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| Author(s) | Tanvir Islam (TVS) Rasel Ahmed (TVS) Oliver Buchan (PVI) Aldyandra Hami Seno (BUL) |
| Reviewer(s) | Farhadur Arifin (TVS) Miah Raihan Mahmud Arman (TVS) Dr Feroz Farazi (UCAM) |
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| Project Coordinator | Vorarlberg University of Applied Sciences (FHV) |
|-------------------------|---|
| Tel | +43 (0) 5572 792 7128 |
| E-mail | florian.maurer@fhv.at |
| Project website address | www.jidep.eu |

| Disse | mination Level | |
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Table of contents

| Execu | tive Summary7 |
|-------|---|
| 1. | Introduction |
| 2. | Collaborative Space |
| 2.1 | Description |
| 2.2 | Key Features |
| 2.3 | Operation Manual9 |
| 2.3.1 | User Registration |
| 2.3.2 | Individual Registration Process9 |
| 2.3.3 | Organization Registration Process |
| 2.3.4 | User Login Process |
| 2.3.5 | Add User |
| 2.3.6 | Edit User15 |
| 2.3.7 | Delete User |
| 3. | Material Passport |
| 3.1 | Description |
| 3.2 | Key Features |
| 3.3 | Operation Manual21 |
| 3.3.1 | Creating Passport: |
| 3.3.2 | Updating Passport: |
| 3.3.3 | Archiving Passport: |
| 3.3.4 | Viewing Public Passport: |
| 3.3.5 | Publish in Marketplace |
| 3.3.6 | Publish in Catalogue41 |
| 3.3.7 | Create Copy44 |
| 3.3.8 | Mark as Old51 |
| 4. | Circularity Calculator |
| 4.1 | Description53 |
| 4.2 | Key Features |
| 4.3 | Operation Manual55 |
| 5. | Environmental Analytic Tool |
| 5.1 | Description |
| 5.2 | Key Features |
| 5.3 | Operation Manual |
| 6. | Analytical Tool for Composite Material Structures |



| Description |
|-------------------------------------|
| Key Features63 |
| Operation Manual64 |
| Defining Process Conditions |
| Defining Materials |
| Defining Heat Transfer Interfaces71 |
| Analysis and Results72 |
| PCB Analytic Tool74 |
| Description74 |
| Key Features74 |
| Operation Manual74 |
| Environmental Analytic Tool75 |
| Troubleshooting76 |
| Common Issues and Solutions76 |
| Data Validation Errors: |
| Calculation Discrepancies:76 |
| Unresponsive Interface:76 |
| Missing Data:76 |
| Compatibility Issues:76 |
| Persistent Issues: |
| Conclusions77 |
| |



LIST OF TABLES

| TABLE 1 KEY FEATURES OF COLLABORATIVE SPACE | 8 |
|---|----|
| TABLE 2 KEY FEATURES OF MATERIAL PASSPORT TOOL | 21 |
| TABLE 3 KEY FEATURES OF CIRCULARITY CALCULATOR | 54 |
| TABLE 4: KEY FEATURES OF ENVIRONMENTAL ANALYTIC TOOL | |
| TABLE 5 KEY FEATURES OF COMPOSITE MATERIAL STRUCTURES | 63 |
| TABLE 6 KEY FEATURES OF PCB ANALYTIC TOOL | 74 |

LIST OF FIGURES

| FIGURE 1: INDIVIDUAL REGISTRATION PAGE | 9 |
|--|----|
| FIGURE 2: FILL INDIVIDUAL USER INFORMATION | 10 |
| FIGURE 3: ORGANIZATION REGISTRATION PAGE | 11 |
| FIGURE 4: FILL ORGANIZATION USER INFORMATION | 12 |
| FIGURE 5: USER LOGIN PAGE | 13 |
| FIGURE 6: ADD USER - USER LOGIN PAGE | 13 |
| FIGURE 7: ADD USER - DASHBOARD | 14 |
| FIGURE 8: ADD USER - USER DETAILS FORM | 15 |
| FIGURE 9: ADD USER - FILL INFORMATION | 15 |
| FIGURE 10: EDIT USER - USER LOGIN PAGE | 16 |
| FIGURE 11: EDIT USER - DASHBOARD | 17 |
| FIGURE 12: EDIT USER - USER DETAILS FORM | 17 |
| FIGURE 13: EDIT USER - FILL INFORMATION | 18 |
| FIGURE 14: DELETE USER - USER LOGIN PAGE | 18 |
| FIGURE 15: DELETE USER - DASHBOARD | 19 |
| FIGURE 16: DELETE USER - USER DETAILS FORM | 20 |
| FIGURE 17: DELETE USER - FILL INFORMATION | 20 |
| FIGURE 18 : CREATE PASSPORT - SELECT AUTOMOTIVE | 21 |
| FIGURE 19: CREATE PASSPORT - SELECT AUTOMOTIVE | 22 |
| FIGURE 20: CREATE PASSPORT - UPLOAD DOCUMENTS | 22 |
| FIGURE 21: CREATE PASSPORT - IDENTIFIER INFORMATION | 23 |
| FIGURE 22: CREATE PASSPORT - PHYSICAL PROPERTIES | 24 |
| FIGURE 23: CREATE PASSPORT - ADD SUBASSEMBLIES | 25 |
| FIGURE 24: CREATE PASSPORT - COMPOSITION PROPERTIES | 26 |
| FIGURE 25: CREATE PASSPORT - EOL STRATEGY | 26 |
| FIGURE 26: CREATE PASSPORT - CIRCULARITY INDICATOR | 27 |
| FIGURE 27: CREATE PASSPORT - ENVIRONMENTAL PERFORMANCE | 27 |
| FIGURE 28: UPDATE PASSPORT - PASSPORTS PAGE | 28 |
| FIGURE 29: UPDATE PASSPORT - EDIT PASSPORT | 28 |
| FIGURE 30: UPDATE PASSPORT - DOCUMENTS SECTION | 29 |
| FIGURE 31: UPDATE PASSPORT - IDENTIFIER SECTION | 30 |
| FIGURE 32: UPDATE PASSPORT - PHYSICAL PROPERTIES | 31 |
| FIGURE 33: UPDATE PASSPORT - ADD SUBASSEMBLIES | 32 |
| FIGURE 34: UPDATE PASSPORT - COMPOSITION PROPERTIES | 33 |
| FIGURE 35: UPDATE PASSPORT - EOL STRATEGY | 33 |
| FIGURE 36: UPDATE PASSPORT - CIRCULARITY INDICATOR | 34 |
| FIGURE 37: UPDATE PASSPORT | 34 |
| FIGURE 38: ARCHIVE PASSPORT - PASSPORTS PAGE | 35 |
| FIGURE 39: ARCHIVE PASSPORT - CLICK ARCHIVE BUTTON | 35 |
| FIGURE 40: ARCHIVE PASSPORT - CONFIRM ARCHIVE | 36 |
| FIGURE 41: VIEW PUBLIC PASSPORT - PASSPORTS PAGE | 36 |
| FIGURE 42: VIEW PUBLIC PASSPORT - INITIAL VIEW PAGE | 37 |
| FIGURE 43: VIEW PUBLIC PASSPORT - CLICK HERE BUTTON FOR FULL DETAILS | 37 |
| FIGURE 44: PUBLIC VIEW PASSPORT | 38 |
| FIGURE 45: PUBLISH IN MARKETPLACE - PASSPORTS PAGE | 39 |
| | |



| FIGURE 46: PUBLISH IN MARKETPLACE - INITIAL VIEW PAGE | .39 |
|--|---|
| FIGURE 47: PUBLISH IN MARKETPLACE - CLICK HERE BUTTON FOR FULL DETAILS | .40 |
| FIGURE 48: PUBLISH IN MARKETPLACE - CLICK ON PUBLISH IN MARKETPLACE | .40 |
| FIGURE 49: PUBLISH IN MARKETPLACE - SET THE STANDARD PRICE AND LIST PRICE | .41 |
| FIGURE 50: PUBLISH IN MARKETPLACE - PUBLISH TO THE MARKETPLACE | .41 |
| FIGURE 51: PUBLISH IN CATALOGUE - PASSPORTS PAGE | .42 |
| FIGURE 52: PUBLISH IN CATALOGUE - INITIAL VIEW PAGE | .42 |
| FIGURE 53: PUBLISH IN CATALOGUE - CLICK HERE BUTTON FOR FULL DETAILS | .43 |
| FIGURE 54: PUBLISH IN CATALOGUE - CLICK ON PUBLISH IN CATALOG | .43 |
| FIGURE 55: PUBLISH IN CATALOGUE - SET THE STANDARD PRICE AND LIST PRICE | .44 |
| FIGURE 56: PUBLISH IN CATALOGUE - VIEW CATALOGUE | .44 |
| FIGURE 57: CREATE COPY - PASSPORTS PAGE | .45 |
| FIGURE 58: CREATE COPY - INITIAL VIEW PAGE | .45 |
| FIGURE 59: CREATE COPY - CLICK HERE BUTTON FOR FULL DETAILS | .46 |
| FIGURE 60: CREATE COPY - CLICK ON CREATE COPY | 46 |
| FIGURE 61: CREATE COPY - DOCUMENTS SECTION | 47 |
| FIGURE 62: CREATE COPY - IDENTIFIER SECTION | 48 |
| FIGURE 63: CREATE COPY - PHYSICAL PROPERTIES | 0 ب . مر |
| FIGURE 64: CREATE COPY - COMPOSITION PROPERTIES | 50 |
| FIGURE 65: CREATE COPY - FOL STRATEGY | 50 |
| | 51 |
| | 51 |
| | 52 |
| | .52 |
| | .52 |
| EICHDE 71: MARK AS OLD - CLICK MERE BUTTON FOR FULL DETAILS | .55 |
| FIGURE 71. MARK AS OLD - CLICK ON CREATE COPT | .55 |
| FIGURE 72. CIRCULARITY CALCULATOR SHOWING MATERIAL DATA INPUT FORM | .55 |
| MATERIALS | ГC |
| | .50 |
| | EC |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX | .56 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 | .56 .58 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 | .56 .58 .59 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA | .56 .58 .59 .59 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 70: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS | .56 .58 .59 .59 .60 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS | .56 .58 .59 .59 .60 .60 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION | .56 .58 .59 .59 .60 .60 .61 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT | .56 .58 .59 .60 .60 .61 .61 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT | .56 .58 .59 .60 .60 .61 .61 .61 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM | .56 .58 .59 .60 .60 .61 .61 .62 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) | .56 .58 .59 .60 .60 .61 .61 .62 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART | .56 .58 .59 .60 .60 .61 .61 .61 .62 .63 .64 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART FIGURE 85: TETRA MESH WORKFLOW | .56 .58 .59 .60 .60 .61 .61 .62 .63 .64 .65 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART FIGURE 85: TETRA MESH WORKFLOW FIGURE 86: MESHED PART | .56 .58 .59 .60 .60 .61 .61 .62 .63 .64 .65 .65 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 | .56 .58 .59 .60 .60 .61 .61 .62 .63 .64 .65 .65 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 | .56 .58 .59 .60 .61 .61 .61 .62 .63 .64 .65 .65 .66 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS. FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT. FIGURE 82: LCA CALCULATION - LCA REPORT. FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART FIGURE 85: TETRA MESH WORKFLOW FIGURE 86: MESHED PART FIGURE 87: MOULD FIGURE 88: SETTING SIMULATION PARAMETERS IN VISUAL RTM FIGURE 89: DEFINING CONVECTION PARAMETERS | .56 .58 .59 .60 .61 .61 .61 .62 .63 .64 .65 .65 .66 .67 .67 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART FIGURE 85: TETRA MESH WORKFLOW FIGURE 86: MESHED PART FIGURE 87: MOULD FIGURE 87: MOULD FIGURE 88: SETTING SIMULATION PARAMETERS IN VISUAL RTM FIGURE 89: DEFINING CONVECTION PARAMETERS FIGURE 80: NON-CURING MATERIAL TAD | .56 .58 .59 .60 .61 .61 .62 .63 .64 .65 .65 .65 .66 .67 .67 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART FIGURE 85: TETRA MESH WORKFLOW FIGURE 86: MESHED PART FIGURE 87: MOULD FIGURE 88: SETTING SIMULATION PARAMETERS IN VISUAL RTM FIGURE 89: DEFINING CONVECTION PARAMETERS FIN VISUAL RTM FIGURE 89: DEFINING MATERIAL TAB FIGURE 91: REINFORCEMENT MATERIAL TAB FIGURE 91: REINFORCEMENT MATERIAL TAB | .56 .58 .59 .60 .60 .61 .61 .62 .63 .64 .65 .65 .65 .66 .67 .68 .69 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART FIGURE 85: TETRA MESH WORKFLOW FIGURE 86: MESHED PART FIGURE 88: SETTING SIMULATION PARAMETERS IN VISUAL RTM FIGURE 89: DEFINING CONVECTION PARAMETERS FIN VISUAL RTM FIGURE 90: NON-CURING MATERIAL TAB FIGURE 91: REINFORCEMENT MATERIAL TAB FIGURE 92: RESIN MATERIAL TAB | .56 .58 .59 .60 .60 .61 .61 .62 .63 .64 .65 .65 .66 .67 .67 .68 .69 .69 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2. FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS. FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION. FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT). FIGURE 84: IMPORTED FOAM CORE PART. FIGURE 85: TETRA MESH WORKFLOW. FIGURE 86: MESHED PART FIGURE 87: MOULD FIGURE 88: SETTING SIMULATION PARAMETERS IN VISUAL RTM FIGURE 89: DEFINING CONVECTION PARAMETERS FIGURE 90: NON-CURING MATERIAL TAB FIGURE 91: REINFORCEMENT MATERIAL TAB FIGURE 92: RESIN MATERIAL TAB FIGURE 93: ASSIGNMENT OF NON-CURING MATERIALS FIGURE 93: ASSIGNMENT OF NON-CURING MATERIALS FIGURE 93: ASSIGNMENT OF NON-CURING MATERIALS FIGURE 94: ASSIGNMENT OF NON-CURING MATERIALS FIGURE 93: ASSIGNMENT OF NON-CURING MATERIALS FIGURE 94: ASSIGNMENT OF NON-CURING MATERIALS | .56 .58 .59 .60 .60 .61 .61 .62 .63 .64 .65 .65 .65 .66 .67 .67 .68 .69 .70 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2. FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS. FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIAL DETAILS. FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION. FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART FIGURE 85: TETRA MESH WORKFLOW. FIGURE 86: MESHED PART FIGURE 87: MOULD FIGURE 88: SETTING SIMULATION PARAMETERS IN VISUAL RTM FIGURE 89: DEFINING CONVECTION PARAMETERS SIN VISUAL RTM FIGURE 89: DEFINING MATERIAL TAB FIGURE 91: REINFORCEMENT MATERIAL TAB FIGURE 92: RESIN MATERIAL TAB FIGURE 93: ASSIGNMENT OF NON-CURING MATERIALS. FIGURE 93: ASSIGNMENT OF NON-CURING MATERIALS. FIGURE 94: LAYER DESIGN MANAGER. | .56 .58 .59 .60 .60 .61 .61 .62 .63 .64 .65 .65 .66 .67 .67 .68 .69 .70 .70 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2. FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA. FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION. FIGURE 81: LCA CALCULATION - LCA REPORT. FIGURE 82: LCA CALCULATION - LCA REPORT. FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART. FIGURE 85: TETRA MESH WORKFLOW. FIGURE 86: MESHED PART. FIGURE 87: MOULD. FIGURE 88: SETTING SIMULATION PARAMETERS IN VISUAL RTM FIGURE 89: DEFINING CONVECTION PARAMETERS S. FIGURE 90: NON-CURING MATERIAL TAB. FIGURE 91: REINFORCEMENT MATERIAL TAB. FIGURE 92: RESIN MATERIAL TAB. FIGURE 92: RESIN MATERIAL TAB. FIGURE 93: ASSIGNMENT OF NON-CURING MATERIALS. FIGURE 94: LAYER DESIGN MANAGER. FIGURE 94: LAYER DESIGN MANAGER. FIGURE 95: THERMAL NON-COINCIDENT DEFINITION. | .56 .58 .59 .60 .61 .61 .61 .62 .63 .64 .65 .65 .66 .67 .68 .69 .70 .70 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2. FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA. FIGURE 78: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS. FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS. FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS. FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION. FIGURE 81: LCA CALCULATION - LCA REPORT. FIGURE 82: LCA CALCULATION - LCA REPORT. FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT). FIGURE 84: IMPORTED FOAM CORE PART. FIGURE 85: TETRA MESH WORKFLOW. FIGURE 86: MESHED PART. FIGURE 87: MOULD. FIGURE 88: SETTING SIMULATION PARAMETERS IN VISUAL RTM. FIGURE 89: DEFINING CONVECTION PARAMETERS IN VISUAL RTM. FIGURE 89: DEFINING CONVECTION PARAMETERS SIN VISUAL RTM. FIGURE 90: NON-CURING MATERIAL TAB. FIGURE 91: REINFORCEMENT MATERIAL TAB. FIGURE 92: RESIN MATERIAL TAB. FIGURE 92: RESIN MATERIAL TAB. FIGURE 93: ASSIGNMENT OF NON-CURING MATERIALS. FIGURE 94: LAYER DESIGN MANAGER. FIGURE 95: THERMAL NON-COINCIDENT DEFINITION. FIGURE 96: EXAMPLE OF MESH NON-COINCIDENT DEFINITION. FIGURE 96: EXAMPLE OF MILEST CASE. | .56 .58 .59 .60 .60 .61 .61 .62 .63 .64 .65 .65 .65 .65 .67 .68 .69 .70 .71 .71 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 80: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART FIGURE 85: TETRA MESH WORKFLOW FIGURE 86: MESHED PART FIGURE 86: MESHED PART FIGURE 87: MOULD FIGURE 88: SETTING SIMULATION PARAMETERS IN VISUAL RTM FIGURE 89: DEFINING CONVECTION PARAMETERS FIGURE 90: NON-CURING MATERIAL TAB FIGURE 91: REINFORCEMENT MATERIAL TAB FIGURE 91: REINFORCEMENT MATERIAL TAB FIGURE 92: RESIN MATERIAL TAB FIGURE 93: ASSIGNMENT OF NON-CURING MATERIALS FIGURE 94: LAYER DESIGN MANAGER FIGURE 94: LAYER DESIGN MANAGER FIGURE 95: THERMAL NON-COINCIDENT DEFINITION FIGURE 96: EXAMPLE OF MESH NON-COINCIDENCE IN TEST CASE FIGURE 97: CURING SIMULATION IN PROGRESS FIGURE 97: CURING SIMULATION IN PROGRESS | .56 .58 .59 .60 .60 .61 .61 .62 .63 .64 .65 .65 .65 .66 .67 .68 .69 .70 .71 .72 |
| FIGURE 74: CIRCULARITY CALCULATOR SHOWING CALCULATED CIRCULARITY INDEX FIGURE 75: LCA CALCULATION - STEP 1 FIGURE 76: LCA CALCULATION - STEP 2 FIGURE 77: LCA CALCULATION - SUB-ASSEMBLY ADD DATA FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - ADD MATERIAL DETAILS FIGURE 79: LCA CALCULATION - SUB-ASSEMBLY - LIST OF MATERIALS FIGURE 80: LCA CALCULATION - LCA METHODOLOGY SELECTION FIGURE 81: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 82: LCA CALCULATION - LCA REPORT FIGURE 83: JIDEP COMPOSITE ANALYTICAL TOOL TEST CASE: COMPOSITE CROSSBEAM (LEFT) AND MANUFACTURING PARAMETERS (RIGHT) FIGURE 84: IMPORTED FOAM CORE PART FIGURE 85: TETRA MESH WORKFLOW FIGURE 86: MESHED PART FIGURE 87: MOULD FIGURE 88: SETTING SIMULATION PARAMETERS IN VISUAL RTM FIGURE 89: DEFINING CONVECTION PARAMETERS FIGURE 89: DEFINING CONVECTION PARAMETERS FIGURE 90: NON-CURING MATERIAL TAB FIGURE 91: REINFORCEMENT MATERIAL TAB FIGURE 91: REINFORCEMENT MATERIAL TAB FIGURE 91: REINFORCEMENT MATERIAL TAB FIGURE 92: RESIN MATERIAL TAB FIGURE 93: ASSIGNMENT OF NON-CURING MATERIALS FIGURE 94: LAYER DESIGN MANAGER FIGURE 95: THERMAL NON-COINCIDENT DEFINITION FIGURE 95: THERMAL NON-COINCIDENT DEFINITION FIGURE 96: EXAMPLE OF MESH NON-COINCIDENCE IN TEST CASE FIGURE 97: CURING SIMULATION IN PROGRESS. FIGURE 98: LOADED SIMULATION RESULTS | .56 .58 .59 .60 .61 .61 .62 .63 .64 .65 .65 .65 .66 .67 .67 .68 .69 .70 .71 .72 .73 |



| FIGURE 99: SELECTING CONTOUR RESULTS TO VISUALIZE | 73 |
|---|-----|
| FIGURE 100: CURE SIMULATION RESULTS AT 2208S | 74 |
| FIGURE 101 - PCB ANALYTIC TOOL ANALYSIS APPROACH BASED ON FEATURES F001 | AND |
| F002 | 75 |
| FIGURE 102: PCB ANALYTIC TOOL FEATURE F002 DETECTION APPROACH | 75 |



Executive Summary

This report is the final version of deliverable D4.1 for the JIDEP project. It showcases our developed tools and operational guidelines. In JIDEP, we created digital solutions tailored for industries, addressing their needs and aligning with our project goals. One essential tool, the Environmental Analytic Tool, helps organizations measure the life cycle analysis of manufacturing products, which promotes sustainable practices among our industrial partners, a core objective of the JIDEP. Another significant tool we've developed is the Material Passports. This tool provides stakeholders with essential product information, ensuring transparency and accountability throughout the product's lifecycle. Its value lies in its ability to align perfectly with the project's aims, making it an integral part of our toolkit. To promote the circular economy, we introduced the Circularity Calculator. It empowers stakeholders to make informed decisions about resource efficiency and waste management, thereby significantly contributing to the circular economy. Our Collaborative Space service helps with teamwork and efficient data sharing among stakeholders, reflecting JIDEP's emphasis on collaboration. Additionally, we developed analytical tools for composite material structures and PCB analysis. These tools cater to engineers and researchers and support JIDEP's mission to integrate advanced technology into industry practices. These innovative solutions demonstrate our commitment to technological excellence and promise to elevate businesses and industries towards a more sustainable and collaborative future under the JIDEP project.



1. Introduction

The JIDEP project represents a significant step in creating sustainable and innovative industry solutions. This report, the final version of deliverable D4.1, guides the tools we have developed and their operational manuals. These tools are designed to meet industries' changing needs while staying true to the goals of the JIDEP initiative. As part of our dedication to sustainable practices, the JIDEP project has rolled out tools designed to empower organizations across various sectors. One essential tool is the Environmental Analytic Tool, a robust platform that helps organizations measure and improve their ecological impact. This tool embodies the core values of the JIDEP project, emphasizing the importance of sustainability practices that are central to our mission.

Material Passport is crucial to ensuring transparency and accountability throughout a product's lifecycle. The Circularity Calculator, which adopts circular economy principles, helps businesses optimize processes and maximize product circularity and resource efficiency. Developing analytical tools for composite material structures and PCBs showcases cutting-edge technology integration into industry practices.

This report presents the tools developed under the JIDEP project, emphasizing their role in advancing technological excellence, sustainability, and collaboration within industries. These tools guide the transformative journey towards a more sustainable and interconnected future aligned with the JIDEP initiative.

2. Collaborative Space

2.1 Description

Individuals gain access to diverse material passports and teams upon signing up on collaborative space, while organisations enjoy a centralised platform for streamlined collaboration. Secure login credentials ensure personalised user experiences, benefiting organisations from a robust user management system. As administrators log in, they can seamlessly add, edit, or remove users, each assigned distinct access levels—Admin, Editor, or Publisher—tailored to their roles. This subtle user management and a user-friendly interface ensure efficient collaboration.

| Feature number | Feature name | | |
|----------------|---------------------------------|--|--|
| F001 | User Registration: Individual | | |
| F002 | User Registration: Organization | | |
| F003 | User Login | | |
| F004 | Add User | | |
| F005 Edit User | | | |
| F006 | Delete User | | |

Table 1 Key features of Collaborative Space

2.2 Key Features



2.3 Operation Manual

2.3.1 User Registration

User registration is the first step to unlocking the full potential of the JIDEP Platform. It provides a personalized account, enabling access to powerful tools tailored to meet industry needs. Your registered account ensures security, traceability, and a customized user experience.

2.3.2 Individual Registration Process

Step 1: Visit the Registration Page

 Navigate to the JIDEP Platform registration page through the provided URL

| JIDEP | | Home | Shop | Material Passport | Contact us | 0 ۲ | Sign in |
|---------------------------|---------------------|------------------------------------|--------|-------------------|------------|----------|----------------|
| | Sign-up as | 🔵 Individual 🛛 Organiz | zation | | | | |
| | Name | e.g. John Doe | | | | | |
| | Email | | | | | | |
| | Organization | Choose organization TVS UCAM | | | | | |
| | Password | | | | | | |
| | Confirm Password | | | | | | |
| | | Sign up | | | | | |
| | Alread | y have an account? | | | | | |
| | | | | | | | |
| Funded by the European | Union | · | | | Home | ə • Term | is of Services |
| Eigure 1: | Individual | Registration Page | 2 | | | | |

Step 2: Fill in User Information

 Complete the registration form with accurate and relevant information. This typically includes your name, email address, organization and other required details.



| JIDEP | | Home Shop Material Passport Contact us 🏾 🗮 🔍 Sign in |
|--------------|---------------|--|
| 5 | Sign-up as | Individual Organization |
| | Name | Jhon Doe |
| E | Email | doe@example.com |
| | Organization | Choose organization TVS UCAM |
| | Password | •••••• |
| | Confirm | •••••• |
| , | Passwora | |
| | | Sign up |
| | Already | iy have an account? |
| Funded by | Union | Home • Terms of Services |
| | | |

Figure 2: Fill Individual User Information

Step 3: Create a Secure Password

 Choose a strong and secure password to protect your account. Ensure it meets the specified password requirements for enhanced security.

Step 4: Click "Sign up"

- Once the valid information are entered, click the "Sign up" button to register the platform.

2.3.3 Organization Registration Process

Step 1: Visit the Registration Page

- Navigate to the JIDEP Platform registration page through the provided URL



| JIDEP | | Home Shop Material Passport Contact us 🐂 🔍 Sign in | |
|--------------|---------------------|---|--|
| | Sign-up as | Individual Organization | |
| | Name | e.g. John Doe | |
| | Email | | |
| | Domains | Choose domains Automotive PCB Wind Turbine | |
| | Roles | Choose roles Recycler Repair | |
| | Website | Enter organization's w | |
| | Password | | |
| | Confirm Password | | |
| | | Sign up | |
| | Alread | dy have an account? | |

Figure 3: Organization Registration Page

Step 2: Fill in User Information

 Complete the registration form with accurate and relevant information. This typically includes your name, email address, organization, roles, domain and other required details.



| JIDEP | | Home Shop Material Passport Contact us 🏾 🗮 🔍 Sign in |
|--------------|---------------------|--|
| | Sign-up as | Individual Organization |
| | Name | Jhon Doe |
| | Email | doe@example.com |
| | Domains | Choose domains Automotive PCB Wind Turbine |
| | Roles | Choose roles Recycler Repair |
| | Website | example.com |
| | Password | |
| | Confirm Password | |
| | | Sian up |
| | Alread | ly have an account? |

Figure 4: Fill organization user information

Step 3: Create a Secure Password

- Choose a strong and secure password to protect your account. Ensure it meets the specified password requirements for enhanced security.

Step 4: Click "Sign up"

- Once the valid information is entered, click the "Sign up" button to register on the platform.

2.3.4 User Login Process

Now that you've successfully registered, accessing the JIDEP Platform is a straightforward process. This section will guide you through the user login steps, ensuring a secure and efficient entry into the platform.

User login is a crucial step in gaining access to the JIDEP Platform, providing a secure gateway to the suite of tools and collaborative spaces. Logging in with your registered credentials ensures a personalized and protected user experience.

Step 1: Visit the Login Page

 Navigate to the JIDEP Platform login page through the provided URL



| JIDEP | | Home | Shop | Material Passport | Contact us | 0 ج | Sign in |
|--------------|---------------------------------|--------|------|-------------------|------------|-----|---------|
| | Email | | | | | | |
| | Email | | | | | | |
| | Password | | | | | | |
| | Password | | | | | | |
| | Log in | | | | | | |
| | Don't have an account? Reset Pa | ssword | | | | | |

Figure 5: User login page

Step 2: Enter Registered Email

- Input the email address used during the registration process.
- Step 3: Provide Password
 - Enter the secure password created during registration. Ensure the password meets the specified requirements for security
- Step 4: Click "Login"
 - Once the email and password are entered, click the "Login" button to access the platform.

2.3.5 Add User

This operational manual provides step-by-step guidance on adding users within the organization. As an Administrator of the organisation, you can Add a user by following the below process:

- Step 1: Visit the Login Page
 - Navigate to the JIDEP Platform login page through the provided URL

| JIDEP | | Home | Shop | Material Passport | Contact us | 0 ج | Sign in |
|--------------|----------------------------------|-------|------|-------------------|------------|-----|---------|
| | Emgil | | | | | | |
| | Email | | | | | | |
| | Password | | | | | | |
| | Password | | | | | | |
| | Log in | | | | | | |
| | Don't have an account? Reset Pas | sword | | | | | |

Figure 6: Add User - User login page

Step 2: Enter Registered Email



- Input the email address used during the registration process as an administrator.
- Step 3: Provide Password
 - Enter the secure password created during registration. Ensure the password meets the specified requirements for security
- Step 4: Click "Login"
 - Once the email and password are entered, click the "Login" button to access the platform.

Step 5: Navigate to the User Management

- Once logged in, navigate to the dashboard

| S JIDEP | | | Home Material Passport (| Collaborative Space Contact us Administrator 🝷 |
|-----------------|---------------------|---------------------|---|--|
| Shared Passport | Collaborative Space | e / User Management | | ◆ Add paw |
| | | | | - Add how |
| | List of user | s | | |
| | Roles | Name | Email | Action |
| | admin | John Doe | john.doe@example.com | 8 |
| | admin | Emily White | emily.white@example.com | |
| | admin | Daniel Lee | daniel.lee@example.com | |
| | admin | Ava Harris | ava.harris@example.com | 8 |
| | editor | Jane Smith | jane.smith@example.com | |
| | editor | Michael Brown | michael.brown@example.com | |
| | editor | Sophia Wilson | sophia.wilson@example.com | (27) (B) |
| | publisher | Alex Johnson | alex.johnson@example.com | |
| | publisher | Olivia Davis | olivia.davis@example.com | 8 |
| | publisher | William Turner | william.turner@example.com | 8 |
| | | | | |
| | | | | |
| | | + * · | This project has received | |
| | | ¢ | funding from Horizon Europe Research and | |
| | | × | Annovation under grant agreement number | |
| | | | 101058732 | |

Figure 7: Add User - Dashboard Step 6: Click the "Add new" button to start adding new user process - Once navigate to User Management Click on "Add new"



| u | JIDEP | | | | vace Contact us Administrator * |
|----------|-----------------|--------------|----------------|--|---------------------------------|
| | Shared Passport | Collaborativ | Na | ne | |
| | User Management | | Em | ail | + Add new |
| | | List of | Rol | 9 | |
| | | Roles | Cr | oose roles v | tion |
| | | admin | Ter | nporary Password | |
| | | admin | | | |
| | | admin | | Save | |
| | | admin | | | Close |
| | | editor | Jane Smith | jane.smith@example.com | |
| | | editor | Michael Brown | michael.brown@example.com | |
| | | editor | Sophia Wilson | sophia.wilson@example.com | |
| | | publisher | Alex Johnson | alex.johnson@example.com | |
| | | publisher | Olivia Davis | olivia.davis@example.com | |
| | | publisher | William Turner | william.turner@example.com | |
| | | | | | |
| | | | | 🕇 🖕 This project has received | |
| | | | * * * | funding from Porizon Europe Research and innovation under grant agreement number 10/056732 | |

Figure 8: Add User - User Details form

Step 7: Provide valid information for adding a new user

- Fill in the required information for the new user, including name, email, and a secure password.
- Specify the user's access level by selecting "Administrative," "Editor," or "Publisher."
- Click "Save" to confirm the addition

| * | S JIDEP | | | | × | |
|---|-----------------|------------------|--------------------|---|-------|-----------|
| | Shared Passport | collaborativ | Name | | | |
| | Shared Passport | | RUSH | | | |
| | User Management | | Email | | | + Add new |
| | | | Ahmed | | | |
| | | List of | Role | | | |
| | | Roles | Editor | ~ | tic | n |
| | | admin | Temporar | y Password | | |
| | | admin | | | | |
| | | admin | | Save | - 1 | |
| | | admin | | | Close | |
| | | editor Jane | Smith | jane.smith@example.com | Z | |
| | | editor Miche | ael Brown | michael.brown@example.com | Ø | |
| | | editor Soph | nia Wilson | sophia.wilson@example.com | | |
| | | publisher Alex . | Johnson | alex.johnson@example.com | Ø | |
| | | publisher Olivio | a Davis | olivia.davis@example.com | Ø | |
| | | publisher Willia | am Turner | william.turner@example.com | (| |
| | | | | | | |
| | | | | | | |
| | | | ****, * **** | This project has received funding from Horizon Europe Research and Innovation under grant agreement number 10/059732 | | |

Figure 9: Add User - Fill information

2.3.6 Edit User

This operational manual provides step-by-step guidance on updating users Copyright © JIDEP Project Consortium 2022



within the organization. As an Administrator of the organisation, you can update user details by following the below process:

- Step 1: Visit the Login Page
 - Navigate to the JIDEP Platform login page through the provided URL

| JIDEP | | Home | Shop | Material Passport | Contact us | 0 چ | Sign in |
|--------------|---------------------------------|---------|------|-------------------|------------|-----|---------|
| | Email | | | | | | |
| | Email Password | | | | | | |
| | Password | | | | | | |
| | Log in | | | | | | |
| | Don't have an account? Reset Po | issword | | | | | |

Figure 10: Edit User - User login page

- Step 2: Enter Registered Email
 - Input the email address used during the registration process as an administrator.
- Step 3: Provide Password
 - Enter the secure password created during registration. Ensure the password meets the specified requirements for security
- Step 4: Click "Login"
 - Once the email and password are entered, click the "Login" button to access the platform.
- Step 5: Navigate to the User Management
 - Once logged in, navigate to the dashboard





| 3 | JIDEP | | | Home Material Passport Collabo | orative Space Contact us Administrator 👻 |
|---|------------------------------------|---------------------|---------------------|---|--|
| | Shared Passport User Management | Collaborative Space | e / User Management | | + Add new |
| | | List of users | s | | |
| | | Roles | Name | Email | Action |
| | | admin | John Doe | john.doe@example.com | 8 |
| | | admin | Emily White | emily.white@example.com | |
| | | admin | Daniel Lee | daniei.lee@example.com | (C) |
| | | admin | Ava Harris | ava.harris@example.com | 8 |
| | | editor | Jane Smith | jane.smith@example.com | |
| | | editor | Michael Brown | michael.brown@example.com | |
| | | editor | Sophia Wilson | sophia.wilson@example.com | 8 |
| | | publisher | Alex Johnson | alex.johnson@example.com | |
| | | publisher | Olivia Davis | olivia.davis@example.com | |
| | | publisher | William Turner | william.turner@example.com | 8 |
| | | | | | |
| | | | | This project has received funding from Horizon Europe Research and innovation under grant agreement number 10/059732 | |

Figure 11: Edit User - Dashboard

Step 6: Click the "Edit" icon to update user details

- Once you navigate to User Management Click on "Edit Button"

| S JIDEP | | | | | × | aace Contact us Administrator * | |
|-----------------|-------------|---------------|-----------|----------------------------|-------|---------------------------------|--|
| | | | Name | | | | |
| Shared Passport | Colidborduv | | John Doe | | | | |
| User Management | | | Email | | | + Add new | |
| | | | john.doeg | example.com | | | |
| | List of | | Role | | | | |
| | Roles | | Admin | ~ | | tion | |
| | admin | | Temporan | y Password | | | |
| | admin | | | | | | |
| | admin | | | Update | | | |
| | admin | | | | Close | | |
| | editor | Jane Smith | | jane.smith@example.com | | | |
| | editor | Michael Brow | 'n | michael.brown@example.com | I | | |
| | editor | Sophia Wilso | n | sophia.wilson@example.com | 1 | | |
| | publisher | Alex Johnson | 1 | alex.johnson@example.com | 1 | | |
| | publisher | Olivia Davis | | olivia.davis@example.com | I | | |
| | publisher | William Turne | ər | william.turner@example.com | 1 | | |
| | editor | Rasel | | Ahmed | I | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Figure 12: Edit User - User Details form

Step 7: Provide valid information to update user details

- Update the necessary details such as name, email, or access level
- Click "Update" to confirm the update



| | | under die Australie auf Annalise Gana Contactus Administrator e |
|-----------------|-------------------------|---|
| | | X |
| с | collaborativ | Name |
| Shared Passport | | John Doe |
| User Management | | Email + Add new |
| | 11-1-6 | John.doegrexample.com |
| | LIST OF | Role |
| | Roles | Admin v lion |
| | admin | Temporary Password |
| | admin | |
| | admin | Update 1 |
| | admin | Close |
| | editor Jane Smith | janesmith@example.com |
| | editor Michael Brow | in michaelbrown@example.com 🕜 🗐 |
| | editor Sophia Wilso | n sophia.wilson@example.com 🛛 🕜 🛢 |
| | publisher Alex Johnson | n alexjohnson@example.com 🛛 🔽 🔒 |
| | publisher Olivia Davis | olivía.dovis@example.com |
| | publisher William Turne | er william.tumer@example.com |
| | editor Rasel | Ahmed 💴 🔒 |
| | | |
| | | |
| | | This project has received |
| | | |
| | | |

Figure 13: Edit User - Fill information

2.3.7 Delete User

This operational manual provides step-by-step guidance on deleting users within the organization. As an Administrator of the organisation, you can delete user details by following the below process:

Step 1: Visit the Login Page

- Navigate to the JIDEP Platform login page through the provided URL

| JIDEP | | Home | Shop | Material Passport | Contact us | 0 چ | Sign in |
|--------------|------------------------------|----------|------|-------------------|------------|-----|---------|
| | E-mail | | | | | | |
| | Email | | | | | | |
| | Password | | | | | | |
| | Password | | | | | | |
| | Log in | | | | | | |
| | Don't have an account? Reset | Password | | | | | |

Figure 14: Delete User - User login page

Step 2: Enter Registered Email

- Input the email address used during the registration process as an administrator.

Step 3: Provide Password



- Enter the secure password created during registration. Ensure the password meets the specified requirements for security
- Step 4: Click "Login"
 - Once the email and password are entered, click the "Login" button to access the platform.

Step 5: Navigate to the User Management

- Once logged in, navigate to the dashboard

| 🐼 JIDEP | | | Home Material Passport Callabo | rative Space Contact us Administrator * |
|-----------------|---------------------|---------------------|---|---|
| Shared Passport | Collaborative Space | e / User Management | | |
| User Management | | | | + Add new |
| | List of users | 8 | | |
| | Roles | Name | Email | Action |
| | admin | John Doe | john.doe@example.com | 8 |
| | admin | Emily White | emily.white@example.com | |
| | admin | Daniel Lee | daniel.lee@example.com | |
| | admin | Ava Harris | ava.harris@example.com | (C) (B) |
| | editor | Jane Smith | jane.smith@example.com | |
| | editor | Michael Brown | michael.brown@example.com | |
| | editor | Sophia Wilson | sophia.wilson@example.com | |
| | publisher | Alex Johnson | alex.johnson@example.com | |
| | publisher | Olivia Davis | oiivia.davis@example.com | |
| | Publisher | winam rumer | william.tumer@example.com | |
| | | | | |
| | | | This project has received funding from Horizon to be fore Research and innovation under grant agreement number 101058732 | |

Figure 15: Delete User - Dashboard

Step 6: Click the "Delete" button to delete a user

- Once you navigate to User Management Click on the "delete Button"



| - | S JIDEP | | | Home Material Passport Collabore | stive Space Contact us Administrator 👻 |
|---|------------------------------------|---------------------|---------------------|---|--|
| | Shared Passport User Management | Collaborative Space | e / User Management | | + Add new |
| | | List of users | 3 | | |
| | | Roles | Name | Email | Action |
| | | admin | John Doe | john.doe@example.com | 8 |
| | | admin | Emily White | emily.white@example.com | |
| | | admin | Daniel Lee | daniel.lee@example.com | |
| | | admin | Ava Harris | ava.harris@example.com | 6 |
| | | editor | Jane Smith | jane.smith@example.com | |
| | | editor | Michael Brown | michael.brown@example.com | |
| | | editor | | sophia.wilson@example.com | |
| | | publisher | Olivia Davis | olivia davis@example.com | |
| | | publisher | William Turner | william.turner@example.com | |
| | | | | | |
| | | | | | |
| | | | | This project has received funding from Horizon Europe Research and Innovation under grant agreement number 101058732 | |

Figure 16: Delete User - User Details form

Step 7: Confirm delete to remove an user from organisation

- Click "Delete" to confirm the deletation

| - | JIDEP | | | × | llaborative Space Contact us Administrator * |
|---|-----------------|---------------------|----------------|--|--|
| | Shared Passport | Collaborative Space | / User Manag | <u>ا</u> | |
| | User Management | | | Are you sure? | + Add new |
| | | List of users | | Do you really want to delete this user? This process cannot be undone. | |
| | | Roles | Name | Cancel Delete | Action |
| | | admin | Emily White | oninyanitowoxumpio.com | 28 |
| | | admin | Daniel Lee | daniel.lee@example.com | |
| | | admin | Ava Harris | ava.harris@example.com | |
| | | editor | Jane Smith | jane.smith@example.com | |
| | | editor | Michael Brown | michael.brown@example.com | |
| | | editor | Sophia Wilson | sophia.wilson@example.com | |
| | | publisher | Alex Johnson | alex.johnson@example.com | |
| | | publisher | Olivia Davis | olivia.davis@example.com | |
| | | publisher | William Turner | william.turner@example.com | |
| | | editor | Rasel | Ahmed | |
| | | publisher | John Doe | john.doe@example.com | |
| | | | | | |
| | | | | | |
| | | | ** | This project has received funding from Horizon Europe Research and Innovation under grant | |

Figure 17: Delete User - Fill information

3. Material Passport

3.1 Description

The Material Passport represents a novel solution designed to improve product lifecycle management, ensuring transparency, security, and collaboration. This dynamic platform facilitates creating, updating, and



deleting product passports, capturing detailed attributes throughout a product's journey. Leveraging distributed storage ensures robust and decentralized data management, while the platform's innovative features, including blockchain verification and role-based access control, fortify the integrity and security of product information. With viewable public passports, shareable access, and QR code convenience, this streamlines communication, fosters stakeholder collaboration and elevates responsible and sustainable product management standards.

3.2 Key Features

| Table 2 Key Feature | s of Material Passport Tool |
|---------------------|-----------------------------|
| Feature number | Feature name |
| F001 | Create Passport |
| F002 | Update Passport |
| F003 | Archive Passport |
| F004 | List Passports |
| F005 | Publish in Marketplace |
| F006 | Publish in Catalogue |
| F007 | Create Copy |
| F008 | Mark as Old |

- 3.3 Operation Manual
 - 3.3.1 Creating Passport:
 - Step 1: Please visit: <u>https://jidep.co/passports/new</u>

| JIDEP | | | Home | Shop I | Material Passport | Contact us | 0 ج | Administrator - |
|---------------|--------------------|----------|------------------------|--------|---------------------------|--------------------|----------|--------------------------------|
| | | | | | | | | |
| 1 Application | 2 Documents 3 Iden | ifier 4 | Physical Properties | 5 | Composition Properties | 6 Circul Econor | ar ny | 7 Environmental Performance |
| | | Choose y | our applico | ation | | | | |
| | | | an l | | | | | |
| | | ् | | | | | | |
| | Automotive | | PCB | | Wind Tur | bine | | |
| | | | | | | | | |

Figure 18 : Create Passport - Select Automotive

Step 2: Select your application example.: Automotive





Figure 19: Create Passport - Select Automotive

Step 3: Upload documents from the range of EPD, MSDS, CE Marking, Datasheet and so on. And after uploading the documents click "Next".

| JIDEP | | | | Home | Shop | Material Passport | Contac | tus 🏲 🖸 | Adminis | trator - |
|-----------------|------------------------|--------------|---|------------------------|------|---------------------------|--------|---------------------|-----------------|---------------------|
| | | | | | | | | | | |
| Application | 2 Documents | 3 Identifier | 4 | Physical Properties | 5 | Composition Properties | 6 | Circular Economy | 7 Envir Perf | onmental ormance |
| Select document | type to upload 🗸 🗸 | | | | | | | | | |
| 9106eea6e529 | 5cf46ff15eac1160008.pd | F | | | | DAT | ASHEET | | Remove | |
| | | | | | | | | | | |
| | | | | | | | | | Previous | Next |

Figure 20: Create Passport - upload documents

Step 4: Provide valid and required information to proceed with the identifier section



| Application | n 🗸 Documents 🕄 Identi | fler 4 Physical 5 C Properties | Composition 6 Circular Properties Economy | 7 Environmental Performance | | | |
|-------------|---|-----------------------------------|--|--------------------------------|--|--|--|
| | Name: () Cross Bar 1 LH | Brand Name: () ADLER | Trade Name: () Cross Bar | | | | |
| | GTIN: 0 150420240011 | EAN: 0 6150420240011 | | | | | |
| | Description: It's the first cross bar situated on the left side of the MC20 chassis. | | | | | | |
| | Images: Choose files No file chosen | | | | | | |
| | Manufacturer | Remove | | _ | | | |
| | Name: | Registration number: | Registration Country: | | | | |
| | Aimas Partecipazioni Industriali S 🗸 | 04048111210 | | _ | | | |
| | Name: | Registration number: | Registration Country: | | | | |
| | Almas Partecipazioni Industriali SPA | 09648111210 | Italy | | | | |
| | | | Pr | avious | | | |

Figure 21: Create Passport - Identifier Information Step 5: Provide valid and required information to proceed with the physical properties section



| JIDEP | | Home | Shop Material Passport | Contact us 🏻 🛏 🔍 | Administrator - |
|-------------------------------|------------------------|--------------------------|-----------------------------|-----------------------|--------------------------------|
| Application V Documents | Identifier | Physical Properties | 5 Composition Properties | 6 Circular Economy | 7 Environmental Performance |
| Dimension | | | | | |
| Length: 0.6 | Unit: Width: m 0.15 | Unit: | Height: | Unit: m | |
| Mass | | Density | | | |
| Mass: | Unit: | Density: 385000 | Unit: g/m³ | | |
| Energy and ther | mal performance | | | | |
| Heat transfer coefficient: | Unit: | Thermal conductivity: | Unit: | | |
| 0 | | 0 | | | |
| | | | | | |
| | | | | Pi | revious Next |

Figure 22: Create Passport - Physical Properties Step 6: Provide valid and required information to proceed with the composition properties section



| Sub-assembly Level: | S€ () | ∽ Sub-assembly | / Serial: St () ~ | ID: |
|--|---------------|-------------------------------|---------------------------|-----|
| Sub-assembly Name: | | Mass (kg) | Mass Ratio (%) | |
| | 0 | 0 ① | 0 () | |
| Enter a valid name. | | Enter a valid mass. | Enter a valid mass ratio. | |
| Fraction of mass from re | cycled sour | ces (%) | 0 | |
| Fraction of mass from re | used source | es (%) | 0 | |
| Fraction of mass collecte | ed to go into | a recycling process (%) | 0 | |
| Fraction of mass going ir | nto compon | ent reuse (%) | 0 | |
| Efficiency of the recycling | g process us | ed for collected for recyclin | g 0 | |
| Efficiency of the recycling feedstock | g process us | ed to produce recycled | 0 | |

Figure 23: Create Passport - Add Subassemblies



| Application | ~ | Documents | Identifier | Physical Properties | 5 Composition 5 Properties | 6 Circular Economy | 7 Environmental Performance |
|-------------|-----------------|----------------|--------------|--|---------------------------------|-------------------------|--------------------------------|
| | Sub-as | semblies | | | | | |
| | Data Sur | nmary | | | Add s | ub-assembly information | |
| | Sub- assembl | y Name | Mass (kg) | % of mass from Recycled source | % of mass from Reused source | Action | |
| | L1S1 | Foam | 0.34 | 0 | 0 | | |
| | L1S2 | Aluminium | 0.216 | 0.43 | 0 | | |
| | L1S3 | Glass Fiber | 0.009 | 0 | 0 | | |
| | L1S4 | Carbon Fiber | 0.498 | 0 | 0 | | |
| | L1S5 | Epoxy Adhesive | e 0.025 | 0 | 0 | | |
| | L1S6 | Epoxy resin | 0.293 | 0 | 0 | | |
| | | | | | | | |
| | | | | | | Pre | evious Next |

Figure 24: Create Passport - Composition Properties



| Appl | lication 🔽 Documents 🔽 Identifier | Physical Properties | Composition Properties 6 Ec | ircular 7 Environmental onomy Performance |
|------|---------------------------------------|------------------------|--------------------------------|--|
| | Applied Circularity/ EoL Strategy | | | |
| | Select document type to upload \sim | | | |
| | Documents | | | |
| | Document name | | Document type Actio | on |
| | d3a7377220e53f112913844a68d6a9s.pdf | | Recycle | ove |
| | | | | |
| | | | | |
| | | | | Previous Next |
| | | | | |

Figure 25: Create Passport - EoL Strategy

Step 8: Click next to proceed with the passport creation page



| Application | Documents | Identifier | Physical Properties | Composition Properties | 6 Circular Economy | 7 Environmental Performance |
|-------------|---|--|--|--|--|--------------------------------|
| | Circularity Index | | | | | |
| | The Circularity Index is a me which resources and materi materials by the mass of tot | tric that measures the degre als are kept in use and waste al input materials, expressed | 0.25 e to which a company, produ e is minimized. The Circularity I as a percentage. | uct, or economy is circular. It Index is calculated by dividi | is used to assess the extent ng the mass of circular inpu | to t |
| | | | | | | Previous Next |

Figure 26: Create Passport - Circularity Indicator



| Application | | Documents | | Identifier | ~ | Phy: Prop | sical erties | • | Composition Properties | n 🔽 | Circular Economy | 7 | Environmental Performance |
|-------------|------------|------------------|-------------|-------------------|------------|--------------|-----------------|----------|---------------------------|-------|---------------------|---|------------------------------|
| | | Fund | tional Un | it: | | | Carbon Fo | otprint: | | Unit: | | | |
| A | s you don' | t have EPD docum | ent, please | e click here to c | onduct LCA | A study | | | | | | | |
| | | | | | | | | | | | Previous | с | reate Passport |

Figure 27: Create Passport - Environmental Performance

3.3.2 Updating Passport:

Step 1: Please visit: <u>https://jidep.co/passports</u>



| JIDEP | Home LC | A Tool Shop | Material Passport | Collaborative Space | Contact us | 0 ج | Administrat | tor - |
|------------------------------|------------------------------|-------------|---|--|------------|--------------|-------------|------------|
| Material Passports | S | | | | | | | |
| | | | | | | | Create Pa | assport |
| Search | | | | | Sort by: | Name (A - Z) | ~ | : = |
| | | • | Film Inder vinforcement vinforcement Bolt connection | Listernal Listernal Listernal Listernal Martin Mart | | | | |
| Cross Bar 1 LH AUTOMOTIVE | Cross Bar 1 LH AUTOMOTIVE | | | e Blade E | | | | |
| 10 per paç 🗸 | | | | | | | First | 1 Last |

Figure 28: Update passport - passports page



Figure 29: Update passport - edit passport

Step 3: Uploaded documents from the range of EPD, MSDS, CE Marking, Datasheet and so on. And after uploading the documents click "Next".



| JIDEP | | | | Home | Shop | Material Passpo | rt Conto | actus 🍗 | Administrator | • |
|-----------------|-----------------------|--------------|---|------------------------|------|---------------------------|----------|---------------------|-------------------------|--------------|
| | | | | | | | | | | |
| Application | 2 Documents | 3 Identifier | 4 | Physical Properties | 5 | Composition Properties | 6 | Circular Economy | 7 Environme Performa | ental nce |
| Select document | t type to upload 🗸 🗸 | | | | | | | | | |
| bbb0b7c1f309 | 71b0fa0cbd7ad6eb71s.p | df | | | | D | ATASHEET | | Remove | |
| | | | | | | | | | | |
| | | | | | | | | | Ne | xt |

Figure 30: Update passport - documents section Step 4: Provide valid and required information to proceed with the identifier section



| Application | Documents 3 Identif | iler 4 Physical 5 Properties | Composition 6 Circular Properties Economy | 7 Environmental Performance |
|-------------|---|-------------------------------------|--|--------------------------------|
| | Name: 0 Cross Bar 1 LH | Brand Name: () ADLER | Trade Name: () Cross Bar | |
| | GTIN: 0 150420240011 | EAN: () 6150420240011 | | |
| | Description: It's the first cross bar situated on the left | side of the MC20 chassis. | ~ | |
| | Images: Choose files No file chosen | | | |
| | Manufacturer | Remove | | |
| | Name: Almas Partecipazioni industriali S 🗸 | Registration number: | Registration Country: | - |
| | Supplier | | | _ |
| | Name: | Registration number: 09648111210 | Registration Country: Italy | |
| | | | Pro | evious Next |

Figure 31: Update passport - identifier section Step 5: Provide valid and required information to proceed with the physical properties section



| JIDE | 2 | | | Hom | e Shop | Material Passport | Contact us | ₩0 | Administrator - |
|-------------|-------------------------------|--------------|-------|--------------------------|--------|---------------------------|----------------|--------------|--------------------------------|
| | | | | | | | | | |
| Application | Documents | ✓ Identif | ier | Physical Properties | 5 | Composition Properties | 6 Circ Ecor | ular 10my | 7 Environmental Performance |
| | Dimension | | | | | | | | |
| | Length: | Unit: | Width | : Uni | : | Height: | U | nit: | |
| | 0.6 | m | 0.15 | m | | 0.06 | | m | |
| | Mass | | | Density | | | | | |
| | Mass: | Unit: | | Density: | Unit: | | | | |
| | 1386 🗸 | g 🗸 | | 385000 | g/r | ma | | | |
| | Energy and the | rmal perform | ance | 1 | | | | | |
| | Heat transfer coefficient: | Unit: | | Thermal conductivity: | Unit: | | | | |
| | 0 | | | 0 | | | | | |
| | | | | | | | | | |
| | | | | | | | | P | Previous Next |
| | | | | | | | | _ | |

Figure 32: Update passport - physical properties Step 6: Provide valid and required information to proceed with the composition properties section



| Sub-assembly Level: | se 🚺 | ~ s | ub-assembly Se | erial: | se 🚺 🗸 | | ID: |
|--|--------------|-----------------|-----------------|-----------|------------------|---|-----|
| Sub-assembly Name: | | Mass (kg) | | Mass Ro | atio (%) | | |
| | () | 0 | 0 | 0 | (| D | |
| Enter a valid name. | | Enter a valid | mass. | Enter a v | alid mass ratio. | | |
| Fraction of mass from recy | ycled sourc | es (%) | | 0 | | | |
| Fraction of mass from reus | sed sources | s (%) | | 0 | | | |
| Fraction of mass collected | l to go into | a recycling pr | ocess (%) | 0 | | | |
| Fraction of mass going int | o compone | ent reuse (%) | | 0 | | | |
| Efficiency of the recycling | process use | ed for collecte | d for recycling | 0 | | | |
| Efficiency of the recycling feedstock | process use | ed to produce | recycled | 0 | | | |
| | | | | | | | |

Figure 33: Update Passport - Add Subassemblies



| ~ | Application | ~ | Documents | ~ | Identifier | Pro Pro | nysical operties | 5 Compositio Properties | 9 0 6 | Circular Economy | 7 | Environmental Performance |
|---|-------------|-----------------|-------------|------|--------------|----------------------|---------------------|---------------------------------|--------------|---------------------|---------|------------------------------|
| | | Sub-as | semblies | | | | | | | | | |
| | | Data Sur | nmary | | | | | Ad | dd sub-asse | mbly information | n | |
| | | Sub- assembl | y Name | | Mass (kg) | % of mas Recycled | s from source | % of mass from Reused source | Ac | tion | | |
| | | L1S1 | Foam | | 0.34 | 0 | | 0 | C | | | |
| | | L1S2 | Aluminium | | 0.216 | 0.43 | | 0 | C | | | |
| | | L1S3 | Glass Fiber | | 0.009 | 0 | | 0 | C | | | |
| | | L1S4 | Carbon Fibe | ər | 0.498 | 0 | | 0 | C | | | |
| | | LIS5 | Epoxy Adhe | sive | 0.025 | 0 | | 0 | | | | |
| | | L1S6 | Epoxy resin | | 0.293 | 0 | | 0 | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | Previou | JS Next |

Figure 34: Update passport - composition properties Step 7: Click next to proceed with the EoL Strategy page

| Application | Documents | Identifier | ~ | Physical Properties | ~ | Composition Properties | 6 | Circular Economy | 7 En Pe | vironmental erformance |
|-------------|--------------------------------|--------------|---|------------------------|---|---------------------------|-------|---------------------|------------|---------------------------|
| | Applied Circularity/ | EoL Strategy | | | | | | | | |
| | Select document type to upload | l v | | | | | | | | |
| | Documents | | | | | | | | | |
| | Document name | | | | | Document typ | be Ac | tion | | |
| | d3a7377220e53f112913844a6 | 68d6a9s.pdf | | | | Recycle | Re | emove | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | Previous | Next |
| | | | | | | | | | | |

Figure 35: Update passport - EoL Strategy

Step 8: Click next to proceed with the passport creation page



| Application | ✓ Do | ocuments | Identifier | | Physical Properties | ~ | Composition Properties | 6 | Circular Economy | 7 | Environmental Performance |
|-------------|---|---|--|--|--|--------------------------|--|-------------|---|--------|------------------------------|
| | Circularity | y Index: | | | | | | | | | |
| | The Circularity In which resources materials by the | ndex is a metric tha s and materials are e mass of total inpu | It measures the degre kept in use and waste t materials, expressed | e to which d e is minimiz l as a perce | 0.25 a company, produced. The Circularity intage. | ct, or eco Index is c | nomy is circular. It i alculated by dividir | s used to c | issess the extent to s of circular input | 2 | |
| | | | | | | | | | F | reviou | Is Next |

Figure 36: Update passport - Circularity Indicator



| | Application | ~ | Documents | ~ | ldentifier | 6 | - | Physical Properties | ~ | Compositio Properties | n 🔽 | Circular Economy | I | 7 Environmental Performance |
|---|-------------|---|-----------|----------|------------|---|---|------------------------|------------|--------------------------|-------|---------------------|---|--------------------------------|
| | | | Func | tional U | nit: | | | Carbon | Footprint: | | Unit: | | | |
| | | | | | | | | | | | | | | |
| _ | | | | | | | | | | | | Previous | | Update Passport |

Figure 37: Update passport

3.3.3 Archiving Passport:

Step 1: Please visit: https://jidep.co/passports



| JIDEP | Home L | .CA Tool Sho | op Material Passport | Collaborative Space | Contact us | 0 ۲ | Administrator - |
|--------------------|----------------|--------------|---|--|------------|--------------|-----------------|
| Material Passports | 5 | | | | | | |
| | | | | | | l | Create Passport |
| Search | | | | | Sort by: | Name (A - Z) | → # = |
| | | > | Film mater vinforcement Bolt connection | Lifernal byer al byer byer byer byer byer byer byer byer | | | |
| Cross Bar 1 LH | Cross Bar 1 LH | | Wind Turbine | Blade | | | |
| AUTOMOTIVE | AUTOMOTIVE | | WIND_TURBIN | E | | | First 1 Last |

Figure 38: Archive Passport - passports page

Step 2: Click the "Archive" button to delete the passport

| JIDEP | Home LCA Tool S | Shop Material Passport | Collaborative Space | Contact us | <u>ہ</u> و ، | Administrator 🝷 | |
|--------------------|-----------------|--|--|------------|--------------|-----------------|-----|
| Material Passports | S | | | | | Create Passpor | t |
| Search. | | | | Sort by: | Name (A - Z) | ~ | ≡ |
| | | Internal vinforcement Bold connection | Ladrag dar software Leternal Ladrag dar Ladrag dar SIDE VIEW La | | | | |
| Cross Bar 1 LH | Cross Bar 1 LH | Wind Turbin | e Blade | | | | |
| AUTOMOTIVE | AUTOMOTIVE | WIND_TURBIN | E | | | | |
| 10 per pa; 🗸 | | | | | | First 1 Lc | ast |

Figure 39: Archive Passport - click Archive button

Step 3: Click the "Archive" button to confirm deletion of the passport



| JIDEP | Home L | | Network Space | | H 0 | | ÷ |
|-------------------|----------------|---|--------------------|----------|--------------|--------------|------|
| Material Passport | s | (| B | | | | |
| | | Are yo | ou sure? | | I | Create Passp | ort |
| Search. | | Do you really want to archive this passport? This process cannot be undone. | | Sort by: | Name (A - Z) | ~ | |
| | | Cancel | Archive | | | | |
| Cross Bar 1 LH | Cross Bar 1 LH | | Wind Turbine Blade | | | | |
| AUTOMOTIVE | AUTOMOTIVE | | WIND_TURBINE | | | | |
| 10 per par v | | | | | | First 1 | Last |

Figure 40: Archive Passport - confirm archive

3.3.4 Viewing Public Passport:

Step 1: Please visit: <u>https://jidep.co/passports</u>

| JIDEP | Home Lo | CA Tool Shop | D Material Passport | Collaborative Space | Contact us | 0 چ | Administro | ator - |
|--------------------|----------------|--------------|--|---|------------|--------------|------------|----------|
| Material Passports | 3 | | | | | | | |
| | | | | | | l | Create P | Passport |
| Search | | | | | Sort by: | Name (A - Z) | ~ | . = |
| | | > | Film nate vinforcement Bult connection | Lighming Light Lyper 6 lower aut Internal Lyper 6 lower aut | | | | |
| Cross Bar 1 LH | Cross Bar 1 LH | | | e Blade | | | | |
| | | | | | | | | |
| 10 per pa; 🗸 | | | | | | | First | 1 Last |

Figure 41: View Public Passport - passports page Step 2: Click in the body of the passport to view details of the passport




Figure 42: View Public Passport - initial view page Step 3: Click the "Click here" button to view full details of the passport

| | the set that the stated because the set of the set | × | itact us 🐂 🔍 Administrator - |
|------------------------------|--|-------|--|
| Material Passport | Scan to view | | Create Passport Sort by: Name (A - Z) 🗸 📰 🚍 |
| | Cross Bar 1 LH Product ID: 3e26222843 Domain: AUTOMOTIVE Mass: 1.386 kg Manufacturer: Almas Part | | |
| Cross Bar 1 LH AUTOMOTIVE | Click here for more details. | Close | First 1 Last |

Figure 43: View Public Passport - Click here button for full details

Step 4: Check the data availability of the passport



| JIDEP | | Home LCA Tool | | sport Colk | aborative S | | ۳O | Administrator - |
|--|--|--|---|---|--|---|------------------|---------------------|
| Possoorts | Data Authoptic | oitu | | | | | | |
| r daapronta | Data Authentia | un nenn entretenner | 19 | | | | | |
| Create Passport | Proof: @ Verified with | 101-8623-62526582284 Blockshain | 13 | | | | | |
| Create Copy | Bublish in Marketniase | Bublish in Catalog | | | | | | |
| Mark as Old | Publish in Marketpiace | Publishin Collaby | | | | | | |
| | | | | | | | | |
| | | Cross Bar | 114 | | | | | |
| | | Domain: All | | | | | | |
| | | Trade News | OMOTIVE | | 6 | | | |
| | | Trade Name: | | | Cros | s Bar | | |
| | | Brand Name: | | | ADLE | R | | |
| | | GTIN: | | | 15042 | 20240011 | | |
| | | EAN: | | | 61504 | 420240011 | | |
| | | About this iten | n bar situated on the lot | side of the h | IC20 chossie | | | |
| | | La dia materidas | but should of the left | andle of others | | | | |
| 1. Contract (1. Contract) | | | | | | | | |
| | | | | | | | | |
| Documents | | COMPOSI | TION PROPERT | ES | | | | |
| EPD: 77c7a8 | 3_epd.pdf | Sub-assem | blies | | | | | |
| Circularity Docu | ments | Cub. | | | * of more | e from Becucled | Kofme | res from Deused |
| RECYCLE : d3d | 173msds.pdf | assembly | Name | Mass source | | source | source | |
| Manufacturer | | LISI | Foam | 0.34kg | 0 | | 0 | |
| Name: A | Umas Partecipazioni ndustriali SPA | L1S2 | Aluminium | 0.216kg | 43 | | 0 | |
| Registration 0 Number: | 9648111210 | L1S3 | Glass Fiber | 0.009kg | 0 | | 0 | |
| Registration It | taly | L1S4 | Carbon Fiber | 0.498kg | 0 | | 0 | |
| Country: | | 1185 | Epoxy | 0.025kg | 0 | | 0 | |
| Supplier | | 2100 | Adhesive | 0.02049 | 0 | | 0 | |
| Name: A | Almas Partecipazioni | 1166 | Epone regin | 0.20264 | 0 | | 0 | |
| k | ndustriali SPA | 130 | Epoxyream | 0.253kg | v | | 0 | |
| | 9648111210 | | | | | | | |
| Registration 0 | | OID OLULAR | FOONOLAY | | | ENIVIDIONING | | DEODUANOS |
| Registration 0 Number: | | | | ENVIRONMEI | NTAL PE | RFORMANCE | | |
| Registration 0 Number: Registration II | taly | | | | Functional Unit 🖲 1 piece of crossbar of 1.386 | | | |
| Registration 0 Number: Registration It Country: | taly | Circularity | Indicator: | | | Functional Unit () | kn | r crossbar of 1.386 |
| Registration 0 Number: Registration II Country: | taly | Circularity | Indicator: | | | Functional Unit () | kg | CO2 eq. |
| Registration C Number: Registration II Country: PHYSICAL PRO | ^{taly} PERTIES | Circularity | Indicator: | | | Functional Unit () : Carbon Footprint | kg : 47.13 kg | C02 eq. |
| Registration C Number: Registration II Country: PHYSICAL PRO | PERTIES | Circularity | 0.25 | | | Functional Unit () | kg : 47.13 kg | CO2 eq. |
| Registration C Number: Registration II Country: PHYSICAL PROD Dimensions : | PERTIES 0.6m X 0.15m X 0.06m | Circularity | 0.25 | | | Functional Unit (| kg : 47.13 kg | CO2 eq. |
| Registration C Number: Registration II Country: PHYSICAL PROD Dimensions : Mass: | taly PERTIES 0.8m X 0.15m X 0.08m 1.386kg | Circularity | 0.25 | measures the | , | Functional Unit (| kg : 47.13 kg | CO2 eq. |
| Registration C Number: Registration R Country: PHYSICAL PRO Dimensions : Mass: Density: | taly PERTIES 0.6m X 0.15m X 0.06m 1.386kg 385000kg/m* | The Circularity | Indicator: 0.25 y Index Is a metric that th a company, product used to assess the out | measures the | D Is | Functional Unit C | kg : 47.13 kg | CO2 eq. |
| Registration C Number: Registration II Country: PHYSICAL PROI Dimensions : Mass: Density: Heat Transfer Coefficient: | taly PERTIES 0.6m X 0.15m X 0.06m 1.386kg 385000kg/m ⁹ @/ | The Circularity | undicator: 0.25 y Index Is a metric that th a company, product used to assess the ext materials are kept in u he Circularity index is a | measures the or economy ant to which is and waste alculated by | a Is | Functional Unit @ | kg : 47.13 kg | CO2 eq. |
| Registration C Number: Registration II Country: PHYSICAL PROI Dimensions : Mass: Density: Heat Transfer Coefficient: Thermal Conductivit | taly PERTIES 0.6m X 0.16m X 0.06m 1.386kg 385000kg/m ³ (12) 325000kg/m ³ (12) (| The Circularity of The Circularity of degree to whice circular. It is resources and minimized. T dividing the m mass of to be | Indicator: 0.25 y Index Is a metric that the a company, product used to assess the ext materials are kept in u the Circularity Index Is a tass of circular input m tailingut materials, exp | measures the ar economy ant to which e and waste alculated by sterials by th essed as a | a Is Is | Functional Unit C | kg : 47.13 kg | CO2 eq. |

Figure 44: Public view Passport

3.3.5 Publish in Marketplace Step 1: Please visit: <u>https://jidep.co/passports</u>



| JIDEP | Home LC | A Tool Shop | Material Passport | Collaborative Space | Contact us | 0 ج | Administro | ator - |
|--------------------|----------------|-------------|--|--|------------|-------------|------------|------------|
| Material Passports | S | | | | | | | |
| | | | | | | | Create P | assport |
| Search | | | | | Sort by: | Name (A - Z |) ~ | . = |
| | | > | Fill Internal vinforcement Bolt connection | Liternal Loyer of the second s | | | | |
| Cross Bar I LH | Cross Bar 1 LH | | | e Blade | | | | |
| 10 per paç 🗸 | | | | | | | First | 1 Last |

Figure 45: Publish in Marketplace - passports page

| S JIDEP | line of the other tenders and all the second | × | itact us 🛛 🏲 🔍 | Administrator 👻 |
|--|--|-------|-----------------------|-----------------|
| Material Passport | Scan to view | | | |
| Search. | ■ ☆ ☆ @ ■ → ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ | | Sort by: Name (A - Z) | Create Passport |
| | Cross Bar 1 LH Product ID: 3e26222843 Domain: AUTOMOTIVE Mass: 1.386 kg Manufacturer: Almas Part | | | |
| Cross Bar 1 LH AUTOMOTIVE 10 per pag ~ | Click here for more details. | Close | | First 1 Last |

Step 2: Click in the body of the passport to view details of the passport

Figure 46: Publish in Marketplace - Initial View page

Step 3: Click the "Click here" button to view full details of the passport



| JIDEP | | × | act us 🐂 🔍 🧳 | Administrator 👻 |
|------------------------------|--|-------|-----------------------|-----------------|
| Material Passport | Scan to view | | | |
| Search | City States and States | s | sort by: Name (A - Z) | Create Passport |
| | Cross Bar 1 LH Product ID: 3e26222843 Domain: AUTOMOTIVE | | | |
| | Manufacturer: Almas Part | | | |
| Cross Bar 1 LH AUTOMOTIVE | Click here for more details. | 1 | | |
| 10 per paç 🗸 | | Close | | First 1 Last |

Figure 47: Publish in Marketplace - Click here button for full details Step 4: Click on the "Publish in Marketplace" button to make this product

| availa | ble for the mark | ketplace | | | | | | |
|--|--|--|-------------------------|-------------------------|---------------------|------------|----|-----------------|
| JIDEP | ٢ | lome LCA Tool | Shop | Material Passport | Collaborative Space | Contact us | ۳0 | Administrator 🝷 |
| Passports Create Passport Create Copy Mark as Old | Data Authenticity ID: 3e2620b1-2820-4dd1-84 Proof: © Verified with Block Publish in Marketplace | 623-62526582284 Icchain Whilsh in Catalog Cross Bar | 43 • 1 LH | | | | | |
| • | | Domain: AUT | ΓΟΜΟΤΙ | /E | | | | |
| | | Trade Name: | | | Cross Bar | | | |
| | | Brand Name: | | | ADLER | | | |
| | | GTIN: | | | 150420240 | 011 | | |
| | | EAN: | | | 615042024 | 0011 | | |
| | | About this iter It's the first cross | n s bar situe | ated on the left side o | f the MC20 chassis. | | | |
| ~ | | | | | | | | |

Figure 48: Publish in Marketplace - Click on Publish in Marketplace Step 5: Click on the "Publish in Marketplace" button and set the standard price and list price of the product



| JIDEP | | House totated also therefolds and a linker downed | X |) - 0 | |
|--|---|---|---|------------------|--|
| Passports Create Passport Create Copy Mark as Old | Data Au ID: 3e26201 Proof: @ Ve Publish in 1 | Cross BarlLH Standard price (c): Ist price (c): Ist price (c): Please enter a valid price. Please enter a valid price. Descenter a valid price. | | | |
| | | About this item It's the first cross bar situated on the left side of the MC20 chassis. | | | |

Figure 49: Publish in Marketplace - set the standard price and list price Step 6: Click on the "Publish" button to publish marketplace

| JIDEP | | Home LCA Tool Shop | Material Passport | Collaborative Space | + =0 | Administrator - |
|--|--|--|--------------------------|---------------------------|------|-----------------|
| Passports Create Passport Create Copy Mark as Old | Data Authenticity ID: 3e2620b1-2820-4dd1-8623-6 Proof: @ Verified with Blockchain View Marketplace View Catalog | 25265822843 | | | | |
| | CI Do Tr | ross Bar 1 LH main: AUTOMOTIVE ade Name: | | Cross Bar | | |
| | Br | and Name: | | ADLER | | |
| | Gi Gi | TIN: | | 150420240011 | | |
| • | EA Ab | IN: out this item the first cross bar situated on th | ne left side of the MC20 | 6150420240011 chassis. | | |

Figure 50: Publish in Marketplace - publish to the marketplace

3.3.6 Publish in Catalogue Step 1: Please visit: <u>https://jidep.co/passports</u>



| JIDEP | Home | LCA Tool Sł | hop N | Material Passport | Collaborative Space | Contact us | 0 ج | Administro | ator - |
|--------------------|----------------|-------------|-------|---|---|------------|--------------|------------|----------|
| Material Passports | S | | | | | | | | |
| | | | | | | | | Create P | Passport |
| Search. | | | | | | Sort by: | Name (A - Z) | ~ | . = |
| | | b | | Filmeral Performent Performent Bell Resection | Lagrange Lag | | | | |
| Cross Bar 1 LH | Cross Bar 1 LH | | | Wind Turbine | e Blade | | | | |
| 10 per pa; ~ | AUTOMOTIVE | | | WIND_TURBIN | E | | | First | 1 Last |

Figure 51: Publish in Catalogue - passports page

| JIDEP | line at an and the states of the second | × | itact us 🛛 🐂 🔍 | Administrator - |
|------------------------------|--|-------|----------------------|-----------------|
| Material Passport | Scan to view | | | |
| Search. | E A Sport | | Sort by: Name (A - a | Create Passport |
| | Cross Bar 1 LH Product ID: 3e26222843 Domain: AUTOMOTIVE Mass: 1.386 kg Manufacturer: Almas Part | | | |
| Cross Bar I LH AUTOMOTIVE | Click here for more details. | Close | | First 1 Last |

Step 2: Click in the body of the passport to view details of the passport

Figure 52: Publish in Catalogue - Initial View page

Step 3: Click the "Click here" button to view full details of the passport



| | Note to the date to the state of the state of the state | × | itact us 🛛 🐂 🖸 | Administrator - |
|--|--|-------|-----------------|-----------------|
| Material Passport | Scan to view | | | |
| Search. | Material Passport | | Sort by: Name (| Create Passport |
| | Cross Bar 1 LH Product ID: 3e26222843 Domain: AUTOMOTIVE Mass: 1.386 kg Manufacturer: Almas Part | | | |
| Cross Bar 1 LH AUTOMOTIVE 10 per pat | Click here for more details. | Close | | First 1 Last |

Figure 53: Publish in Catalogue - Click here button for full details Step 4: Click on the "Publish in Marketplace" button to make this product available for marketplace

| JIDEP | | Home LC | | op Material Passport | Collaborative Space | Contact us | 0 ج | Administrator - |
|-----------------|-------------------------|-------------------------|------------------------------------|-----------------------------|----------------------|------------|-----|-----------------|
| Passports | Data Authenticit | у | | | | | | |
| Create Passport | ID: 3e2620b1-2820-4dd1- | 8623-62526 | 65822843 | | | | | |
| Create Copy | Proof: | ckchain | | | | | | |
| Mark as Old | Publish in Marketplace | Publish in Ca | italog | | | | | |
| | | | | | | | | |
| (Down | | Cros Domair Trade | n: AUTOM | H | Cross Bar | | | |
| | | Brand | Name: | | ADLER | | | |
| | AR I | GTIN: | | | 150420240 | 011 | | |
| | | EAN: | | | 615042024 | 0011 | | |
| | | About t It's the fi | this item irst cross bar | situated on the left side (| of the MC20 chassis. | | | |
| ~ | | | | | | | | |

Figure 54: Publish in Catalogue - Click on Publish in Catalog Step 5: Click on the "Publish in Catalog" button and set the standard price and list price of the product



| | ٢ | iome LCA Too | Shop | Material Passport | Collaborative Space | Contact us | ۳.0 | Administrator 👻 |
|--|---|--|-------------------------|--------------------------|-----------------------------------|------------|-----|-----------------|
| Passports Create Passport Create Copy Mark as Old | Data Authenticity ID: 3e2620b1-2820-4dd1-80 Proof: © Verified with Block Publish in Marketplace Pr | 623-625265822 :chain ublish in Catalog | 843 | | | | | |
| | | Cross Bo Domain: A Trade Name | ar 1 LH utomot | IVE | Cross Bar | | | |
| | | Brand Name GTIN: | 9: | | ADLER 150420240 | 011 | | |
| | | EAN: About this it | em ss bar sit | uated on the left side o | 615042024 If the MC20 chassis. | 0011 | | |

Figure 55: Publish in Catalogue - set the standard price and list price Step 5: Check the availability of the passport's metadata in the Catalogue platform by clicking 'View Catalog"

| JIDEP | | Home LCA To | ol Shop | Material Passport | Collaborative Space | + =0 | Administrator - |
|--|---|--|------------|--------------------------|---------------------|------|-----------------|
| Passports Create Passport Create Copy Mark as Old | Data Authenticity ID: 3e2620b1-2820-4dd1-8623-62 Proof: @ Verified with Blockchain View Marketplace View Catalog | 5265822843 | | | | | |
| | Cru Don Tra | OSS Bar 1 LH nain: AUTOMO de Name: | TIVE | | Cross Bar | | |
| | | nd Name: N: | | | ADLER | | |
| | EAN | 4: | | | 6150420240011 | | |
| | Abo It's th | o ut this item ne first cross bar si | uated on t | he left side of the MC20 | chassis. | | |
| ~ | | | | | | | |

Figure 56: Publish in Catalogue - view catalogue

3.3.7 Create Copy

Step 1: Please visit: https://jidep.co/passports



| JIDEP | Home L | .CA Tool Shop | Material Passport | Collaborative Space | Contact us | 0 ۲ | Administr | ator - |
|--------------------|----------------|---------------|--|-----------------------|------------|--------------|-----------|------------|
| Material Passports | | | | | | | | |
| | | | | | | | Create I | Passport |
| Search | | | | | Sort by: | Name (A - Z) | ~ | : = |
| | | ð | Till Internal einforcement Bold connection | Ladrag day SDE VEW | | | | |
| Cross Bar 1 LH | Cross Bar 1 LH | | Wind Turbine | e Blade | | | | |
| AUTOMOTIVE | AUTOMOTIVE | | WIND_TURBIN | E | | | | |
| 10 per paç 🗸 | | | | | | | First | 1 Last |

Figure 57: Create Copy - passports page

Step 2: Click in the body of the passport to view details of the passport



Figure 58: Create Copy - Initial View page Step 3: Click the "Click here" button to view full details of the passport



| | | × | ntact us 🏻 🏲 🔍 | Administrator 👻 |
|------------------------------|--|-------|--------------------|-----------------|
| Material Passport | Scan to view | | | |
| Search. | Carlos Ca | | Sort by: Name (A - | Create Passport |
| | Cross Bar 1 LH Product ID: 3e26222843 & Domain: AUTOMOTIVE Mass: 1.386 kg Manufacturer: Almas Part | | | |
| Cross Bar I LH AUTOMOTIVE | Click here for more details. | Close | | First 1 Last |

Figure 59: Create Copy - Click here button for full details Step 4: Click on the "Create Copy" button to create a instance of this

| passpo | ort | | | | | | | |
|--|---|--|--------------------------|--------------------------|---------------------|------------|-----|-----------------|
| | ٢ | Home LCA Tool | Shop | Material Passport | Collaborative Space | Contact us | 0 ۲ | Administrator 👻 |
| Passports Create Passport Create Copy Mark as Old | Data Authenticity ID: 3e2620b1-2820-4dd1-8 Proof: © Verified with Block Publish in Marketplace | 623-625265822 cchain ublish in Catalog | 343 | | | | | |
| | | Cross Bo Domain: Al Trade Name | ir 1 LH лтомот | IVE | Cross Bar | | | |
| | | | : | | ADLER | 011 | | |
| | | EAN: | | | 6150420240 | 0011 | | |
| | | About this ite It's the first cro | em ss bar siti | uated on the left side o | f the MC20 chassis. | | | |
| | | | | | | | | |

Figure 60: Create Copy - Click on Create Copy

Step 5: Uploaded documents from the range of EPD, MSDS, CE Marking, Datasheet and so on. And after uploading the documents click "Next".



| JIDEP | | Home Shop | Material Passport | Contact us 🛛 🐂 🔍 | Administrator 👻 |
|------------------------------------|----------------|--------------------------|---------------------------|-----------------------|--------------------------------|
| | | | | | |
| Application 2 Documents | 3 Identifier 4 | Physical 5 Properties | Composition Properties | 6 Circular Economy | 7 Environmental Performance |
| Select document type to upload 🛛 🗸 | | | | | |
| | | | | | |
| | | | | | Next |
| | | | | | |

Figure 61: Create Copy - documents section

Step 6: Provide valid and required information to proceed with the identifier section



| S JIDEP | | Home Shop | Material Passport Contact us 🔫 🖲 | Administrator 👻 |
|-------------|---|---------------------------------|--|--------------------------------|
| | | | | |
| Application | Documents Identifi | er 4 Physical 5 Properties 5 | Composition 6 Circular Properties Economy | 7 Environmental Performance |
| | Name: 0 | Brand Name: 1 | Trade Name: 0 | |
| | Cross bar 🗸 | N/A 🗸 | N/A | |
| | GTIN: () | EAN: 0 | | |
| | N/A | N/A |] | |
| | Description: | | | |
| | Cross bar details will put here 3 | | ~ | |
| | | | | |
| | Images: | | | |
| | Choose files No file chosen Please upload atleast one picture. | | | |
| | Manufacturer | | | |
| | Name: | Registration number: | Registration Country: | |
| | Almas Partecipazioni Industriali Si 🗸 | 9648111210 | Italy 🗸 |] |
| | Supplier | | | |
| | Name: | Registration number: | Registration Country: | |
| | Almas Partecipazioni Industriali SPA | 9648111210 | italy |] |
| | | | | |
| | | | Pre | vious |
| | | | | |

Figure 62: Create Copy - identifier section

Step 7: Provide valid and required information to proceed with the physical properties section



| JIDE | 2 | | | I | Home | Shop I | Material Passport | Contact us | . , 0 | Administrator - |
|-------------|-------------------------------|--------------|-------|-----------------------|----------|--------|---------------------------|--------------|------------------|--------------------------------|
| | | | | | | | | | | |
| Application | Documents | ✓ Identif | ier | 4 Physica Properti | al es | 5 | Composition Properties | 6 Cir Eco | cular nomy | 7 Environmental Performance |
| | Dimension | | | | | | | | | |
| | Length: | Unit: | Width | : | Unit: | | Height: | | Jnit: | |
| | 0.6 | m | 0.15 | | m | | 0.06 | | m | |
| | Mass | | | Density | | | | | | |
| | Mass: | Unit: | | Density: | | Unit: | | | | |
| | 1386 🗸 | g 🗸 | | 385000 | | g/m³ | | | | |
| | Energy and the | rmal perform | ance | | | | | | | |
| | Heat transfer coefficient: | Unit: | | Thermal conductivity: | | Unit: | | | | |
| | 0 | | | 0 | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | Р | revious Next |
| | | | | | | | | | | |

Figure 63: Create Copy - physical properties

Step 8: Provide valid and required information to proceed with the composition properties section



| ~ | Application | ~ | Documents 🗸 | Identifier | Physical Properties | 5 Composition Properties | 6 Circular Economy | 7 Environmental Performance |
|---|-------------|------------------|----------------|---------------|-----------------------------------|---------------------------------|-------------------------|--------------------------------|
| | | Sub-ass | semblies | | | | | |
| | | Data Sum | nmary | | | Add su | ub-assembly information | |
| | | Sub- assembly | Name | Mass (kg) | % of mass from Recycled source | % of mass from Reused source | Action | |
| | | L1S1 | Foam | 0.34 | 0 | 0 | | |
| | | L1S2 | Aluminium | 0.216 | 0.43 | 0 | | |
| | | L1S3 | Glass Fiber | 0.009 | 0 | 0 | 6 | |
| | | L1S4 | Carbon Fiber | 0.498 | 0 | 0 | | |
| | | L1S5 | Epoxy Adhesive | 0.025 | 0 | 0 | | |
| | | L1S6 | Epoxy resin | 0.293 | 0 | 0 | | |
| | | | | | | | | |
| | | | | | | | Pre | vious Next |
| | | | Eigung C | A. Crasta Car | | | | |

Figure 64: Create Copy - composition properties

| Application | Documents Identifier | Physical Properties | Composition Properties | 6 Circular Economy | 7 Environmental Performance |
|-------------|-------------------------------------|------------------------|---------------------------|-----------------------|--------------------------------|
| | Applied Circularity/ EoL Strategy | | | | |
| | Select document type to upload | | | | |
| | Documents | | | | |
| | Document name | | Document type | Action | |
| | d3a7377220e53f112913844a68d6a9s.pdf | | Recycle | Remove | |
| | | | | | |
| | | | | | |
| | | | | | Previous Next |
| | | | | | |

Figure 65: Create Copy - EoL Strategy

Step 9: Click next to proceed with the passport creation page



| JIDEP | | | | | | Home | Shop | Material Passport | Contact | us 😭 🛛 | Admin | istrator 🝷 |
|-------------|--|---|---|---|--|--|-------------------------|--|-----------------------------|--------------------------------------|-------------|---------------------------|
| | | | | | | | | | | | | |
| Application | | Documents | C Ic | lentifier | ~ | Physical Properties | ~ | Composition Properties | 6 Ec | Circular conomy | 7 Env Pe | vironmental erformance |
| | Circulo | irity Index: | | | | | | | | | | |
| | The Circula which reso materials b | rity Index is a metri Irces and material: y the mass of total | c that measu s are kept in input materi | ures the degre use and wasta als, expressed | ee to which o e is minimize d as a perce | 0.17 a company, produc ad. The Circularity In Intage. | ct, or eco ndex is c | nomy is circular. It is u alculated by dividing | used to asse the mass of | ess the extent t f circular input | o | |
| | | | | | | | | | | | Previous | Next |

Figure 66: Update passport - Circularity Indicator

Step 10: Click "Update Passport" to complete the create copy feature

| Application | Documents 🗸 Identifier 🗸 | Physical Properties Composition Properties | Circular Economy 7 Environmental Performance |
|-------------|--------------------------|--|--|
| | Functional Unit: | Carbon Footprint: Unit: | : |
| | | | |
| | | | Previous Update Passport |

Figure 67: Create Copy - Update passport

3.3.8 Mark as Old

Step 1: Please visit: https://jidep.co/passports



| JIDEP | Home LCA Tool | Shop Materia | Passport C | ollaborative Space | Contact us | 0 ج | Administra | ator - |
|-------------------|----------------|--------------|---|--------------------|------------|--------------|------------|------------|
| Material Passport | ts | | | | | | | |
| | | | | | | I | Create P | assport |
| Search | | | | | Sort by: | Name (A - Z) | ~ | : = |
| | | | Filler Insterial Fromenti Bolt connection | Leternal Depert | | | | |
| Cross Bar 1 LH | Cross Bar 1 LH | W | ind Turbine Bl | ade | | | | |
| AUTOMOTIVE | AUTOMOTIVE | v | | | | | First | 1 Last |

Figure 68: Mark as Old - passports page Step 2: Click in the body of the passport to view details of the passport



Figure 69: Mark as Old - Initial View page

Step 3: Click the "Click here" button to view full details of the passport



| JIDEP | | × | ntact us 🎢 🔍 🗚 | dministrator - |
|------------------------------|--|-------|-----------------------|-----------------|
| Material Passport | Scan to view | | Sort by: Name (A - Z) | Create Passport |
| | Cross Bar 1 LH Product ID: 3e26222843 Domain: AUTOMOTIVE Mans: 1.386 kg Manufacturer: Almas Part | | | |
| Cross Bar 1 LH AUTOMOTIVE | Click here for more details. | Close | | First 1 Last |

Figure 70: Mark as Old - Click here button for full details Step 4: Click on the "Mark as Old" button to cease the passport

| JIDEP | | Home LCA Tool Shop Mai | terial Passport Collaborative | Space Contact us | H 0 | Administrator - |
|---|---|--|------------------------------------|------------------|------------|-----------------|
| Passports Create Passport Create Copy | Data Authenticity ID: 3e2620b1-2820-4dd1- Proof: © Verified with Bloc Publish in Marketplace | / 8623-625265822843 kchain Publish in Catalog | | | | |
| | | Cross Bar 1 LH Domain: AUTOMOTIVE | | non Bar | | |
| | | Brand Name: | AD | LER | | |
| | | GTIN: EAN: | 150 | 0420240011 | | |
| • | | About this item It's the first cross bar situated | on the left side of the MC20 chass | is. | | |

Figure 71: Mark as Old - Click on Create Copy

4. Circularity Calculator

4.1 Description

The Circularity Calculator is developed as an ontology-based software that supports different actors in the industry for deciding product's circularity strategies by comparing different design scenarios for the products' circularity indicators. The methodology seeks to provide the user with a frame of reference for discussing how circular a product is. We have incorporated Material Circularity Indicators (MCI) adopted from Ellen Macarthur foundation



indicator methodology¹. The MCI is a key component of the calculator that quantifies the circularity of a product by measuring the extent to which linear flow has been minimized and restorative flow maximized for its component materials. This provides a numerical value between 0 and 1, indicating the level of circularity.

4.2 Key Features

The Circularity Calculator empowers businesses to quantify, optimize, and enhance their circular economy practices, contributing to a more sustainable and environmentally conscious approach to product development and lifecycle management.

| Feature number | Feature name |
|----------------|---|
| F001 | Material Traceability: This feature allows users to trace the origin of materials used in the product, ensuring transparency and |
| | sourcing practices. |
| F002 | Circularity Metrics: The tool generates key circularity metrics, including recycling rates, reuse potential, and remanufacturing feasibility, aiding businesses in understanding the circular economy potential of their products. |
| F003 | Compliance Tracking: The tool helps users track compliance with circular economy regulations and standards, ensuring that businesses stay aligned with evolving sustainability requirements in their respective industries. |
| F004 | Circularity Indicator: The tool generates a Circularity Indicator, quantifying the circularity of a product on a scale from 0 to 1. A value of 0 indicates that the product is not circular, while a value of 1 signifies full circularity, providing a clear and concise measure of a product's sustainability. |
| F005 | Flexible Calculator: the calculator seems adaptable, offering both a whole product approach and a comprehensive approach- that considers individual components, sub-assemblies, parts, and materials. This flexibility enables users to assess circularity at various levels of granularity. |
| F006 | Guidelines Integration: The integration of guidelines for reusing, repairing, and recycling materials within the calculator is a valuable addition. This ensures that users not only receive a circularity index but also practical advice on how to improve circularity through specific actions like reuse, repair, and recycling. |

Table 3 Key Features of Circularity Calculator



¹ https://www.ellenmacarthurfoundation.org/material-circularity-indicator Copyright © JIDEP Project Consortium 2022

4.3 Operation Manual

Step 1: Provide valid and required information to calculate the circularity of the product

- Enter the name of the material, weight (in appropriate units), and the source of the material (e.g., production, recycling).
- Provide the End-of-Life (EOL) collection ratio, indicating the percentage of the material collected at the end of its life cycle.
- Specify the EOL destination, detailing where the material goes after reaching its end-of-life.

| Sub-assembly Level: | se 🕛 | ∽ Sub-a | ssembly Ser | ial: | se 🕛 🗸 | | ID |
|---|-------------|---------------------|-------------|-------------|----------------|----|----|
| Sub-assembly Name: | | Mass (kg) | | Mass Rat | io (%) | | |
| | () | 0 | () | 0 | | 0 | |
| Enter a valid name. | | Enter a valid mass | | Enter a val | lid mass ratio |). | |
| Fraction of mass from recyc | led source | es (%) | | 0 | | | |
| Fraction of mass from reuse | d sources | (%) | | 0 | | | |
| Fraction of mass collected to | o go into c | a recycling proces | s (%) | 0 | | | |
| Fraction of mass going into | componei | nt reuse (%) | | 0 | | | |
| Efficiency of the recycling pr | ocess use | d for collected for | recycling | 0 | | | |
| Efficiency of the recycling pr feedstock | ocess use | d to produce recy | cled | 0 | | | |
| | | | | | | | |

Figure 72: Circularity Calculator showing material data input form

Step 2: Provide all the materials information to calculate the circularity of the product



| ~ | Application | ~ | Documents | ~ | Identifier | ~ | Physical Properties | 5 | Composition Properties | 6 | Circular Economy | 7 | Environmental Performance |
|---|-------------|----------------|--------------|----------|--------------|--------------|--------------------------|-----------|-----------------------------|---------|---------------------|--------|------------------------------|
| | | Sub-as | ssemblies | | | | | | | | | | |
| | | Data Su | mmary | | | | | | Add su | b-assei | mbly informatic | n | |
| | | Sub- assemb | ly Name | | Mass (kg) | % of Recy | mass from cled source | % (Re | of mass from used source | Act | ion | | |
| | | LISI | Foam | | 0.34 | 0 | | 0 | | Ø | Ê | | |
| | | L1S2 | Aluminium | | 0.216 | 0.43 | | 0 | | Ø | | | |
| | | L1S3 | Glass Fiber | | 0.009 | 0 | | 0 | | | | | |
| | | L1S4 | Carbon Fiber | r | 0.498 | 0 | | 0 | | | | | |
| | | L1S5 | Epoxy Adhes | ive | 0.025 | 0 | | 0 | | | | | |
| | | L1S6 | Epoxy resin | | 0.293 | 0 | | 0 | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | Previo | us Next |

Figure 73: Circularity Calculator showing input data about constituent materials



| JIDE | | Home Shop Material Passport | Contact us 🐂 🔍 Administrator 🗝 |
|-------------|--|--|--|
| | | | |
| Application | Documents Identifier | Physical Composition Properties Properties | 6 Circular 7 Environmental Economy 7 Performance |
| | Circularity Index: | | |
| | The Circularity Index is a metric that measures the degree to whic which resources and materials are kept in use and waste is minin materials by the mass of total input materials, expressed as a per | 0.17 ch a company, product, or economy is circular. It is unized. The Circularity Index is calculated by dividing reentage. | used to assess the extent to the mass of circular input |
| | | | Previous |

Figure 74: Circularity Calculator showing calculated circularity index.



5. Environmental Analytic Tool

5.1 Description

Life Cycle Assessment (LCA) provides a comprehensive view of the environmental impacts associated with all stages of a product's life. Here Environmental Analytic Tool helps to create LCA report more user friendly way than ever. The interface developed under this tool made easier for the end user or stakeholders to calculate LCA without having prior knowledge on Life Cycle Assesment. LCA reports offer detailed insights into various environmental impacts, resource uses, emissions, waste generation, and more, across all stages of a product's lifecycle. These reports are essential for organizations to make informed decisions aimed at reducing environmental impacts, improving sustainability, and achieving regulatory compliance.

5.2 Key Features

The reports generated from LCA can vary depending on the specific goals and scope of the assessment, here is the some key features of Environmental Analytic Tool.

| Feature number | Feature name |
|----------------|---|
| F001 | Environmental Impact Reports: Environmental Impact |
| | Reports measure the product's contribution to issues like |
| | climate change, ozone depletion, acid rain, and |
| | eutrophication. They provide data on greenhouse gas |
| | emissions, air, water, and soil pollutants, helping organizations |
| | understand and mitigate their environmental footprint. |
| F002 | Resource Use Reports: Resource Use Reports quantify the |
| | total energy, water, and raw materials consumed throughout a |
| | product's lifecycle. These reports help organizations identify |
| | and optimize resource efficiency, reducing overall |
| | environmental impact. |
| F003 | Emissions Reports: Emission Reports detail pollutants |
| | released into the air, water, and soil during a product's |
| | lifecycle. They provide crucial data for identifying and |
| | mitigating environmental pollution and health risks. |
| F004 | Waste Reports: Waste Reports measure the amount of |
| | hazardous and non-hazardous waste produced during a |
| | product's lifecycle. They help businesses manage waste better |
| F00F | and ennance their sustainability efforts. |
| F005 | Impact Category Reports: Impact Category Reports assess |
| | the potential effects on numan health, ecosystems, and |
| | resource depiction. These reports help organizations |
| | their products |
| | ineir producis. |

Table 4: Key Features of Environmental Analytic Tool



| F006 | Lifecycle Stage Reports: Lifecycle Stage Reports break |
|------|--|
| | down the environmental impacts at each phase of a product's |
| | life, from production to disposal. These reports help identify |
| | which stages have the most significant effects and where |
| | improvements can be made. |

5.3 Operation Manual

Step 1: Provide valid and required information to get report of LCA

- Enter the country of origin from the list.
- Provide component/product name
- Specify the functional unit and number of sub-assembly

| LCA Ca | alculation |
|----------------------------|------------|
| Country of Origin | |
| Country of origin | |
| Component/Product Name | |
| Enter component or produ | uct name |
| Functional Unit | |
| 1 piece of structural unit | |
| No. of Sub-Assembly | |
| 0 | |
| Cancel | Next |

Figure 75: LCA Calculation - Step 1

Step 2: Add material details of sub-assemblies for calculating LCA **Select Product Category:**

• Choose a category from the list.

Select Sub-Category:

• Choose a sub-category under the selected category.

Select Material:

• Pick a material based on the selected category and subcategory.



Enter Amount:

• Provide the amount and select the unit.

Enter Transport Distance:

- Input the distance for road transport.
- Input the distance for marine transport.

| Sub-Assembly 1 | Sub-Assembly 2 | Sub-Assembly 3 | Sub-Assembly 4 | Assembly |
|--------------------------|------------------------------------|----------------|----------------|---------------|
| LCA Test Assembly Func | tional Unit 1 piece of stru | ctural unit | | Batch Process |
| 📚 Material | | | | < |
| 4 Energy Consumption | | | | < |
| | Ca | ncel | ext | |

Figure 76: LCA Calculation - Step 2

| Sub-Assembly 1 | Sub-Assembly 2 | Sub-Assembly 3 | Sub-Assembly 4 | Assembly |
|---------------------------------|-------------------------------------|----------------|----------------|---------------|
| LCA Test Assembly Func | tional Unit 1 piece of struc | tural unit | | Batch Process |
| 📚 Material | | | | < |
| No material data is available | 2. | | | |
| + Add Data | | | | |
| 4 Energy Consumption | | | | < |
| No energy consumption da | ta is available. | | | |
| + Add Data | | | | |
| | Can | ncel | ext | |

Figure 77: LCA Calculation - Sub-Assembly Add data



| Sub-Assembly 1 | Sub-Assembly 2 Sub-Assembly 2 | ub-Ass | embly 3 | Sub-Assembly 4 | Assembly |
|------------------------------|---|--------|-----------------------------------|----------------|---------------|
| LCA Test Assembly F | Functional Unit 1 piece of structural un | it | | | Batch Process |
| S Material | | | | | < |
| No material data is avai | Add Material Details | | | | |
| + Add Data | Category Sub Category | Mater | ial | | |
| Finergy Consumpt | Metals Alloys | Alur | ninium alloy, AlLi Unit | | < |
| No energy consumption | sp DelTerret() | ÷ | kg | | |
| + Add Data | 800 | | 4200 | km) | |
| | Cancel | | | Add | |

Figure 78: LCA Calculation - Sub-Assembly - Add Material Details

| Sub-Assembly 1 | Sub-Ass | embly 2 | Sub-Assembly 3 | | Sub-Assembly 4 | Assembly | | |
|-------------------------|------------------------|-----------------|-------------------|-------|----------------------|---------------|--|--|
| LCA Test Assembly Fur | nctional Unit 1 | piece of struct | ural unit | | | Batch Process | | |
| 📚 Material | | | | | | < | | |
| Name | Amount | Unit | Road Transport (k | m) Mi | arine Transport (km) | Action | | |
| Aluminium alloy, AlLi | 50 | kg | 800 | | 4200 | 0 🖻 | | |
| Galvanized steel sheet | 10 | kg | 800 | | 4200 | 0 🖻 | | |
| + Add Data | | | | | | | | |
| 4 Energy Consumptio | n | | | | | < | | |
| Name | | Amount | | Unit | | Action | | |
| Electricity, low voltag | e | 20 | | kWh | | ∕ ⊡ | | |
| | | | | | | | | |
| | | Cano | el | Next | | | | |

Figure 79: LCA Calculation - Sub-Assembly - List of Materials

Step 3: Select LCA calculation Methodology - Select methodology for the LCA calculation



| Sub-Assembly 1 | Sub-Assembly 2 Sub-Assembly 3 Sub-Assembly 4 | | Assembly | J | | | | |
|---|---|---|----------|---|--|--|--|--|
| LCA Test Assembly Fun | ictional Unit 1 piece of structural unit | | | | | | | |
| S Material | | | < | | | | | |
| Name | | × | Action | | | | | |
| Plastic granulate, unspecified, recycled | Calculate result & Generate report | | / ₪ | | | | | |
| + Add Data | To see result, please select one methodology Select Methodology IMPACT World+ Midpoint * | | | | | | | |
| 4 Energy Consumption | Next | | < | | | | | |

Figure 80: LCA Calculation - LCA Methodology Selection



| - | | | | |
|--|---|--|--|--|
| Ies | stal Consumptions | Test Assembly-SA2 | | |
| # | Product Name | Amount | | Unit |
| 1 | Test Assembly-SA1-Id-06cc102d | 1 | | P |
| 2 | Test Assembly-SA2-id-06cc102d | 1 | | p |
| 3 | Galvanized steel sheet, at plant/RNA | . 10 | | kg |
| Lif _{Evalu} | e Cycle Assessment ated LIFe Cycle Assessment (LCA) using | the above Life Cycle Inventory | (LCI) data | |
| Lif Evalu Ch | e Cycle Assessment ated Life Cycle Assessment (LCA) using aracterisation Damage Assessment | the above LIFE Cycle Inventory | (LCI) data | |
| Lif Evalu Cha The s | e Cycle Assessment (LCA) using aracterisation Damage Assessment ubstances that contribute to an impact ubstances for various environmental imp | the above Life Cycle Inventory Single Score category are multiplied by a choact categories. | r (LCI) data naracterisation factor t | hat expresses the relative contribution c |
| Lif Evalu Ch The s the su | e Cycle Assessment ated LIFe Cycle Assessment (LCA) using aracterisation Damage Assessment ubstances that contribute to an Impact ubstances for various environmental Imp rence: https://simapro.com/wp-content/ | the above Life Cycle Inventory Single Score category are multiplied by a ch pact categories. | r (LCI) data naracterisation factor t anualMethods.pdf | hat expresses the relative contribution o |
| Lif Evalu Ch The s the su Refer | e Cycle Assessment ated Life Cycle Assessment (LCA) using aracterisation Damage Assessment ubstances that contribute to an impact ubstances for various environmental imp rence: https://simapro.com/wp-content/ haracterisation | the above Life Cycle Inventory Single Score category are multiplied by a ch bact categories. uploads/2020/10/DatabaseMa | r (LCI) data naracterisation factor t anualMethods.pdf | hat expresses the relative contribution o |
| Char Char Refer C | e Cycle Assessment ated Life Cycle Assessment (LCA) using aracterisation Damage Assessment ubstances that contribute to an impact of ubstances for various environmental imp rence: https://simapro.com/wp-content/ haracterisation | the above LIFE Cycle Inventory Single Score Category are multiplied by a choact categories. Suploads/2020/10/DatabaseMa | r (LCI) data naracterisation factor t anualMethods.pdf | hat expresses the relative contribution o |
| Lif Evalu Cha The s Refer C Sh | e Cycle Assessment ated Life Cycle Assessment (LCA) using aracterisation Damage Assessment ubstances that contribute to an impact ubstances for various environmental imp rence: https://simapro.com/wp-content/ haracterisation ow 10 entries dicator name | the above Life Cycle Inventory Single Score Category are multiplied by a choor categories. | r (LCI) data haracterisation factor t anualMethods.pdf | that expresses the relative contribution of Search: |
| Lif Evalu Chas the site Refer C Sh In | e Cycle Assessment ated LIFe Cycle Assessment (LCA) using i aracterisation Damage Assessment ubstances that contribute to an impact ubstances for various environmental imp rence: https://simapro.com/wp-content/ haracterisation | the above Life Cycle Inventory Single Score Category are multiplied by a charact categories. Uploads/2020/10/DatabaseMai | (LCI) data haracterisation factor t anualMethods.pdf ount | that expresses the relative contribution o Search: |



| LIFE Cycle / | Assessment (LCA) using th | (LCA) Resu e above Life Cycle Inv | l CS entory (LCI) data | | |
|--|---|--|----------------------------------|---------------------------|----------------------|
| Characterisation | Damage Assessment | Single Score | | | |
| The substances that on the substances for va the substances for va Reference: <u>https://sir</u> | contribute to an impact ca rious environmental impa napro.com/wp-content/up | tegory are multiplied ct categories. bloads/2020/10/Data | by a characterisation facto | r that expresses the rela | tive contribution of |
| Characterisati | on | | | | |
| Show 10 🗸 entrie | | | | Search: | |
| Indicator name | | <u>*</u> | Amount | | Unit name |
| Acidification | | | 1.2291300179715612 | | mol H+ eq |
| Climate change | | | 234.41595023561763 | | kg CO2 eq |
| Climate change - Biog | enic | | 0.3061274919172894 | | kg CO2 eq |
| Climate change - Foss | it | | 233.19156545242151 | | kg CO2 eq |
| Climate change - Land | use and LU change | | 0.9181938546304532 | | kg CO2 eq |
| Ecotoxicity, freshwate | ۲ | | 6472.014363088129 | | CTUe |
| Ecotoxicity, freshwate | er - inorganics | | 2751.4911882363062 | | CTUe |
| Ecotoxicity, freshwate | er - metals | | 3535.3370862921556 | | CTUe |
| Ecotoxicity, freshwate | r - organics | | 185.18608855966747 | | CTUe |
| Eutrophication, fresh | vater | | 0.06572354922075375 | | kg P eq |
| Showing 1 to 10 of 28 e | ntries | | | Previous 1 | 2 3 Next |

Figure 82: LCA Calculation - LCA Report

6. Analytical Tool for Composite Material Structures

6.1 Description

The analytical tool for composite materials is based on the ESI PAM Composites suite of simulation software for composite material manufacturing processes. These software modules provide tools to assess the manufacturing process of a composite part and optimise it to reduce time and cost whilst maintaining quality prior to mass production. For these simulations, a large number of material characteristic data (such as density, thermal conductivity, stiffness etc.) are typically required, which are usually obtained from time-consuming and expensive coupon tests.

One of the benefits of the JIDEP material passport is the ability to store information from previous material characterisation tests and store them for use in future projects. This aims to save time and cost for material characterisation on new projects and help optimise the manufacturing process to increase efficiency and sustainability. The analytical tool and the material passport have been developed together to ensure that



the relevant material characteristics are stored and in a usable format for the manufacturing simulations, as will be demonstrated in this manual.

The test case that is demonstrated in the JIDEP project is the simulation of curing for an automotive composite floor beam for end user Adler (see Figure 1). The part is a composite floor beam which is comprised of a foam core with metallic and fibreglass inserts surrounded by a skin of carbon fibre prepreg. The part components (core, inserts and wet carbon fibre prepreg skin) are assembled in a mould with a 0/90/0/90/0/90/45/-45/0/90/45/-45 stacking sequence for the prepreg laminate. Afterwards, it is placed in an oven to apply heat and pressure to cure based on parameters supplied by Adler (see Figure 1). The simulation test case here will give an example of how the analytical tool works to simulate the curing behaviour of the part with the provided manufacturing parameters.



Figure 83: JIDEP composite analytical tool test case: composite crossbeam (left) and manufacturing parameters (right)

6.2 Key Features

The composite analytical tool aims to provide a simplified and efficient way for end users to quickly assess how the chosen manufacturing parameters (temperature, pressure, etc.) affects the part and how it impacts the manufacturing process (time and energy required). To allow this, the tool has the following features:

| Feature number | Feature |
|----------------|---|
| F001 | Allow assessment of part behaviour (in this case curing) during the manufacturing process based on chosen parameters (temperature, pressure etc.). This allows the adjustment of the parameters to find optimum values. |
| F002 | Accepts material characteristics data from the JIDEP material passport to reduce the need for characterisation tests. |
| F003 | Readily accepts end-user CAD data and can tolerate minor gaps and intersections between parts without the need to fix geometry. |
| F004 | Has an automated meshing workflow to defeature complex geometry and create tetra mesh that is suitable for the curing simulation. |

Table E Kay Franking of Commonite Material Structures



| F005 | Provides complete visualisation of manufacturing parameters and |
|------|---|
| | curing behaviour of the part during the manufacturing process |
| | period. |

6.3 Operation Manual

The operation of the tool can be split into 5 steps:

- (1) importing parts and meshing,
- (2) defining process conditions,
- (3) defining materials,
- (4) defining heat transfer interfaces, and

(5) analysis and results.

These steps will be detailed below, and a video version is available by clicking this <u>link</u>. Importing parts and Meshing

- 1. The tool readily receives CAD files of parts and assemblies in several formats. However, to avoid importing errors in the geometry, it is recommended to use the .igs format.
- 2. Start by opening the ESI PAM composites suite and going to the Visual Mesh module. Create a new file, import parts through file append, and select the CAD file. The part will be imported as a geometry, as shown in Figure-71.



Figure 84: Imported foam core part

3. To mesh the part, go to the workflow tetra mesh process. This will show the workflow window on the left panel of the screen (see Figure 72). To start the process, click the play button at the bottom of the workflow. A window will pop up with the meshing parameters, as shown in Figure 72. For this case, the element size is 4mm with simple topology simplification (which defeats the geometry if it is too complex to mesh). Click OK, and the part will be meshed automatically.





Figure 85: Tetra mesh workflow

4. Complete the process for all parts (including mould). This can be done in 1 file or by creating separate files for each part and then appending them together after meshing. For the test case, the meshed part and mould are shown in Figure 73 and Figure 74.



Figure 86: Meshed part





Figure 87: Mould

6.3.1 Defining Process Conditions

- 1. Once the part and mould are meshed, we need to define the process conditions we subject them to. In this case, the provided parameters (temperature and pressure) are given in Figure 72. Since the curing process is thermochemical, only the temperature profile will be applied to the part and mould.
- 2. To do this, switch to the Visual RTM module and go to RTM simulation parameters (see Figure 75). Select the simulation type as curing and then define the simulation time In Figure 1, the process is 200 minutes or 12000 seconds. Here, we define the time as 24000 seconds to give an extra period after heating to see how the part behaves. Select the resin which corresponds to the matrix of the carbon fibre prepreg (here, it is labelled as resin c). If it is not yet defined, it can be created in the materials tab (as will be shown in the next section on defining materials).



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| — 3=>Geo_Crossbeam_foarm_2_MS0121995RH | o comp | |
| - 4=>Mesh_Crossbeam_foam_2_MS0121995RH | | |
| 6=>Mesh_Crossbeam_gls_insert_1_MS0121B18 | Process Duration : 24000 sec | |
| — 7=>Geo_Crossbeam_gls_insert_2_MS0121B18_2 | May time Cleo : 120.00 rec | |
| 9=>Mesh_Crossbeam_gls_insert_2_MS0121 Define cure | Prote Calculture | |
| 10=>Mesh_Crossbeam_alu_insert_1_MS012 Simulation | Risin Selection | |
| -O 11=>Geo_Crossbeam_alu_insert_2_MS0121 | Database : User 🗳 🕂 | |
| 12=>Mesh_Crossbeam_alu_insert_2_MS012 Parameters : | Injected Resin : RESIN_C 🖌 🥖 | |
| 14=>Mesh_Crossbeam_CFRP_laminate_MS | Initial Degree of Cure : 1e-05 | |
| -O 15=>Geo_Mould_Mould_top_1_ID41 | | |
| 16=>Mosh_Mould_Mould_top_1_ID41 (curing) | Output Frequency | |
| -0 18=>Geo_Mould_Mould_bottom_ID07_fixduration_of | Type . The V | |
| 20->Mesh_Mould_Mould_bottom_2_ID08 | Frequency : 120 | |
| O 21=>Geo_Mould_endplate_1_ID35_fix Process | | |
| - 23=>Geo_Mould_endplate_2_ID38 - resin to be cured | | |
| 24=>Mesh_Mould_endplate_2_ID38 | Advanced | Pim |
| Collectors (6) - Initial cure state | SER | |
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- Figure 88: Setting simulation parameters in Visual RTM
- 3. Next, define the process parameters to apply to the part. To apply temperature, go to the process condition section on the simulation tree (on the left) and double-click convection to create a convection heating condition (see Figure 76). Click region to define the surface where the temperature will be applied, which in this case, is the outside of the mould as highlighted in red. The convection coefficient of the mould can be found in the material passport (under Aluminium). The temperature profile in Figure 76 can be entered in a tabular fashion at the bottom of the window.



Figure 89: Defining convection parameters



6.3.2 Defining Materials

- 1. Once the manufacturing process conditions have been defined, it is time to define the materials of the various components in the model. In general, for curing simulations, there are 2 types of materials: curing and non-curing. Curing materials are ones that, throughout the simulation, will transition from a liquid/viscous state into a solid state due to the process conditions applied (in this case, the carbon fibre prepreg skin). Non-curing materials are the other materials that do not cure and just propagate the temperature that is being applied (in this case, the aluminium mould, foam core, as well as the glass fibre and aluminium inserts).
- 2. To define the materials, go to database materials. This will show all the materials in their respective categories. The non-curing materials can be defined in the mould materials section, as shown in Figure 77. To create a new material, double-click the mould section on the tree on the left. For non-curing materials, there are 2 tabs of material properties: general (density) and thermal (conductivity and specific heat). These values can be found in the JIDEP material passport for all the materials.



Figure 90: Non-curing material tab

3. For the carbon fibre prepreg skin, there are 2 components: the carbon fibres and the resin matrix. The carbon fibres can be defined under the reinforcements section of the material database (see Figure 78). For reinforcements, there are also 2 tabs of material properties: general (density) and thermal (conductivity and specific heat). These values can be found in the JIDEP material passport for carbon fibre. Other inputs, such as permeability, can be left empty.



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| Material Database | | |
| File Database Unit | | |
| All Name PREFORM_F | Length Linit: mm | |
| Owner Na AZM | Simulation Type: Curing | |
| | | |
| Dehlic Hove Model General Thermal Mechanical +/- | | |
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| (t) ⊕ Resin (t) Durinsky ∪ Const. 2500 kg/m 3 ∪ Durinsky Let principal mit. Const. 2500 kg/m 3 ∪ | | |
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Figure 91: Reinforcement material tab

4. The resin component of the carbon fibre prepreg can be defined in the resin section of the material database (see Figure 79). For the resin, there are the same general (density) and thermal (specific heat and conductivity) material characteristics tabs as the non-curing materials. However, there is an additional chemical properties tab which includes the properties that control the thermochemical behaviour of the resin as it cures (enthalpy and kinetic profile). All of these values are available in the JIDEP material passport.

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Figure 92: Resin material tab

5. Once the materials have been defined, it is time to assign them to the parts in the model. To assign the non-curing materials, go to the RTM part manager



(see Figure 80). Here it is possible to assign the materials defined previously to each part in the model.



Figure 93: Assignment of non-curing materials

6. To assign the carbon fibre prepreg material to the skin, first go to RTM part orientation and define the reference coordinates for the fibres. Then go to the RTM layer design manager to define the individual layers of the carbon fibre prepreg laminate and which part it is assigned to (see Figure 81). The thickness and fibre content are available in the JIDEP material passport.

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Figure 94: Layer design manager



6.3.3 Defining Heat Transfer Interfaces

1. Once the materials and process conditions have been defined, it is time to define the heat transfer interfaces which control the propagation of heat between parts. To define an interface, go to the interfaces section on the tree on the left and select the thermal non-coincident interface (see Figure 82). The non-coincident interface provides a coupling between surfaces that do not necessarily need to be in contact and have coincident meshes. This is useful when the CAD is not completely aligned (gaps or overlap), possibly due to manufacturing or other considerations (see Figure 83).



Figure 96: Example of mesh non-coincidence in test case



- 2. To define the interface, first, the surface pair between the parts need to be selected (Figure 82). Then, the tolerance values are needed, which are commonly half of the element size used (see meshing section) or the magnitude of misalignment (overlap or gaps) between meshes. Finally, a heat transfer coefficient between the materials of the parts in the interface is needed, which can be found in the JIDEP material passport.
- 3. The interface needs to be defined between each contact pair of the parts in the model to appropriately simulate the heat transfer in the assembly (see Figure 82).

6.3.4 Analysis and Results

1. Once all the interfaces have been defined, the model is complete, and the simulation is ready to run. To do so, go to RTM run simulation, and it will open the start simulation. When the simulation is started, a log can be displayed that shows the progress of the simulation (see Figure 84).



Figure 97: Curing simulation in progress

2. When the simulation is complete, the results can be accessed by going to RTM Load results, which will switch the module to Visual Viewer (see Figure 15)




- Figure 98: Loaded simulation results
- 3. To view the results, go to results contour, and a list of available results will be displayed. To view the curing condition, choose the CURE option (see Figure 86). This should display the cure condition of the part at the start of the simulation (time 0s, see Figure 86).



Figure 99: Selecting contour results to visualize

4. To view how the cure condition changes with time, go to the animation tab on the toolbar, where you can select play, pause or move 1 frame at a time (see Figure 87). The contour will display a range from 0-1 with 0 being completely wet/uncured and 1 being completely cured.





Figure 100: Cure simulation results at 2208s

7. PCB Analytic Tool

7.1 Description

The PCB analytic tool uses camera vision to recognize PCBs or PCB component types, such as processors, capacitors, resistors, etc., and the component locations on the PCB.

The tool has two approaches depending on the PCB. If the PCB is registered in the database, the analytic tool classifies the PCB and generates a Bill of Materials (BOM) with a unique identifier. On the other hand, if the PCB is not registered in the database, the analytic tool proceeds with a detection approach, which identifies each PCB component and generates a BOM with a unique identifier.

| Table 6 Key Features of PCB Analytic Tool | | | | | | |
|---|------------------------------|----------------------------|--|--|--|--|
| Feature number | Feature name | Tool Approach | | | | |
| F001 | PCB Classification | Classification | | | | |
| F002 | PCB Component Detection | Detection | | | | |
| F003 | Unique Identifier Generation | Classification / Detection | | | | |
| F004 | BOM Generation - PCB | Classification | | | | |
| F005 | BOM Generation - | Detection | | | | |
| | Component | | | | | |

7.2 Key Features

7.3 Operation Manual

After opening the PCB analytics tool, the user is prompted to use either an image of a PCB (energy-saving mode) or a direct video feed to analyse the PCB. After the user



presses the 'Detect' button, the analytics tool starts searching the database. If the PCB is 'known', the analytics tool uses the F001 Classification approach to predict the PCB. If the prediction confidence is high enough, the user is prompted to click 'Generate Material Passport'. Then, the analytics tool uses feature F003 to generate a unique serial number for the processed PCB and feature F004 to generate a BOM based on the classification approach.

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| Predicted PCB s: Generate Material Passport | | 99. 45% Arduino Mini Pro |
| | Classification known PCB | |

Figure 101 - PCB analytic tool analysis approach based on features F001 and F002. If the PCB is 'unknown' or not in the database, the analytics tool uses the F002 Detection approach. First, the analytics tool uses feature F003 to generate a unique serial number for the new PCB. Next, the tool begins to take macro images of the PCB and stitches them to create an HD image of the PCB while locating and creating coordinates for each PCB component. Once the process is done, and the PCB components are identified, the user is prompted to click 'Generate Material Passport'. Then, the analytics tool uses feature F005 to generate a BOM of the unknown PCB based on the detection approach.



Figure 102: PCB analytic tool feature F002 detection approach.

8. Environmental Analytic Tool

Envionmental Analytic Tool is still in development, we will provide the operation manual in next version of this deliverable.



9. Troubleshooting

9.1 Common Issues and Solutions

9.1.1 Data Validation Errors:

Symptom: The system rejects input data, indicating validation errors.

Solution: Review each field for proper data format. Ensure numerical values are accurate, percentages are within the valid range, and text inputs meet character limits. Error messages often guide you to the specific issue.

9.1.2 Calculation Discrepancies:

Symptom: Circular indicator values seem inconsistent or unexpected.

Solution: Verify that all input parameters align with the intended material assessment. Double-check the weight units, percentage values, and other numerical inputs. If discrepancies persist, consider recalculating with a fresh set of inputs.

9.1.3 Unresponsive Interface:

Symptom: The tool responds slowly or freezes during use.

Solution: Check your internet connection for stability. If the problem persists, try accessing the tool during non-peak hours. Clear your browser cache or switch to a different browser to rule out local issues. Contact support if the problem persists.

9.1.4 Missing Data:

Symptom: Inability to locate specific data.

Solution: Confirm that the data is added correctly to the system. Check for typos or variations in the fields. If the issue persists, contact support for further assistance.

9.1.5 Compatibility Issues:

Symptom: Display issues or functionality problems specific to certain browsers.

Solution: Ensure you are using a supported browser. Update your browser to the latest version or try an alternative browser to see if the issue persists. Check for the tool's recommendations on browser compatibility.

9.1.6 Persistent Issues:

Symptom: Problems persist despite attempted solutions.



Solution: Contact concerning tools development team for support with detailed information about the issue, steps leading to the problem, and any error messages received. The support team is here to provide personalized assistance.

10. Conclusions

With the final version of deliverable D4.1, the JIDEP project achieves a significant milestone in advancing sustainable and innovative industry solutions. The Environmental Analytic Tool, Material Passport, Circularity Calculator, and advanced analytical tools for composite material structures and PCBs collectively reflect our dedication to promoting sustainability, transparency, and technological excellence. The Collaborative Space, Material Passport, Circularity Calculator, and Environmental Analytic Tools are accessible through the JIDEP platform at https://jidep.co. However, the Analytical Tool for Composite Material Structures and PCB Analytic Tool, developed solely as independent tools, is currently exclusive to consortium members, highlighting the unique benefits of being part of our project. By promoting collaboration, embracing innovation, and prioritizing environmental responsibility, we are paving the way for a brighter, more responsible future for industries worldwide.

