

Why should I get an Arc Flash Study done and what does it involve?









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- All attendees are **on mute**, therefore your voice won't be recorded.
- After the webinar the recording will be stopped and you will have the opportunity to ask questions through the 'chat box'
- You can also use the chat function at any time to direct questions, which will be covered at the end of the presentation
- Thank you for attending and we hope you find this presentation informative and useful
- Following this presentation please feel welcome to contact me <u>clive.sury@reecesfety.co.uk</u> to discuss any requirements you have



Introduction

- Why do an arc flash study
- What will it tell you
- How to do a study



Overview of Arc Flash

Inadvertent contact between live conductors



Explosion

Impact on **Plant**

Impact on Production

Impact on Personnel

Impact on Owner

Impact on Employer



Image from: https://www.creativesafetysupply.com/articles/arc-flash/

Arc Flash Vs Electric Shock

Electric Shock

- Higher likelihood
- Lower consequences
- Well understood and managed



Arc Flash

- Lower likelihood
- Higher consequences
- Poorly understood and managed

Both hazards should be considered as part of a Health and Safety Management System



Arc Flash = hazard

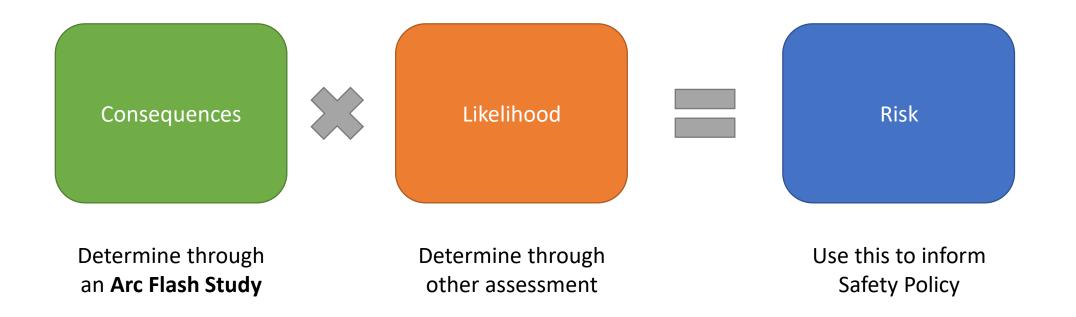
Arc Flash is "just" another hazard.

Employer has a legal obligation to identify and manage hazards.

Demonstrate managed hazards through risk assessment.

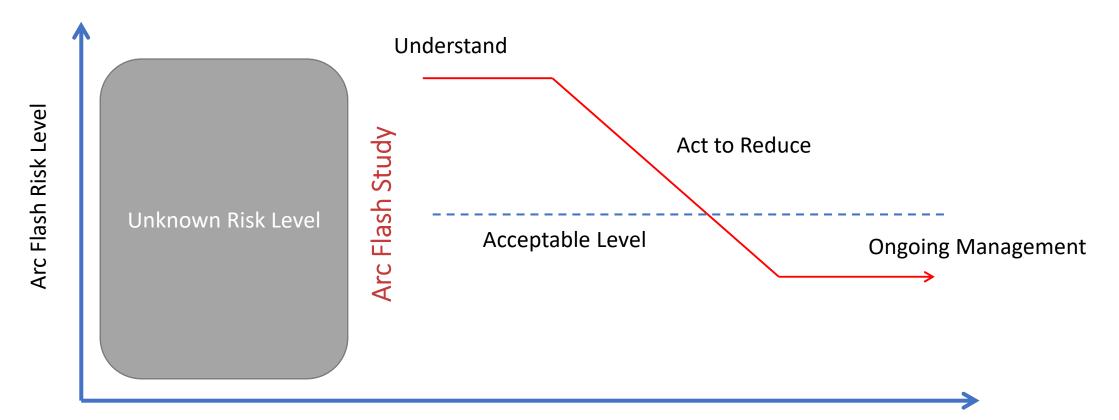


Risk Assess Arc Flash





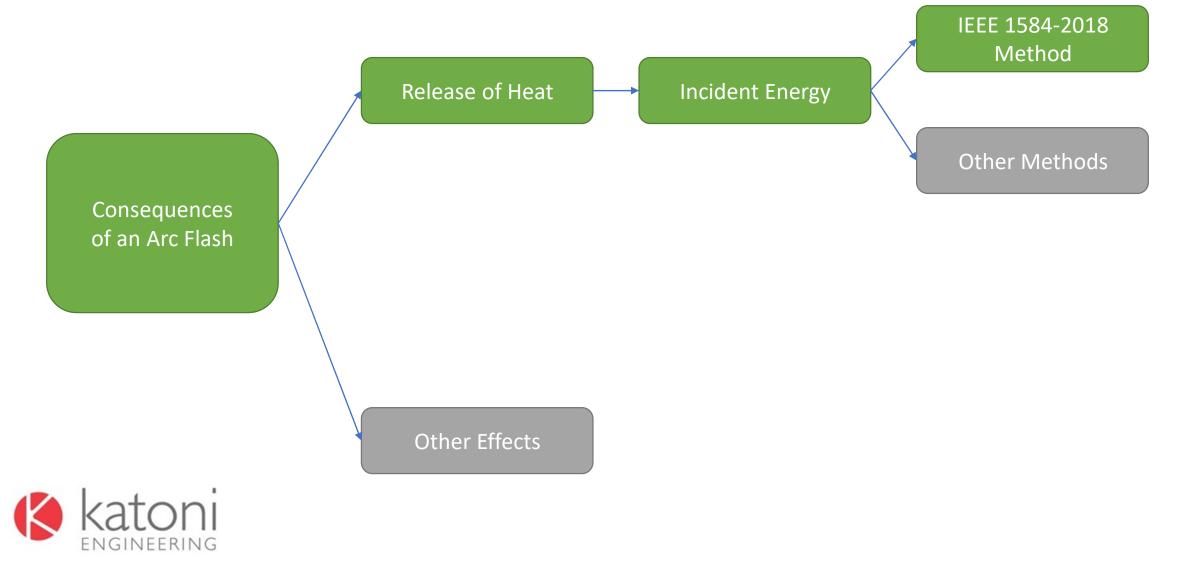
Arc Flash Risk Management



Time



Limitations of an Arc Flash Study



Arc Flash Study Basics – IEEE 1584 Method

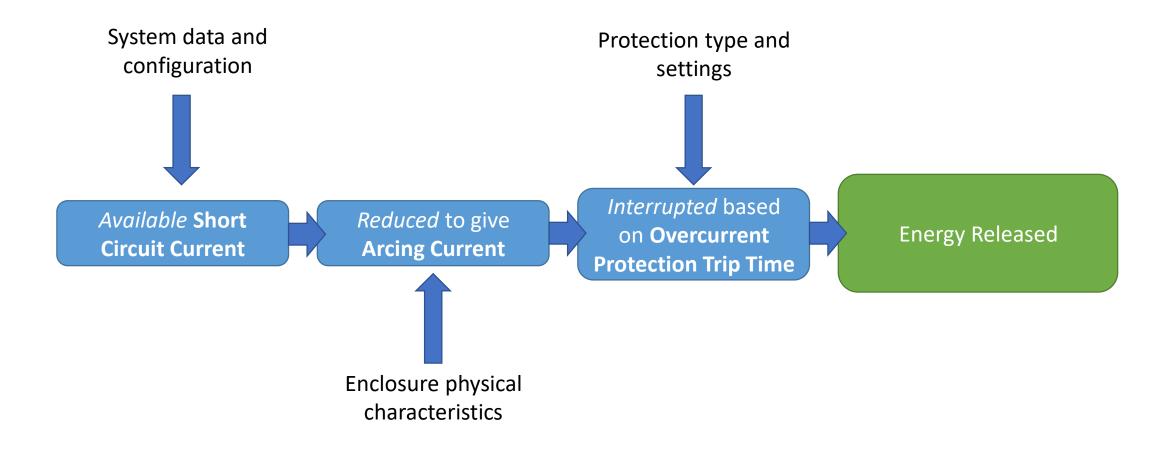
Available Short Circuit Current *Reduced* to give Arcing Current

Interrupted based on Overcurrent Protection Trip Time

Energy Released



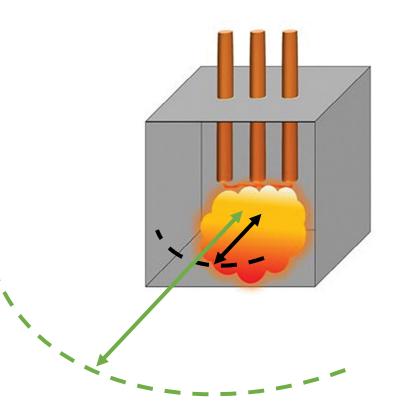
Arc Flash Study Basics – IEEE 1584 Method





Arc Flash Study Outputs

Incident Energy is the heat energy in cal/cm² at the working distance experienced by a person over the duration of the event Arc Flash Boundary is the distance from the arc at which the energy reduces to 1.2 cal/cm²





Options for Arc Flash Study

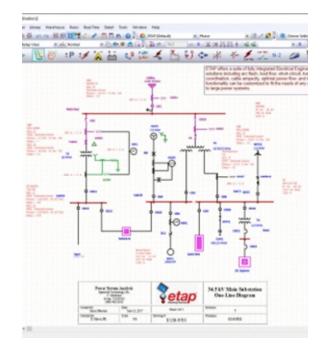
By Hand?



With Excel?

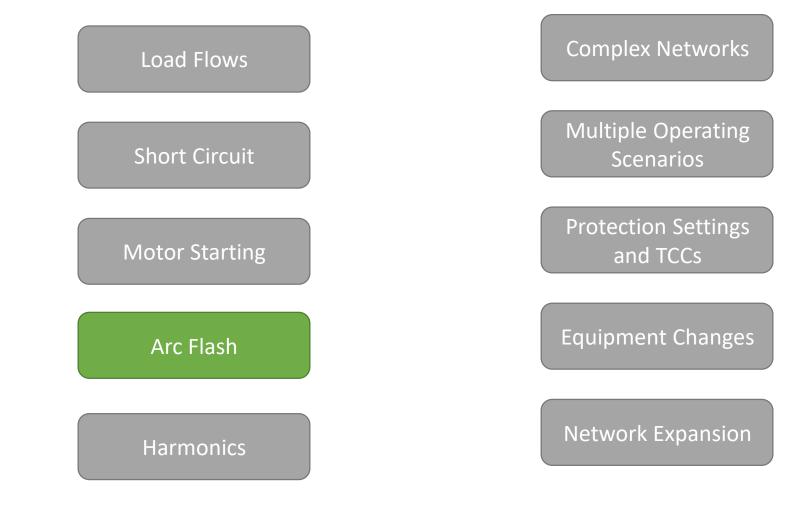
Arc Flash Study Scenario AF1 AFB 3.212 m Input Data Three-Phase Switchboard Voltage Voc 11 KV rms Three-Phase Switchboard Voltage Voc 11 KV rms Three-Phase Switchboard Voltage Voc 11 KV rms Three-Phase Switchboard Voltage Colspan=Texture at Switchboard Ibf 15.19 KA sym rms Electrode Configuration VCB Go 2012 mm Working Distance D 914.4 mm Enclosure Width W 762 mm Enclosure Height H 1143 mm Enclosure Depth L 762 mm Arcing Currents Iarc at 600V 10.909 kA Iarc at 2700V Iarc at 2700V Iarc 1 20.557 kA Iarc 2 Iarc 1 Iarc 2 Iarc 2 Iarc 2 Iarc 3 Iarc 4 Iarc 4 Iarc 1 Iarc 2 Iarc 1 <t< th=""><th>Plant</th><th>NSP</th><th>larc</th><th>13.84 kA</th></t<>	Plant	NSP	larc	13.84 kA	
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With Power Analysis Software?





Power System Analysis Benefits





Typical Inputs to a Study

Available Short Circuit Current *Reduced* to give Arcing Current Interrupted based on Overcurrent Protection Trip Time

Study Outputs at each Switchboard

Generators, Utility Supply, Transformers, Large Motors, Cables, Overcurrent Protective Devices, Switchboards/MCCs

> Operating Scenarios

Switchboards

Overcurrent Protective Devices



Video Demonstration



Study Results

	Normal Operation	Emergency Operation
Main Switchboard	15 cal/cm ²	N/A
Emergency Switchboard	8 cal/cm ²	45 cal/cm ²
Production MCC	8 cal/cm ²	N/A
Utilities MCC	20 cal/cm ²	N/A
Emergency MCC	6 cal/cm ²	65 cal/cm ²
	Normal Operation	Emergency Operation
Main Switchboard	•	
Main Switchboard	2 m	N/A
Emergency Switchboard	2 m 1.5 m	N/A 5 m
Emergency Switchboard	1.5 m	5 m



Using Arc Flash Study Results

Establish a threshold Incident Energy level



Below Threshold

Determine risk

Manage with training, task specific risk assessments and PPE



Above Threshold

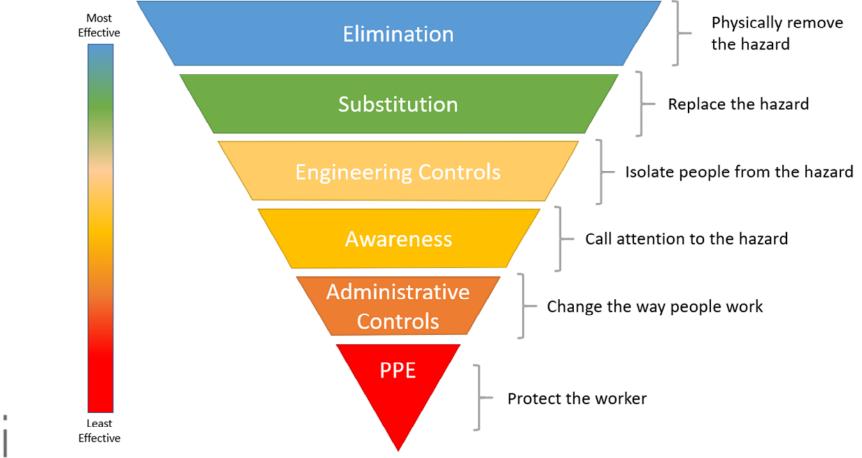
Determine risk

Apply **hierarchy of controls** to reduce the Incident Energy.



Controlling the Hazard

Hierarchy of Controls



Using	5 Study Resu Install an detection lower Inci Energy	arc system to	PPE ac for all	.2 cal/cm ² cross site work in hrooms	No action – no personnel in switchroom during Em Ops	
		Normal Operation		Emergency Operation		
	Main Switchboard	15 cal/cm ²		N/A		
	Emergency Switchboard8 cal/cm2			45 cal/cm ²		
	Production MCC	8 cal/cm ²		N/A		
	Utilities MCC 2		20 cal/cm² N/A			
	Emergency MCC	6 cal/cm ²		65 cal/c	cm ²	
katon	Reduce upstream protection trip times to lower Incident Energy				Typically few activities – retrofit upstream protection with Maintenance Mode	

Electrical Safety Programme

Arc Flash Safety in your ESP might include:

- Arc Flash labelling
- Inclusion in task risk assessments
- Education and training of electrical & non-electrical personnel
- Changes to operational procedures
- Mandatory minimum PPE
- Supplemental PPE for specific tasks/equipment





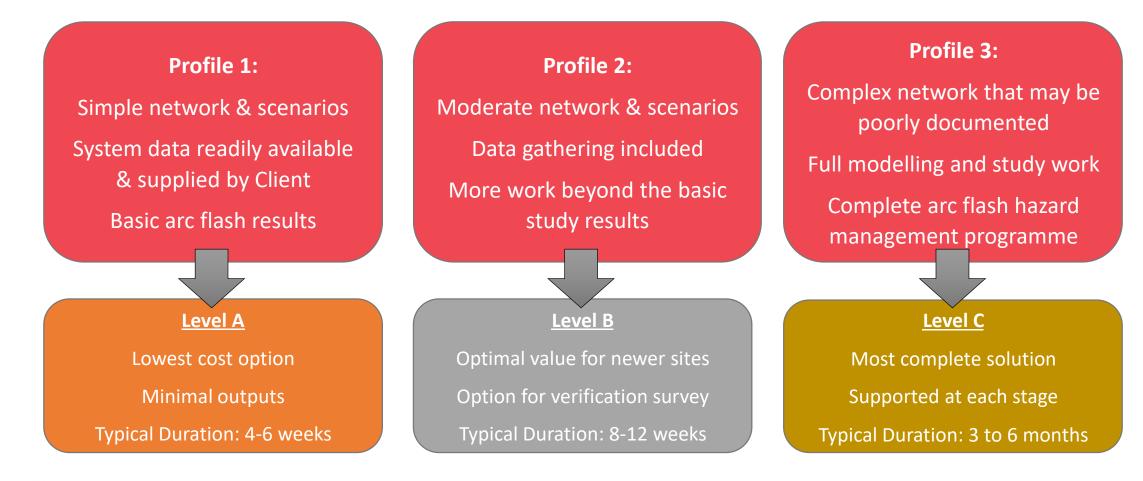
The hazard posed by Arc Flash should be recognised and managed just like any other hazard.

An Arc Flash study will give you quantifiable information about the arc flash risk at your site.

The results should be used to inform and develop an appropriate strategy for managing arc flash risk as part of your existing H&S systems.



Standard Service Levels





Questions?

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Katoni Engineering Arc Flash Services

- Data Gathering and Site Surveys
- Power System Modelling
- Arc Flash Energy Calculations
- Arc Flash Risk Assessments
- Arc Flash Hazard Reduction Studies
- Arc Flash Warning Labels & Drawings
- Risk Assessment Materials
- Arc Flash Training and Awareness Materials
- Selection and Supply of PPE

Find out more at: <u>katoni.com/services/Arc-flash</u>