PROPOSAL SUBMISSION GUIDELINE

2.1 Company & Employee Detail

a) HRDCorp registered company
Non-registered company to refer employersupport@hrdcorp.gov .my for registration.
b) Cover letter
c) Readiness Assessment (RA) report
d) Employees' detail
   i. Name:
   ii. IC No:
   iii. Nationality:
   iv. Age:
   v. Qualification:
   vi. Years in service:
   vii. Current position:

2.2 Training Provider / Vendor Detail

a) Training Provider's Profile

1.	TP name	Selangor Human Resource Development Centre
2.	MyCOID	5196/92
3.	Address	No 1, Ground Floor, Block 2, Pusat Perniagaan Worldwide, Jalan Tinju 13/50, Section 13, 40100 Shah Alam, Selangor.
4.	Contact details	T: 03 5513 3560 E: info@shrdc.org.my W: www.shrdc.org.my

b) Training Provider registered with HRDCorp: Yes
c) Justification if non-registered training provider / vendor engaged: N/A
d) Trainer's profile

Program/Course	*Trainer/s*
Smart Factory Technical Overview: Enabling Technologies for Industry	• Chua Wen-Shyan PhD, HRDF TTT certified (https://capai.hrdf.com.my/verify?id=3446e1e1-cc2e-44ac-9ace-3525976bb8b9)
Data Generation	• Chooi Yu Chong, HRDF TTT certified https://capai.hrdf.com.my/verify?id=3a03498e-b851-4bf7-b786-7bdd4044a4a4
Digital Factory Essentials for Lean – Industry 4.0	• Noor Zamri B Sudin HRDF TTT Exemption Cert No 4072
Data Analytics Essential	• Nur Hanani, HRDF TTT Certified https://capai.hrdcorp.gov.my/verify?id=45ac411f-a50c-4865-8a49-7c02c87383fe

e) Record of past performance

Since 2018, SHRDC has been providing Industry 4.0 competency-based technical training programs with minimum of 50% hands-on modules.

Total trained to date: 266

No	Program	Scheme/Funding	Pax (2018 – YTD January 2022)
1.	Cyber Physical System (CPS) based Automation	SBL/Company funded	6
2.	Cyber Physical System (CPS) based Communications	SBL/Company funded	6
3.	Cyber Physical System (CPS) based Drives and Sensors	SBL/Company funded	7
4.	IoT Gateway	SBL/Company funded	7
5.	PLC Essentials Fundamental	SBL/Company funded	10
6	PLC Essentials Intermediate & Advanced	SBL/HRDF INDCERT	24
7.	Data Generation	SBL/Company funded/HRDF INDCERT	124
8.	Overall Equipment Efficiency (OEE) for Smart Factory	HRDF INDCERT	27
9.	Data Analytics Essential	SBL/Company funded	18
10.	Technical Overview for Smart Factory	SBL/Company funding	60
11.	Industry 4.0 for SME - Get Started with Smart Factory	HRDF SME Skills Training	22
12.	Transforming Factory with Smarter Assembly & Logistics Training	SBL/Company funded	52
13.	Machine Data Logging and Visualization		39
1.	Smart Factory Technologies for Industry	RiSE4WRD 2020	85
2.	Data Generation	RiSE4WRD 2020	39
3.	Machine Data Logging and Visualization	RiSE4WRD 2020	28
4.	Data Formulation OEE	RiSE4WRD 2020	6
5.	Data Analytics Essential	RiSE4WRD 2020	13

f) Schedule of Prices

No	Program	Per pax (RM)	Total pax	Sub total
1.	Smart Factory Technical Overview: Enabling Technologies for Industry	2500		
2.	Data Generation	5000		
3.	Digital Factory Essentials for Lean – Industry 4.0	5000		
4.	Data Analytics Essential	5000		
TOTAL				

2.3 Programme / Course Detail

a) Programme/Course Title

Program/Course
Smart Factory Technical Overview: Enabling Technologies for Industry
Data Generation
Digital Factory Essentials for Lean – Industry 4.0
Data Analytics Essential

b) Level

Program/Course	*Level*
Smart Factory Technical Overview: Enabling Technologies for Industry	Beginner
Data Generation	Intermediate
Digital Factory Essentials for Lean – Industry 4.0	Intermediate
Data Analytics Essential	Intermediate

c) Course Duration

Program/Course	*Duration (day) (9am – 5pm)*
Smart Factory Technical Overview: Enabling Technologies for Industry	2 Days
Data Generation	5 Days
Digital Factory Essentials for Lean – Industry 4.0	5 Days
Data Analytics Essential	5 Days

d) Venue

Program/Course	*Venue*
Smart Factory Technical Overview: Enabling Technologies for Industry	SHRDC Shah Alam / Remote Online Training
Data Generation	SHRDC Shah Alam / Remote Online Training
Digital Factory Essentials for Lean – Industry 4.0	SHRDC Shah Alam / Remote Online Training
Data Analytics Essential	SHRDC Shah Alam / Remote Online Training

e) Type of each course; Classroom / E-learning / Blended / Coaching / Development / Visual / Remote.

Program/Course	*Type of course*
Smart Factory Technical Overview: Enabling Technologies for Industry	Classroom / Remote Online Training
Data Generation	Classroom / Remote Online Training
Digital Factory Essentials for Lean – Industry 4.0	Classroom / Remote Online Training
Data Analytics Essential	Classroom / Remote Online Training

f) Certification or non-certification:

Program/Course	*Type of course*
Smart Factory Technical Overview: Enabling Technologies for Industry	Certification, Swiss Smart Factory
Data Generation	Certification, Swiss Smart Factory
Digital Factory Essentials for Lean – Industry 4.0	Certification, Swiss Smart Factory
Data Analytics Essential	Certification, Swiss Smart Factory

g) Certificate level & certification body - Please specify the course certification and its certification body with certificate copy/evidence (for course with certification only)

Program/Course	*Certification/s*
Smart Factory Technical Overview: Enabling Technologies for Industry	• Certificate of Completion awarded by the Swiss Smart Factory • Certificate of Attendance awarded by SHRDC
Data Generation	• Certificate of Competence awarded by the Swiss Smart Factory • Certificate of Attendance awarded by SHRDC
Digital Factory Essentials for Lean – Industry 4.0	• Certificate of Competence awarded by the Swiss Smart Factory • Certificate of Attendance awarded by SHRDC
Data Analytics Essential	• Certificate of Competence awarded by the Swiss Smart Factory • Certificate of Attendance awarded by SHRDC

h) Course overview including how important is the skills required for employee in addressing the technology gap.

Program/Course	*Skill Focus Area*
Smart Factory Technical Overview: Enabling Technologies for Industry	Smart Factory Architecture, Industrial Internet of Things (IIoT), Data Automation, Data Analytics (overview level)
Data Generation	IIoT & Data Automation
Digital Factory Essentials for Lean – Industry 4.0	Advanced Simulation & Process Modelling and Optimization
Data Analytics Essential	Data Analytics
Program/Course	*Justification*
Smart Factory Technical Overview: Enabling Technologies for Industry	Participants would acquire the knowledge and technology know-how on the enabling technologies related to Industry 4.0 for Smart Factory integration. The participants would also identify the benefits and capabilities of Industry 4.0, how to leverage on the power of data, connectivity & related technologies to improve competitiveness and efficiency for manufacturing organisations. The session would also provide the information on the industrial pathways and platforms available for industries to explore to achieve sustainable digital transformation.
Data Generation	Participants will acquire the technical skills and competencies that will enable them to effectively evaluate and support appropriate manufacturing execution system (MES), including monitoring of machine status and performance, that is deemed suitable for their respective production processes.
Digital Factory Essentials for Lean – Industry 4.0	Participants will acquire the technical skills and competencies that will enable them to effectively implement Lean Manufacturing principles while designing their manufacturing layout and implement the relevant smart manufacturing technologies to visualize and analyze the production analytics. Participants would then be able to implement a combination of Lean – Industry 4.0 methodologies to optimize their production processes and improve productivity and efficiency.

Data Analytics Essential	Participants will acquire the technical skills and competencies that will enable them to visualize and gain insights from the data collected from their operations and analyze them. Participants will be able to conduct a thorough analysis on the data and implement the necessary algorithms for them to gain better insight on the data through trend analysis and forecasting. This would allow the participants to make intelligent and informed business decisions on suitable datasets (correlation and trends of the entire supply chain) through data-driven methodologies which can be included in MES and ERP systems.

i) Course objectives

Program/Course	*Course objectives*
Smart Factory Technical Overview: Enabling Technologies for Industry	• Overview of Industry 4.0 • Overview of the Smart Factory Concept, Architecture and Strategies • Data Automation and Analytics for Smart Factory • Data Formulation Strategies: Overall Equipment Effectiveness (OEE) • Hands-on Technology Demonstration of a Smart Factory and Digitalization Methodologies
Data Generation	• Configuration and set up of the IoT Gateway network • Configuration and set up of the flow-based development tool, Node-Red • Connect sensor(s) and the IoT Gateway to a PLC Controlled tower light system • Utilise Node-Red to read data from the sensor module and setup a data visualization dashboard • Implement MQTT with Node-Red to send data to mobile App or Web browser to generate notifications and alerts.
Digital Factory Essentials for Lean – Industry 4.0	• The program provides a hands-on approach technical training towards configuration and set up of the Digital Factory for Smart Manufacturing Processes. • This program applies and enhances the concept of Lean Manufacturing to improve productivity and manufacturing efficiency through Digital Factory tools. • The production statistics and analytics generated from the digital factory tool and environment will be further analyzed to improve the manufacturing processes through the implementation of virtual factory commissioning to support a cost effective and sustainable factory transformation.
Data Analytics Essential	• Overview of Machine Learning and Data Mining Process • Data Exploration • Machine Learning Algorithms • Decision Tree and Overfitting • Production Quality Prediction and Dashboard (Visualization) • Overfitting and Feature Reduction • Overview of Machine Learning Tools and Platforms

j) Course content and learning outcome to accomplish for each course.

Program/Course	*Course content*	*Learning Outcomes*

Smart Factory Technical Overview: Enabling Technologies for Industry	• Overview of Industry 4.0
	  ○ Introduction of Industry 4.0
	  ○ The Pillars of Industry 4.0
	  ○ Industry 4.0 Maturity Index
	• Overview of the Smart Factory Concept, Architecture and Strategies
	  ○ Smart Factory Concept
	  ○ The Smart Factory System Architecture
	  ○ The Integration of Technologies towards a Smart Factory
	  ○ The Open Innovation and Collaboration Concept and Strategy towards sustainable digital transformation
	• Data Automation, Visualization, and Analytics for Smart Factory
	  ○ Data Automation Maturity Levels
	  ○ Data Acquisition Strategies
	  ○ Data Storage and Visualization Strategies
	  ○ Data Analytics Strategies
	• Data Formulation: Improving Productivity and Efficiency
	  ○ Introduction to Overall Equipment Effectiveness (OEE)
	  ○ Calculating the Equation of Effectiveness
	  ○ The Concept of 6 Big Losses in Manufacturing
	• Data Formulation: Improving Productivity and Efficiency (Continued)
	  ○ Condition Monitoring Strategies for Smart Factory
	  ○ Predictive Maintenance (PdM) Strategies for Smart Factory
	• Technology Demonstration for Smart Factory and Digitalization Methodologies
	  ○ Technology Enablers and Tools to Kickstart your Industry 4.0 Journey
	  ○ Industrial Applications Pathway for Industries
	• Industry4wrd
	  ○ What's in place for SME manufacturers
	  ○ Moving Forward with People, Process, Technology after Readiness Assessment Programme.
		✓ Describe the fundamentals of Industry 4.0 and the concept and strategies of a Smart Factory
		✓ Describe the methodologies and strategies for Data Automation and Analytics towards a Smart Factory
		✓ Identify the enabling technologies of a Smart Factory
		✓ Describe the fundamentals of Overall Equipment Effectiveness (OEE)
		✓ Identify the importance of Data Formulation and OEE towards improving productivity and efficiency for a manufacturing operation
		✓ Identify the benefits of integrating Data Automation and Visualization strategies for a Smart Factory
		✓ Identify the enabling technologies of a Smart Factory
		✓ Better understanding on

		nationwide initiatives in driving the manufacturing sector towards digital transformation – Industry4wrd

Data Generation	• Introduction to Smart Factory Operational Technology (OT)
	  ○ Overview of Operational Technology in Smart Factory
	  ○ Demonstration of Operational Technology with PLC-based system
	• Connecting sensor(s) and IoT Gateway to PLC controlled tower light system
	  ○ Introduction to IoT Gateway and Network
	  ○ Hands-on connecting sensors and setting up IoT Gateway Networks
	• IoT Gateway Setup - (network setup) - Continued
	  ○ Introduction to IoT Gateway and Network
	  ○ Hands-on connecting and setting up IoT gateway Networks
	• Node-Red Setup - installation in Windows
	  ○ Introduction to Node-Red and software requirements
	  ○ Hands-on node.js and Node-Red installation
	• Node-Red familiarization
	  ○ Hands-on start up and accessing Node-Red web interface via web browser
	  ○ Familiarizing with Node-Red platform and environment
	• Using Node-Red to read data from sensor module
	  ○ Hands-on configuring Node-Red nodes and viewing its output
	  ○ Hands-on to complete task of creating a Node-Red flow/program
	• Using Node-Red to setup data visualization on web browser
	  ○ Hands-on configuring dashboard nodes
	• Using Node-Red to setup data visualization on web browser (continued)
	  ○ Hands-on to complete tasks provided
	  ○ Hands-on arranging and formatting the display of dashboards items in Node-Red
		✓ Connect sensors and IoT Gateway
		✓ To read data from the sensor module and setup a data visualization dashboard
		✓ To send data to mobile App or Web browser to generate notifications and alerts
		✓ Able to effectively collate data from existing machines that are part of a manufacturing process.

	• Implementing MQTT with Node-Red to send data
	  ○ Hands-on creating Node-Red flow to read data from sensor using MQTT node
	• Implementing MQTT with Node-Red to send data to Web Browser to create notification alert
	  ○ Hands-on creating Node-Red flow to read data from sensor using MQTT node and send to web browser for notification
	• Implementing MQTT with Node-Red to send data to mobile App to create notification alert
	  ○ Hands-on creating Node-Red flow to read data from sensor using MQTT node and send to mobile app for notification
	• Hands-on practical assessment (tear down and do-over)	

Digital Factory Essentials for Lean – Industry 4.0	Introduction to LEAN Manufacturing • Lean principles • 7 wastes of Lean • MURA • MURI LEAN concepts/methods: • Continuous flow • Pull systems • Job Element analysis • Arrow diagram • Value Add • Non-Value Add • Skill mapping Integrating Lean-Industry 4.0: Benefits of implementing Lean Manufacturing using enabling technologies of Industry 4.0. Lean Manufacturing using Digital Factory Tools. • Case Study 1 • Case Study 2 • Case Study 3 • Case Study 4 • Case Study 5 Discussion on Production Layout Optimization using Lean Manufacturing Principles. Designing a digital factory using Digital Factory Tools: • Introduction to the Digital Factory Software ○ Application layout	✓ Identify the relevant lean manufacturing principles for manufacturing processes ✓ Identify wastes in manufacturing processes ✓ Utilize lean manufacturing methodologies to improve manufacturing process efficiency and productivity ✓ Utilize digital factory tools to visualize the manufacturing performance and improvement using lean manufacturing methodologies. ✓ Identify the importance of digital factory tools and the benefits of virtual commissioning towards

	○ Home tab ○ Process tab ○ Modelling tab ○ Program tab ○ Drawing tab • Layout configuration ○ Loading existing layout ○ Creating new layout ○ Navigation tools • Resources in Process modelling ○ Human worker ○ Mobile robots ○ Robots ○ Vehicles • Transport controller • Pathway and resource position • Idling and charging of resources Design a digital factory using Digital Factory Tools (continued): • Process modelling workflow ○ Layout design: ▪ Stations ▪ Machines ▪ Transportation ▪ Pathway ▪ Resources ○ Define products to be assemble ○ Define processes of assembly line Design a digital factory using Digital Factory Tools (continued): • Process modelling workflow (continued) ○ Define flow of assembly line ○ Run Simulation Production Statistics for Analysis: • Production Statistic dashboard: ○ Charts ○ Viewing data • Export of production statistic and analytics ○ Printing ○ Exporting Assessment: • Participants would be given a case study scenario to develop a digital factory using Lean Manufacturing Principles and analyze the production analytics to improve the design and optimize the manufacturing	integrating a simulation-driven manufacturing process for production process optimization ✓ Configure and setup digital factory models of manufacturing process for production planning and optimization ✓ Identify areas of improvements through virtual commissioning of a manufacturing process in a digital factory.

	processes for Lean-Industry 4.0.	

Data Analytics Essential	• Overview of Machine Learning Data Mining Process
	  ○ Introduction to Machine Learning and Data Mining
	  ○ Data Mining Techniques
	  ○ Application in Smart Factory
	• Unsupervised and Supervised Learning
	  ○ Identify the difference between unsupervised learning and supervised learning
	  ○ Justification in using unsupervised and supervised learning
	  ○ Examples of unsupervised and supervised learning
	• Linear Regression
	  ○ Linear Regression with One Variable
	  ○ Linear Regression model and example
	  ○ Linear Regression with Multiple Variables
	  ○ Multiple Regression model and Example
	• Data Cleaning and Visualization
	  ○ Hands-on session on data cleaning and visualization
	• Correlation
	  ○ Relationship between parameters
	  ○ Scatterplot
	  ○ Correlation Matrix
	• Accuracy Measures
	  ○ Data Evaluation
	  ○ Confusion Matrix
	  ○ Coefficient of Determination
	• Model Evaluation
	  ○ Preprocessing of data
	  ○ Justification
	  ○ Measurement Accuracy
	• Data Combination and Dashboard
	  ○ Hands-on session on data combination and dashboard
	• Overview of Machine Learning Algorithms
	  ○ K-Means Cluster
	  ○ Linear Regression
	  ○ K-Nearest Neighbor
	  ○ Decision Trees Algorithms
	  ○ Random Forest
	  ○ Classification Tree
	• Prediction and Model Evaluation
	  ○ Hands-on session on prediction and model evaluation
	• Decision Trees Algorithms
	  ○ Algorithms to build a decision tree
		• Able to apply basic knowledge, techniques, and tools for machine learning
		• Able to apply machine learning algorithms - Linear Regression, Decision Trees, Random Forest and K-Means.
		• Able to utilize data analytic tools to perform data exploration, preparation, and develop models to visualize the useful information from a dataset.
		• Able to create and evaluate a suitable model, discover overfitting, scoring, and make predictions based on the dataset analyzed.

	○ Computing variable importance in a Decision Tree • Clustering ○ Hands-on session on clustering • Production Quality Prediction ○ Understand the important parameters ○ Present findings using a dashboard • Overfitting and Feature Reduction ○ Overfitting ○ Feature reduction or dimension reduction ○ Hands-on session using manufacturing data • Overview of Machine Learning Platforms ○ Programming Languages for Machine Learning and Data Science ○ Libraries for Machine Learning ○ Batch and Stream Data Processing – Methods and Challenges • Assessment	

k) Skill Focus Area or IR4.0 Pillar

Program/Course	*Skill Focus Area*
Smart Factory Technical Overview: Enabling Technologies for Industry	Smart Factory Architecture, Industrial Internet of Things (IIoT), Data Automation, Data Analytics (overview level)
Data Generation	IIoT & Data Automation
Digital Factory Essentials for Lean – Industry 4.0	Advanced Simulation & Process Modelling and Optimization
Data Analytics Essential	Data Analytics

l) Duration of the course – Actual training days / hours with breakdown by each day

Program/Course	*Duration (day) (9am – 5pm)*
Smart Factory Technical Overview: Enabling Technologies for Industry	2 Days
Data Generation	5 Days
Digital Factory Essentials for Lean – Industry 4.0	5 Days
Data Analytics Essential	5 Days

m) Training Schedule

Program/Course	*Schedule*
Smart Factory Technical Overview: Enabling Technologies for Industry	Q1 – Q2 2022
Data Generation	Q1 – Q2 2022
Digital Factory Essentials for Lean – Industry 4.0	Q1 – Q2 2022
Data Analytics Essential	Q1 – Q2 2022

n) Training pre and post evaluation sample

1. SMART FACTORY TECHNICAL OVERVIEW: ENABLING TECHNOLOGIES FOR INDUSTRY PRE-POST ASSESSMENT – PDF file
2. DATA GENERATION PRE-POST ASSESSMENT – PDF file
3. DIGITAL FACTORY ESSENTIALS FOR LEAN – INDUSTRY 4.0 PRE-POST ASSESSMENT – PDF file
4. DATA ANALYTICS PRE-POST ASSESSMENT – PDF file