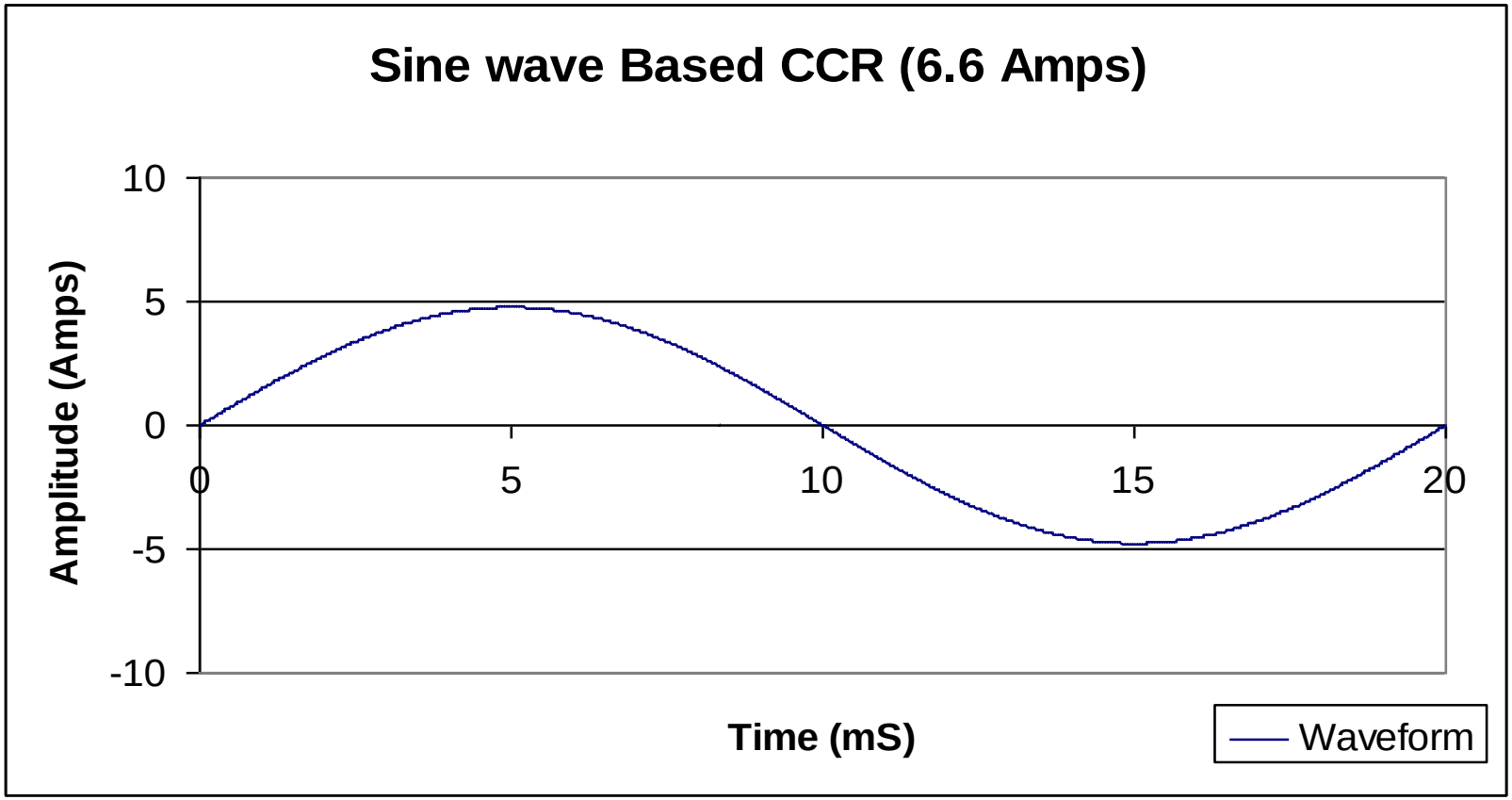
4.55 Amps, 1.00 PF



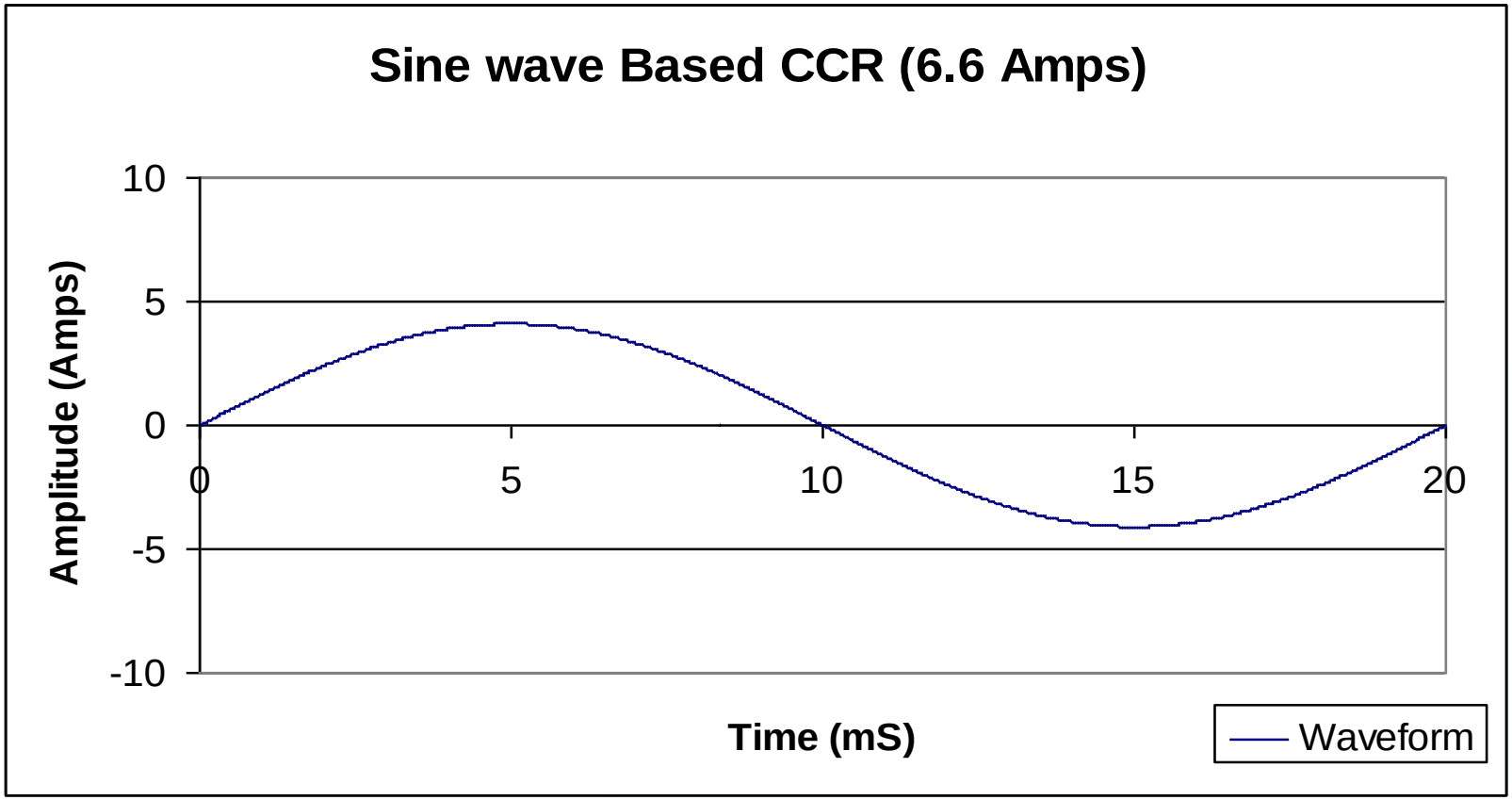
3.89 Amps, 1.00 PF



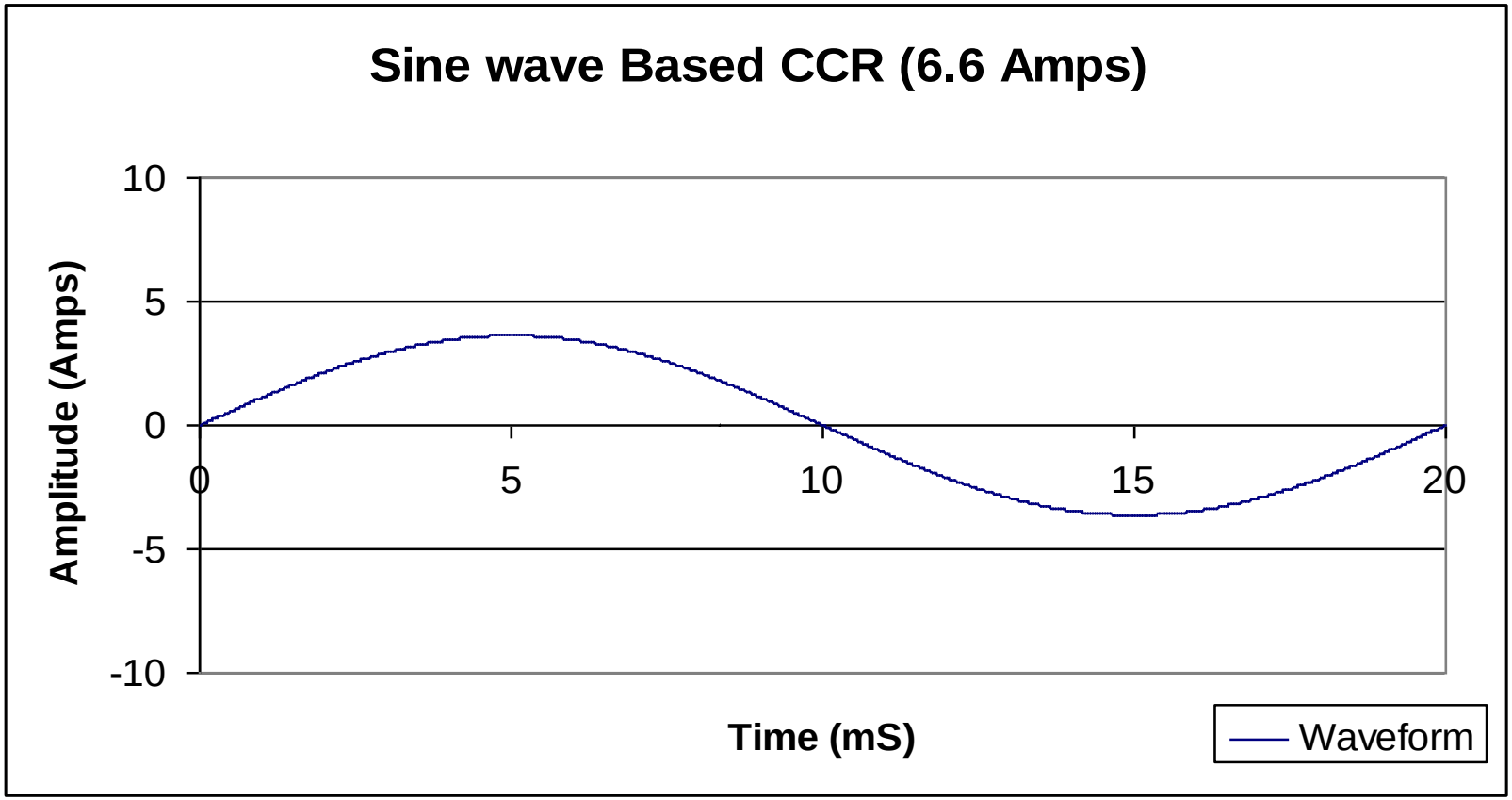
3.37 Amps, 1.00 PF



2.90 Amps, 1.00 PF



2.57 Amps, 1.00 PF



Alternative Power Supply System

DCR

- **1.4 A DC Power Supply – One or Two 500 W outputs**
- **Low output voltage below 400 Volts**

Alternative Power Supply System

DCR

Currently:

- 3 installations running in Canada since 2004
- One installation in Italy

LED’s Bringing a new light to an old industry

Any Questions ?