



# MULTI-LAYER PCB DESIGN

## Utilizing Altium Designer

**For Intermediate & Above  
Levels Only**

### YOU WILL LEARN:

- PCB Design Schematic Capture & Layout
- Import / Export of Necessary Files for Mass Production
- Multilayer PCB Design With Silkscreen, Solder Mask & Etc.
- Creating New Components for Your Personal Altium Library
- Manual Routing and Auto-Route With Respect To Design Rules

PRESENTED BY: FICTRON INDUSTRIAL SUPPLIES SDN BHD & IRS TRAINING SDN BHD

### QR CODE



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# BEGINNER

**A BEGINNER** in the electronics field, is considered one whom may have a small knowledge of electricity or may know nothing at all. Such individual would need to learn about electricity, circuitry, how components function in an electrical circuit, and so on to advance in this field.

Although the **beginner information is easy to obtain**, a fundamental and proper understanding of them will go a long way in understanding more complicated topics later on in more advanced courses.

# INTERMEDIATE

**THE INTERMEDIATE** level in electronics engineering is considered to be the level of an individual whom has at least a diploma in electrical engineering, or has been repairing or building electronic circuits as a hobby.

At this level, **one would know about the function of components** and how to build different smaller scale circuits with them.

In the intermediate level, electronic topics become wider and slightly more difficult to understand. Therefore, building the relevant circuit of every topic is crucial to a deep understanding of higher level discussions and problems later on.

## DIFFICULTY LEVELS

# ADVANCED

**THE ADVANCED** level in electronic engineering field belongs to individuals whom have finished their bachelors or masters in electronic engineering and have finished quite a few projects in this field.

**Such engineers are capable of designing and repairing high-level electronic systems** and have no problem tackling different types of electronic circuits. They can learn the methods of repair very quickly and benefit the most from our courses.

As a result of their advanced level of knowledge, it helps to save time when explaining different methods of repair and advanced circuitry.

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# INTRODUCTION

**P**rinted Circuit Boards (PCB) have come a long way since they were invented back in 1936 in Vienna. At the time the concern was to organize the messy wires that connected each node individually and took a considerable amount of time to do so. PCBs managed to address those concerns just as mass prints addressed the concerns of publishing newspapers and books. Organized the wires (words) and made it easier to copy the circuitry.

Today, PCBs are still doing more of the same. However **their complexity has increased tremendously in terms of the number of connections they support**, and the number of layers they have. A computer or cellphone's motherboard can have as many as 20 layers within. Each layer addressing a different set of connections with regards to a specific RF standard.

**As PCBs have advanced**, the design techniques has evolved accordingly. So much so that designing complex computing PCBs of today manually on paper seems impossible. To design a modern PCB successfully, specific electrical rules need to be followed (for each layer) to yield a durable product with stable operation throughout its lifecycle. Aside from the electrical rules, there are numerous manufacturing (physical) rules that must be followed as well for a problem-free production with high success rate. Altium Designer provides the user with the option to view their board with all of the installed components in 3D. Which makes mechanical design of your product even easier.

### NOTES:

**\*This course has been designed for those whom are at the intermediate or higher levels.**

Upon successful completion of this course, you'll be able to master secrets of PCB design and produce economical Gerber files, suited for a smooth production. You will be able to turn complex schematics into beautifully designed PCBs and save time with auto-routing when possible.

Since PCB design can become incredibly quick and easy if you are familiar with and fluent in Altium Designer, we think that this is a course every electronic enthusiast or design engineer should take.

This course would suite those individuals whom are in need of designing their own PCBs. Be it for DIY projects or mass production of a new product. If you need to design a PCBs, this is the right course for you.



## TARGET AUDIENCE

**Engineers whom have just graduated from electrical / electronic engineering would benefit from this course as well.** The positions available for a PCB designer are highly paid positions and professional PCB designers aren't easy to find.

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# THE SYLLABUS

01

## PCB DESIGN PROCESS

02

## THE PCB EDITOR WORKSPACE

- PCB Editor Panel
- Using the Panel to Browse
- Preferences Dialog Box
- Document Options Dialog Box
- The PCB Coordinate System
- Grids
- Shortcut Keys for Setup Options

## CREATING A NEW PCB

- Printed Circuit Board Wizard

03

## 04

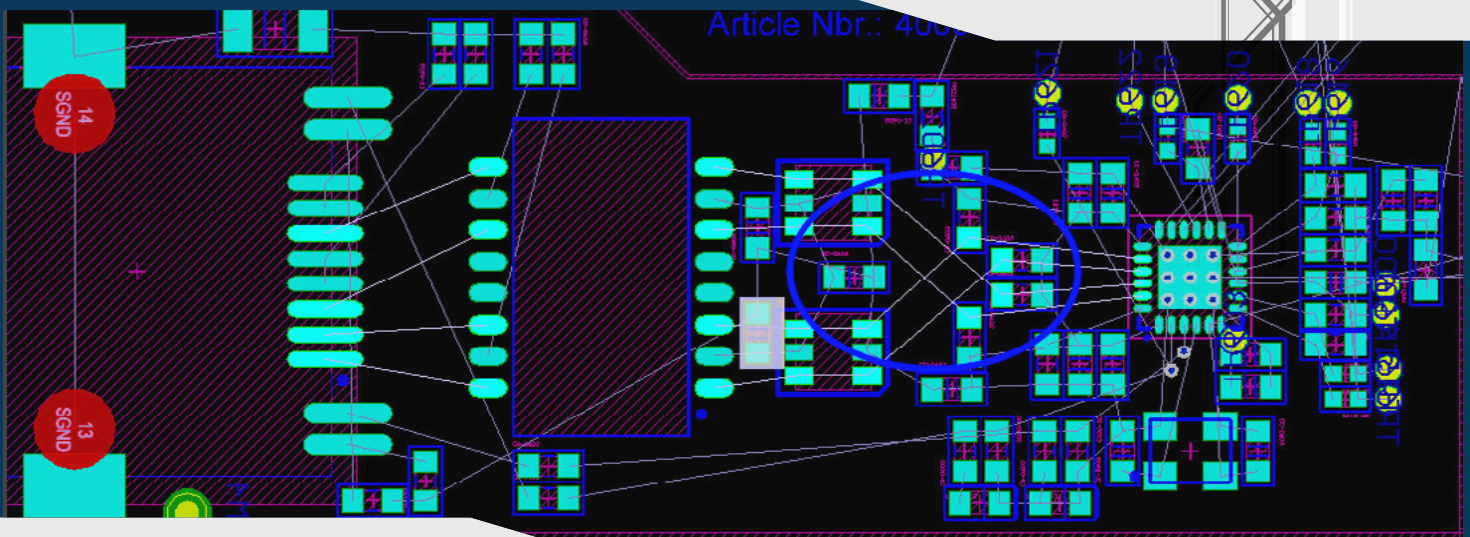
## TRANSFERRING DESIGN INFORMATION TO THE PCB

- Design Synchronization
- Resolving Synchronization Errors
- Summary
- Cross Reference File
- Design Transfer Using a Netlist
- Cross Reference file
- Editing Netlist Macros
- Executing the Netlist Loading

## SETTING UP THE PCB LAYERS

## 05

- Layer Definitions
- Layer Stack Manager
- Defining Mechanical Layers
- Internal Power Planes





# 06

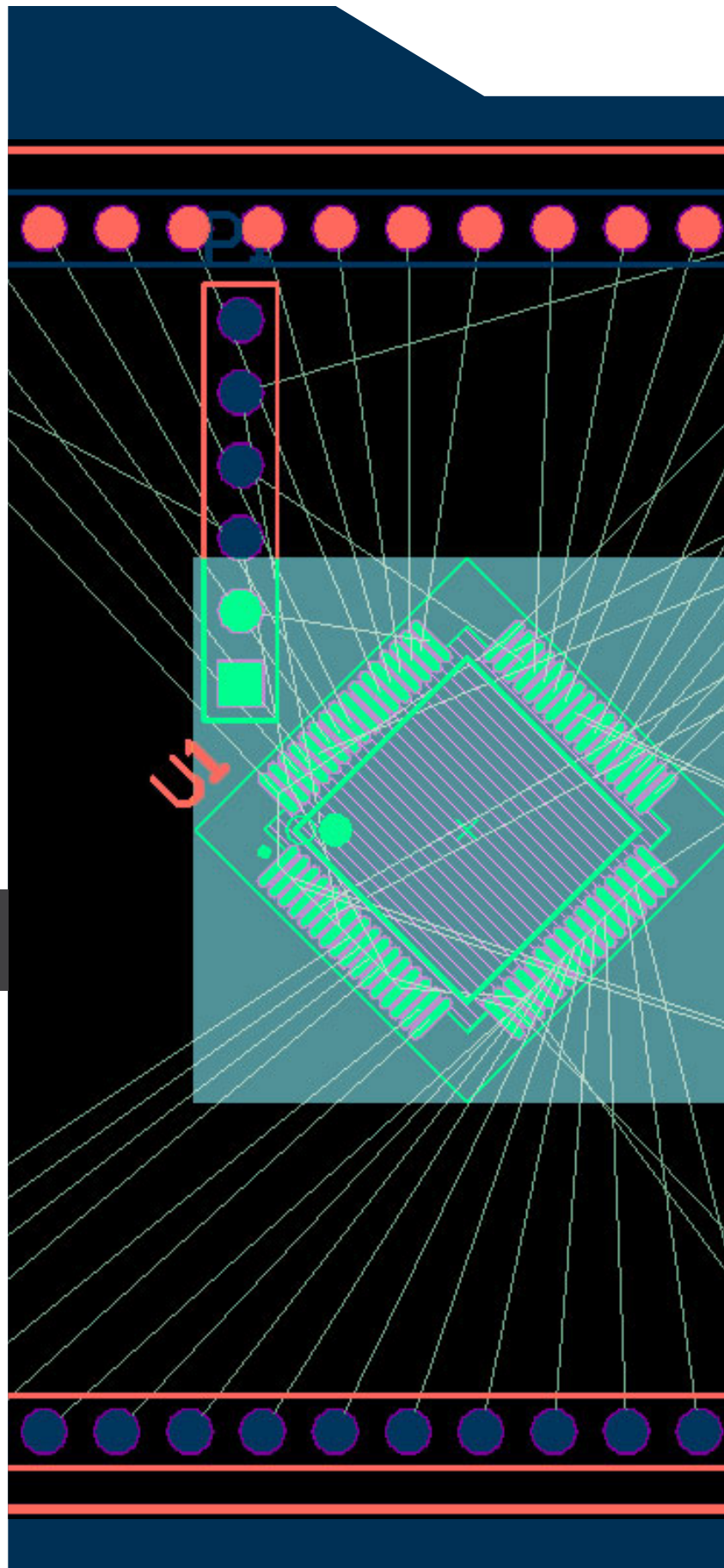
## SETTING-UP DESIGN RULES

- Adding Design Rules
- Object Set
- Rule Type
- Scope
- Precedence
- Routing Rules
- Manufacturing Rules
- High Speed Rules
- Placement Rules
- Signal Integrity Rules
- Additional Information on Rules
- Object Classes
- From To's

# 07

## COMPONENT PLACEMENT TOOLS

- Placing Components with Predetermined Locations
- Moving Components
- Component Unions
- Rooms
- Component Placement Grids
- Density Map
- Interactive Placement Commands
- Auto Placement
- Re-Annotation



## 08

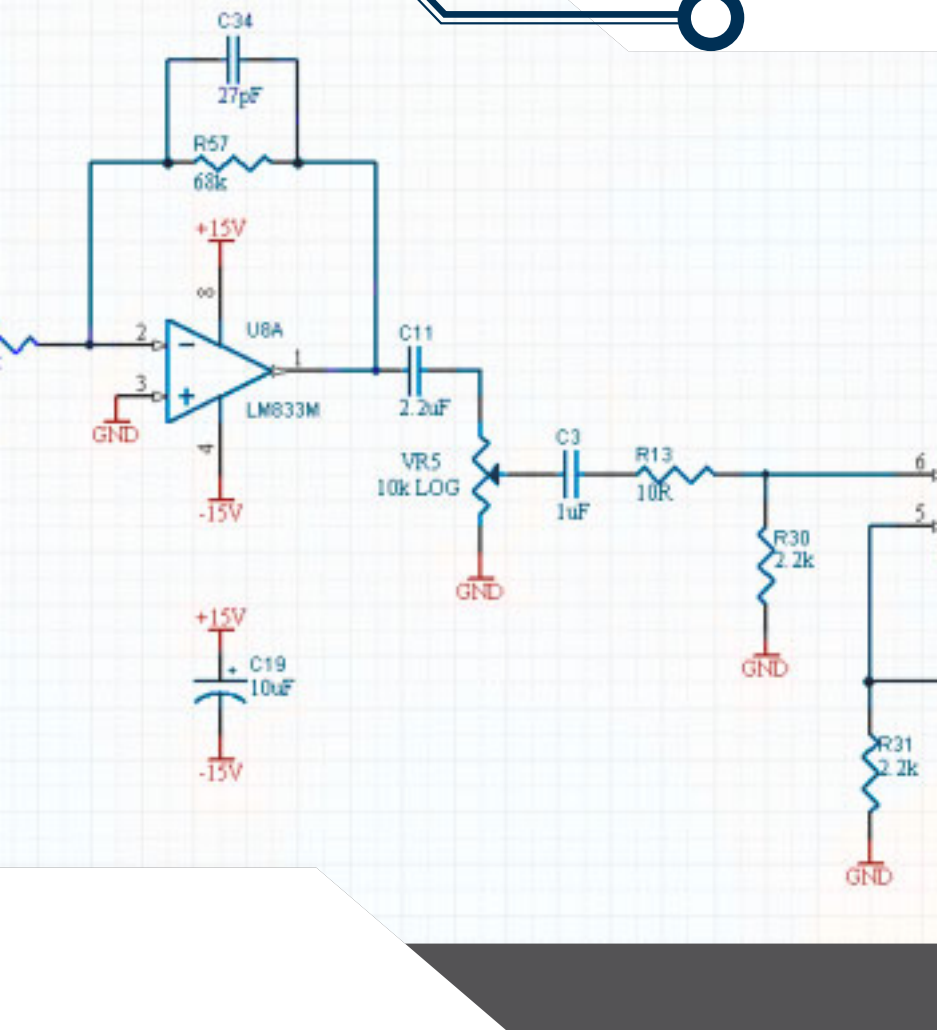
## ROUTING

- Managing Connectivity
- Track Width
- Interactive Routing Mode
- Look Ahead Routing
- Interactive Routing Properties
- Loop Removal
- Automatic Routing
- Setting Up the Automatic Router
- Auto-router Options

## 09

## POLYGONS

- Placing a Polygon
- Editing a Polygon
- Moving a Polygon
- Editing Polygon Vertices
- Deleting a Polygon
- Exercises - Working with Polygons



# 10

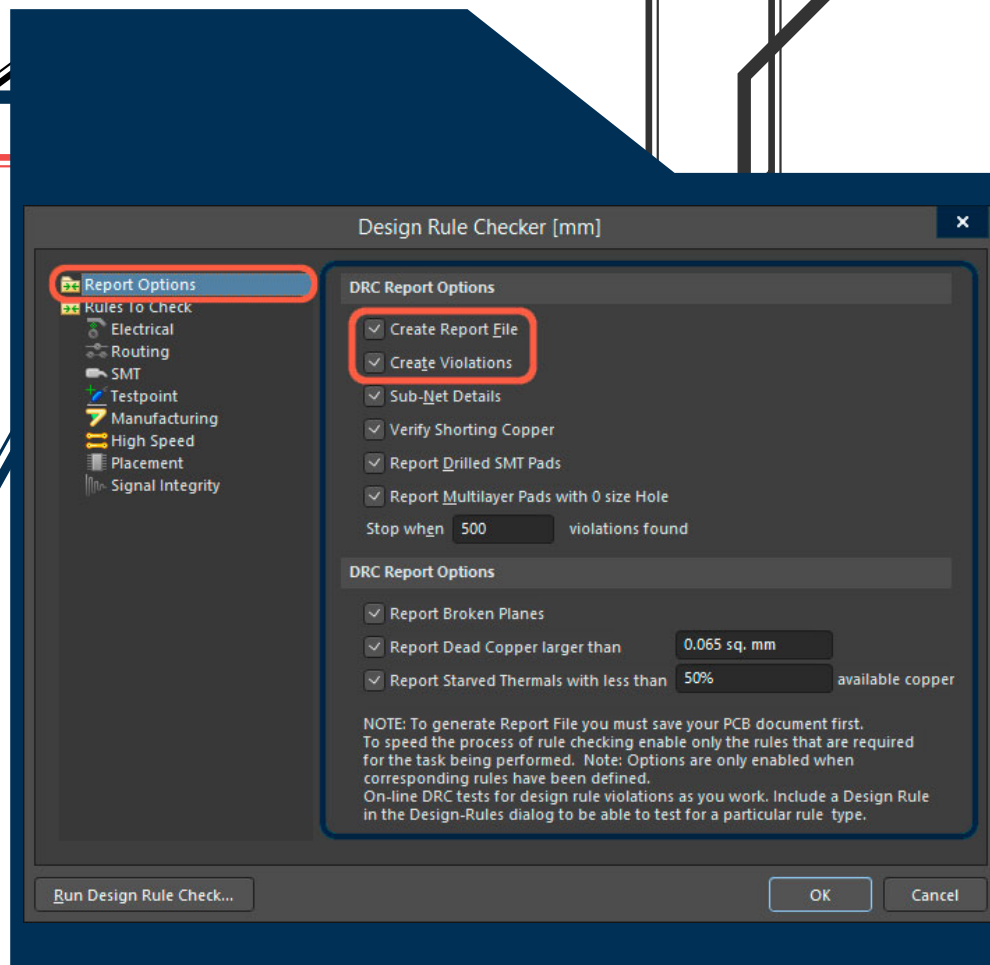
## DESIGN RULE CHECKING

- On-Line DRC
- Design Rules Check Report
- Locating Design Rule Violations
- Exercise

# 11

## PRINTING

- Running Print Preview
- Setting Scale and Orientation and Printer Options
- Copying Print Preview to the Window Clipboard
- PPC Documents



## CAM MANAGER

- Bill Of Materials
- DRC
- Gerber
- NC Drill
- Pick and Place
- Test Point Report

12

13

3D VIEWER

15

14

## PCB LIBRARY EDITOR

## SHORT CUT KEY SUMMARY

- The PCB Library Workspace
- PCB Library Editor Panel
- Creating a Component Using the Component Wizard
- Manually Creating a Component
- Copying a Component
- PCB Design Training Manual
- Special Strings in the Library Editor
- Component Rule Check
- Exercise - Libraries and Components

# TRAINING SCHEDULE

## ITEMS

LESSON  
DURATION  
QUIZ TIME

: 4 LESSONS A DAY  
: 3 DAYS  
: 2 TIMES A DAY (TOTAL OF 6  
QUIZZES FOR 3 DAYS)

LUNCH TIME

: 1230 - 1330 (1 HOUR)



## NOTES

1. There are 2 quizzes taken from the participant each day. One is before lunch and the other before the ending of the training day.
2. A day of absence will require the participant to join the next course for that particular day. Same applies to half day of absence.
3. The last 15 minutes of the training session (1645 - 1700) is for reviewing what been taught.
4. There is a 15 minutes break in between each class and the lunch time if from 1230 - 1330.
5. The training course book, quizzes, components and tools are provided by FICTRON.
6. Every skill that is taught is practiced and built to ensure a full understanding of subject matter.

# ITINERARY / EVENT

## DAY 1 - 3

0915 - 1045 (1 HOUR 30 MINS)

- **LESSON**

1045 - 1100 (15 MINS)

- **BREAKTIME**

1100 - 1230 (1 HOUR 30 MINS)

- **LESSON**
- **QUIZ**

1230 - 1330 (1 HOUR)

- **LUNCH**

1330 - 1500 (1 HOUR 30 MINS)

- **LESSON**

1500 - 1515 (15 MINS)

- **BREAKTIME**

1515 - 1645 (1 HOUR 30 MINS)

- **LESSON**
- **QUIZ**

1645 - 1700 (15 MINS)

- **LESSON REVIEW**

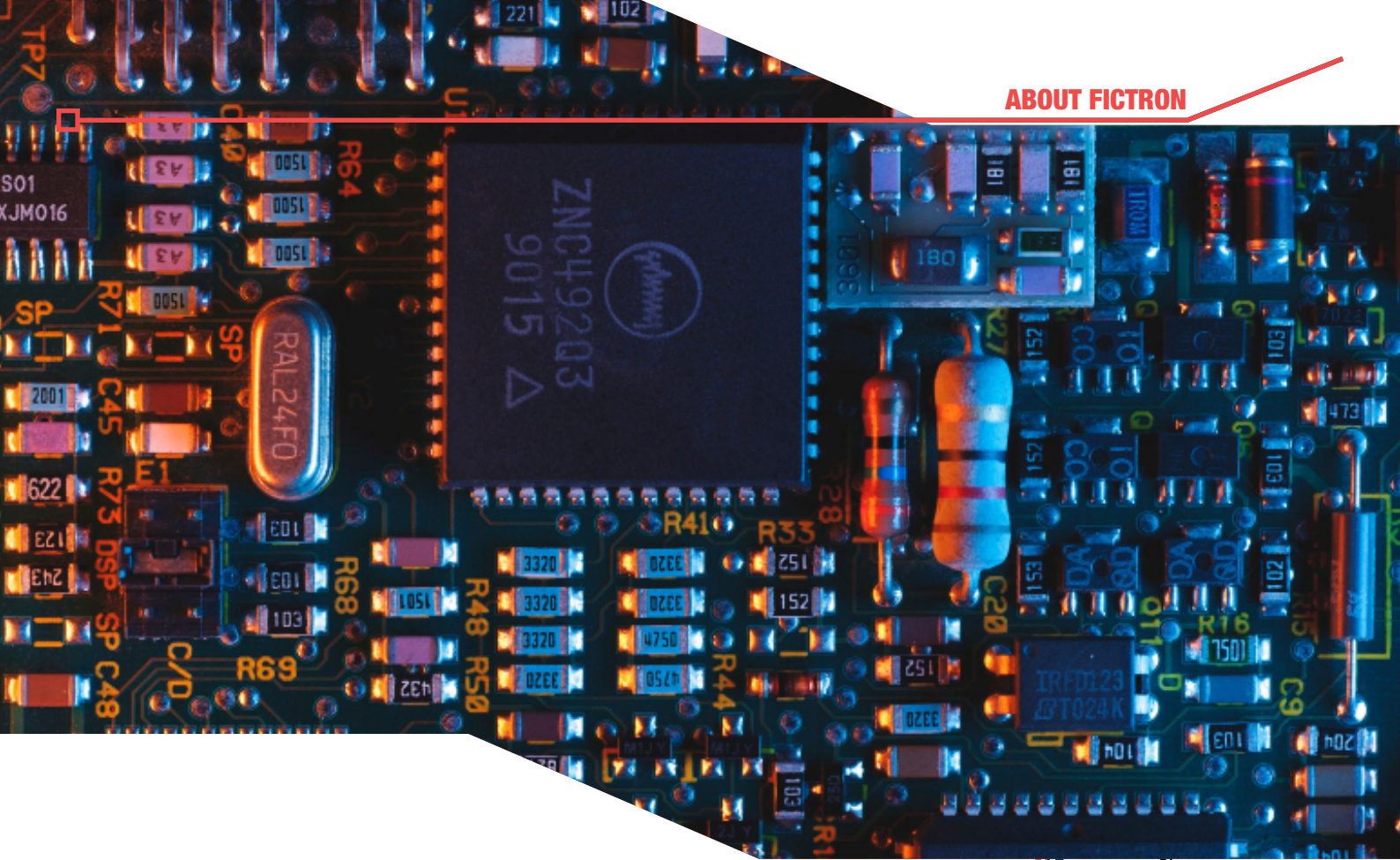
# ABOUT FICTRON

## INTRODUCTION

**FICTRON INDUSTRIAL SUPPLIES** has had extensive experience in repairing industrial electronic Motor Drives, PLC systems, Servo Systems as well as Human Machine Interfaces.

Our engineers are trained in Germany and we are the authorized repair center for **KEB Automation KG**. As an industrial solution provider, we believe in an open market whereby the repair information is shared for the greater good of industrial electronics and ease of operation for local factories.





## REPAIR EXPERTISE

### FICTRON

- On-site
- In-house
- Rush repair
- 10+ years experience
- KEB GMBH certified
- Parameter setting
- PLC projects and back up
- & many more

## AWARDS

- **16th** Asia Pacific International Honesty Enterprise - Keris Award
- **15th** Asia Pacific International Entrepreneur Excellence Award
- **2th** Top Global Brand Leadership Excellence Award
- **World** Confederation of Businesses - Worldcob-Biz 2019 Award





# ABOUT IRS

## INTRODUCTION

**IRS TRAINING SDN BHD**, est. in 1997 has been a pioneer in delivering Creativity and Competency based trainings throughout Malaysia and Asia Region. Consistently known for delivering excellent creativity training programs such as **Edward De Bono's Six Thinking Hats & Lateral Thinking**, is also known for LEGO Serious Play and Game Storming. Additionally, IRS is also currently moving into innovative and creativity application on team namely Four Sight Toolset and Mindset certification. Locally, IRS Training is famous for their HRDF Train the Trainer, Evaluation on Effectiveness of Training, Master Trainer and Training Needs Analysis programmes.

**IRS** believes that in today's era of **VUCA**, there's no other way but to reinvent. We need to engage, embrace, and adopt new ways of learning and working with the latest and emerging technologies. Digital transformation allows us to achieve sustainable advantage we can have over others. As a testament for its effort in consistently providing and delivering quality training programmes, IRS won **SME Awards 2009 for Best Brand in Services Management and Minister of Human Resource Award 2012**.



## TRAINING PROGRAMME

- **FOURSIGHT** Certification
- **De Bono** Creativity Programs
- **Lego Serious Play** Training Methodology
- **Game Storming Training** Methodology
- **IRS Public Course** Series – IR4.0
- **HRDF** Train The Trainer
- **HRDF Evaluation** On Effectiveness Of Training (EET)



## QUALIFICATION

**Registered Training Provider** with Pembangunan Sumber Manusia Berhad (PSMB) since 1997 - No.0281 ClassA;

- Approved HRDF TTT, EET, Master Trainer & TNA Consultant for PSMB
- Approved Training Partner for Certification Courses
- Approved Training Partner for SMETAP & PKS programmes

Registered as an Accredited Centre (Pusat Bertauliah) under JPK / DSD (L02279)

Registered with Ministry of Finance “Pendaftaran Kontraktor” – No.357 - 0002287070

Registered with Perbadanan Produktiviti Malaysia (MPC) – 42L-PLPS

Authorised Representative for FOURSIGHT Certification Tools of Thinking and Innovation

Facilitator for LEGO Serious Play Training Methodology

Authorised Representative of Edward de Bono’s Thinking Systems™

Authorised Provider for Australia Certification Courses (i.e. Certificate IV, Diploma and Advanced Diploma Programmes) accredited by ASQA (Australia Skills Quality Authority).

A Centre for RPL (Recognition of Prior Learning)



## AWARDS

- Winner of **Human Resource Minister Award 2012**
- Awarded The **Brand Laureate SMEs Chapter Awards 2009**
- Awarded the Certificate Of Appreciation for Human Resources Development 2009/2007
- One of the active and recognised provider in Edward de Bono's Thinking Systems™ and the first in Malaysia
- The **Brand Laureate Best Personality Award in 2006 for Dr. Edward De Bono**

# THE INSTRUCTOR

## MR AMIN IZADYSADR



Who is an electronics prodigy from Iran with extensive hands-on design and research experience in the **Electronics field**. He started building his first electronics circuit when he was 7 years old.

He is extremely well-versed with years of experience in PCB Design with Altium, electrical wiring, programming with PIC Basic Pro & Bascom, service and repair of home appliances, car audios, power supplies, portable amplifiers and many more skills acquired through strong desire to learn, love for knowledge, courage and strict discipline in experimenting and R&D. He is certified in **PLC Automation S7 3000, AVR Microcontroller and Digital Circuit Design**.

To learn more about him check out his recently-launched blog at [www.elisha.network](http://www.elisha.network)

## INFORMATION

Please **CLICK HERE** to download the registration form & learn about the pricing. Kindly fill it up and fax / e-mail it to us.

You can register 2 weeks earlier prior to the Training Date to benefit from an earlybirds discount!

Liking our **FACEBOOK PAGE** will entitle you to 2% discount as well!

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## QR CODE



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## WEBSITE

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## BUSINESS HOURS

Monday - Friday  
9:00 AM - 6:00 PM  
Saturday - Sunday Closed

**\*Closed on Public Holiday**

**CONTACT US**