# Creating Combinations for Current, Time and Voltage

# Importing Libraries

In [1]:
```
import pandas as pd
import numpy as np
import itertools
```

# Reading ranges file

In [2]:
```
ranges = pd.read_excel("Ranges of New Inconel Grade.xlsx", skiprows =1)
```

In [3]:
```
ranges
```

Out[3]:

| | Unnamed: 0 | Unnamed: 1 | Max IP (Amp) | Min IP (Amp) | Max Ton (µS) | Min Ton (µS) | Max Toff (µS) | Min Toff (µS) | Max Voltage (Volts) | Min Voltage (Volts) |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | Inconel 188 | Inconel 800 | 220 | 100 | 1.25 | 0.35 | 27 | 7 | 80 | 20 |
| **1** | Inconel 230 | Inconel 625 | 120 | 5 | 500.00 | 10.00 | 100 | 30 | 90 | 5 |
| **2** | Inconel 713 C | Inconel 625 | 120 | 5 | 500.00 | 10.00 | 100 | 30 | 90 | 5 |
| **3** | Inconel 751 | Inconel X-750 | 170 | 8 | 500.00 | 100.00 | 2000 | 37 | 100 | 20 |
| **4** | Inconel 792 | Inconel 800 | 220 | 100 | 1.25 | 0.35 | 27 | 7 | 80 | 20 |
| **5** | Inconel 907 | Inconel 800 | 220 | 100 | 1.25 | 0.35 | 27 | 7 | 80 | 20 |
| **6** | Inconel 909 | Inconel 800 | 220 | 100 | 1.25 | 0.35 | 27 | 7 | 80 | 20 |
| **7** | Inconel 925 | Inconel 800 | 220 | 100 | 1.25 | 0.35 | 27 | 7 | 80 | 20 |

# Creating Combinations for Inconel 792, 907, 909, 925

In [4]:
```
# Creating list of values of Current

amp = list(range(100,225, 5)) # Start value 100, End Value 225, Increment of 5
print(amp)
```

```
[100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 1
80, 185, 190, 195, 200, 205, 210, 215, 220]
```

In [5]:
```
# Creating list of values of Time(on)

t = np.arange(0.35, 1.26, 0.1)
ton = []

for i in t:
    ton.append(round(i,2))
print(ton)
```

```
[0.35, 0.45, 0.55, 0.65, 0.75, 0.85, 0.95, 1.05, 1.15, 1.25]
```

In [6]:
```
# Creating list of values of Time(off)

toff = list(range(7,28,2))
print(toff)
```

```
[7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27]
```

In [7]:
```
# Creating list of values of Voltage

volt = list(range(20,81,5))
print(volt)
```

```
[20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80]
```

# Creating product combinations of all 4 parameters

In [8]:
```
comb = list(itertools.product(amp,ton,toff, volt))
```

In [9]:
```
in792 = pd.DataFrame(comb, columns = ["Amp", "Ton", "Toff", "Volt"])
```

# First 10 rows of combination file

In [10]:
```
in792.head(10)
```

Out[10]:

| | Amp | Ton | Toff | Volt |
|---|---|---|---|---|
| **0** | 100 | 0.35 | 7 | 20 |
| **1** | 100 | 0.35 | 7 | 25 |
| **2** | 100 | 0.35 | 7 | 30 |
| **3** | 100 | 0.35 | 7 | 35 |
| **4** | 100 | 0.35 | 7 | 40 |
| **5** | 100 | 0.35 | 7 | 45 |
| **6** | 100 | 0.35 | 7 | 50 |
| **7** | 100 | 0.35 | 7 | 55 |
| **8** | 100 | 0.35 | 7 | 60 |
| **9** | 100 | 0.35 | 7 | 65 |

# Last 10 rows of combination file

In [11]:
```
in792.tail(10)
```

Out[11]:

| | Amp | Ton | Toff | Volt |
|---|---|---|---|---|
| **35740** | 220 | 1.25 | 27 | 35 |
| **35741** | 220 | 1.25 | 27 | 40 |
| **35742** | 220 | 1.25 | 27 | 45 |
| **35743** | 220 | 1.25 | 27 | 50 |
| **35744** | 220 | 1.25 | 27 | 55 |
| **35745** | 220 | 1.25 | 27 | 60 |
| **35746** | 220 | 1.25 | 27 | 65 |
| **35747** | 220 | 1.25 | 27 | 70 |
| **35748** | 220 | 1.25 | 27 | 75 |
| **35749** | 220 | 1.25 | 27 | 80 |

# Laslty each combination file was saved in csv format

Note: Same code was repeated for the rest of the Inconel Grades