



## Open Calls

ZDMP – Zero Defects Manufacturing Platform – is a multi-partner project that aims at providing an open platform to support factories to reach a zero defects goal. In this context, ZDMP will allow end-users to interconnect their systems (e.g. shop floor and ERP Systems) through ZDMP Applications (zApps), to improve product and process quality assurance. ZDMP is funded by its 30 partners and the European Commission and runs from January 2019 until December 2022. It engages Users, Technology Providers, Consultants and Research Institutes from 11 countries with a total budget of 19M€.

ZDMP launches a €3.2 million Open Call funding opportunity on 1st March 2021 aimed at SME technology developers and manufacturers in Europe. The idea of the Open Calls is to attract Zero Defect ecosystem stakeholders, such as manufacturers with Zero Defect challenges, or developers with integratable or conceptual solutions to solve these problems or enriching their functionalities to reach Zero Defects Manufacturing Processes. The Open Calls are divided into two stages, the first one will be launched in March and the main aim is to develop, integrate, and validate components for the enhancement of the ZDMP platform. The second Open Call is more focused on the establishment of new zApps allowing the use of the ZDMP platform and its components to their full potential, as well as covering specific industrial needs. More details about both Open Calls are summarized in the table and we encourage you to check more information about the Open Calls, and register in the case of interest

<https://www.zdmp.eu/calls>

|                                 | Open Call 1                  | Open Call 2               |
|---------------------------------|------------------------------|---------------------------|
| Opens                           | 1 <sup>st</sup> March 2021   | 2nd August 2021           |
| Closes                          | 30th April 2021 - 17:00, CET | 30th Sept 2021 17:00, CET |
| Funding split                   | 1M€                          | 2.2M€                     |
| Funding range (per sub-project) | €50-150K                     | €50-150K                  |
| Sub-project start               | August 2021                  | January 2022              |
| Project duration                | 9 months (fixed)             | 9 months (fixed)          |
| Expected awards                 | 10                           | 20                        |

## Use Cases

ZDMP considers use cases in disparate manufacturing domains (from automotive to construction), trying to provide answers to common needs and similar problems. In turn, the extendable ZDMP platform aims at supporting factories with a high interoperability level to cope with the concept of connected factories to reach the zero-defects goal.



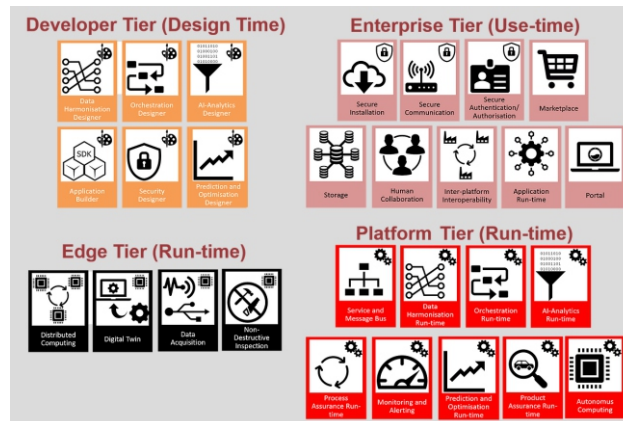
While the advantages of the Zero Defect Manufacturing Strategy are well known in every manufacturing sector, its implementation is not necessarily widespread in the operational environment. Thus, various application scenarios are considered:

| Domain                            | Scenario                                                                                                                                                                                                                                                   |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Engine block manufacturing        | <ul style="list-style-type: none"> <li>Defects detection and prediction in aluminium injection operations</li> <li>Defects detection and prediction in machining operations</li> <li>Defects reduction by optimization of the machining process</li> </ul> |
| Moulds manufacturing              | <ul style="list-style-type: none"> <li>Process alert system for machine tool failure prevention</li> <li>Smart process parameter tuning</li> <li>Moulds manufacturing</li> </ul>                                                                           |
| Electronic products manufacturing | <ul style="list-style-type: none"> <li>Component inspection</li> </ul>                                                                                                                                                                                     |
| Assembly line                     | <ul style="list-style-type: none"> <li>AI-supported optical defects detection</li> <li>Monitoring and control system</li> </ul>                                                                                                                            |
| Steel tubes production            | <ul style="list-style-type: none"> <li>Production monitor</li> </ul>                                                                                                                                                                                       |
| Stone tile cutting                | <ul style="list-style-type: none"> <li>Equipment wear detection</li> </ul>                                                                                                                                                                                 |
| Construction supply chain         | <ul style="list-style-type: none"> <li>Quality control at construction site</li> <li>Quality traceability</li> </ul>                                                                                                                                       |

## ZDMP Platform

The ZDMP Platform exists between the hardware and the application layers of the technology stack. The ZDMP Platform is based on a federated architecture, where all ZDMP components (zComponents) have been classified into several tiers:

- Developer Tier (Design-time):** Is used to create platform conformant containers that can be loaded onto the Marketplace. These containers are then instantiated and thus can be accessed as a service.
- Enterprise Tier (Use-time):** Implements domain-specific applications, decision support systems, and provides user interfaces to end-users. It implements the rules and control logic of the system and issues control commands to the platform and edge tiers.
- Platform Tier (Run-time):** Consolidates operation processes, performs data analytics, and transformation functions with respect to data flows.
- Edge Tier (Run-time):** Collects data from sensors, actuators, devices, control systems, or any asset in the proximity of the physical system, which are collectively called the edge nodes.



## zComponents

These zComponents facilitate the development, sale, and re-use of applications. This functionality and collaboration are enabled by a microservices architecture. To facilitate this architectural style the ZDMP platform utilises a RESTful APIs, Docker containers and a message bus. Key components are as follows:

| zComponent                 | Description                                                                                                                                                                                           |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data Harmonisation         | Ensures that data can be integrated using unified and standardised formats or the formats needed by the data recipient.                                                                               |
| Orchestration              | Allows to design and execute the BPMN processes.                                                                                                                                                      |
| AI-Analytics               | Deals with machine learning integration into ZDMP.                                                                                                                                                    |
| Application Builder        | Supports developers with a UI aiming to define, design, develop, and compose zApps.                                                                                                                   |
| Security Components        | Enables secure communication, secure installation of zApps, authentication/ authorization, risks identification, etc.                                                                                 |
| Storage component          | Data lake allowing persistence and processing the zComponents and zApp' data.                                                                                                                         |
| Non Destructive Inspection | Inspects products for detecting defects.                                                                                                                                                              |
| Monitoring and Alerting    | Responsible for allowing users to collect data points from machines, infrastructure and zApps, visualize them in a webbased UI and alert users and other zComponents, if KPI is out of the threshold. |
| Service and Message Bus    | Enables zApps and external platforms to use other zApps and Platform Tier components in a standardised and secure way.                                                                                |
| Data Acquisition           | Handles data from IoT sensors and other sources.                                                                                                                                                      |
| Marketplace                | Enables search for existing zApps based on various characteristics.                                                                                                                                   |
| Portal                     | Website for access to the ZDMP platform functionality.                                                                                                                                                |

### zApps

zApps typically provide a unique functionality, tailored for a specific purpose, or use case. Thereby they make use of zComponents such as the AI-Analytics Runtime, Storage etc.

| Focus Area                                                                                    | zApp Name                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Machine Learning-based quality control                                                        | zAnomalyDetector, zProductVersionControl, zRemoteQC                                                                                                                         |
| Digital Twins: Monitoring and simulation of IoT devices                                       | zDigitalTwin                                                                                                                                                                |
| Inventory and maintenance management                                                          | zAutomaticCall                                                                                                                                                              |
| Automatic material ordering                                                                   | zAutomaticMaterialOrdering                                                                                                                                                  |
| (Automatic) work rescheduling                                                                 | zRescheduler                                                                                                                                                                |
| Machine monitoring and parameter optimisation                                                 | zMachineMonitor, zMachineAnalytics, zParameterMonitor, zParameterAnalytics, zPowerManager, zCycleTimeManager                                                                |
| Manual and automatic Final Testing                                                            | zFeedbackMFT, zArtificialIntelligenceMFT, zFeedbackAFT, zArtificialIntelligenceAFT                                                                                          |
| Detection of product shape deviations                                                         | zSteelSheetWidthMonitor, zShapeTubeMonitor, zThicknessMonitor, zTilesConformity, zHorizontalWeldDetection, zVerticalWeldMonitor, zXRAYMonitor, zXRAYAnalytics, z3DGenerator |
| Detection of machine parts defects                                                            | zWiresMonitor, zWornOutBladeDetection                                                                                                                                       |
| Material tracking, documentation of material specifications and usage including location tags | zMaterialTracker, zMaterialID                                                                                                                                               |

### Dissemination

One of the project's main goals is to disseminate and publish project's results and ZDMP is pleased to publish an ever-growing set of blogs devoted to project related topics such as data usage ethics. These are available at <https://www.zdmp.eu/blogs>

Another important dissemination path is publications in research journals and conferences. See <https://www.zdmp.eu/papers-abstracts> which includes papers devoted to various topics, as for instance:

- Reference Models for Digital Manufacturing Platforms - Fraile F, Sanchis R, Poler R, Ortiz A. Journal paper (Applied Sciences).
- Cyber-Physical Systems: A Multi-Criteria Assessment for Internet-of-Things (IoT) Systems - Silva E, Jardim-Goncalves R. Journal paper (Enterprise Information Systems).
- A European Manufacturing Platform for Zero-Defects - Stuart CAMPBELL, Santiago CACERES, Gerardo PAGALDAY, Raul POLER, Ricardo GONÇALVES. Conference paper (IESA 2020).

### DMP Cluster Activities

The DMP (Digital Manufacturing Platforms) Cluster Strategy is based on collaborative topics to facilitate research and innovations in the domain of production technologies that are of common interest to the EFFRA (European Factories of the Future Research Association) associated projects. Such defined topics are: Standardization, Dissemination, Scientific and Socio Economic Impact, Experimentation, and Platforms / Architectures. As initiator of the DMP Cluster, ZDMP encourages new members to join. During the last year projects KYKLOS 4.0 and SHOP4CF, as well as ConnectedFactories became part of the Cluster.

Find out more about the cluster by contacting [info@zdmp.eu](mailto:info@zdmp.eu)



Activities have included the following

- **Standardization.** After identification of standardisation gaps, DMP members elaborated a set of CEN-CENELEC (European Committee for Standardization) Workshop Agreements (CWA), which are an intermediate phase on the way to standards development. For ZDMP, the following three CWAs were decided: Zero Defects in Digital Manufacturing Terminology, DMP Marketplace Requirements, and DMP Data Exchange. A CEN-CENELEC October 2020 Workshop on the first topic collated and defined an initial common vocabulary. Moreover, ZDMP together with the EFPF project (previously named: eFactory), works towards establishment of the manufacturing standards portfolio combining important and relevant standards.
- **Scientific and Socio Economic Impact.** ZDMP plays a key role in managing this topic in the cluster and a set of research directions were indicated to catalyse the collaboration among cluster participants. Namely: Security and privacy preservation, Data spaces, data economy and marketplaces, Digital twins for manufacturing, Artificial intelligence for manufacturing and Circular products & climate-neutral manufacturing.
- **Experimentation.** These activities anticipate the consolidation of cluster members' efforts towards a common representation methodologies and templates for the pilots and to establish synergies disseminating the open calls.
- **Platforms and Architectures.** The exchange of views and opinions about the wide range of platform-related challenges takes place on an ongoing basis. For instance, during the DMP cluster meeting on security, state-of-the-art technologies, approaches and standards used by projects were discussed, allowing participants to remain informed about recent activities of every single project and exchange ideas.

