Inputs

CSV path

Thales_Group_Manufacturing.csv

Model path

model.joblib

Metrics path

metrics.json

Filters

Rows to load (for speed)

| 20000 | − | + |

Machine selector

1 ×   2 ×   3 ×   ⊗ ⌄

Operation mode dropdown
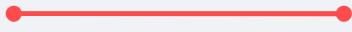
All ⌄

Time window filter

2025-01-01   2025-01-14

Metric sensitivity sliders

Latency weight

0.60
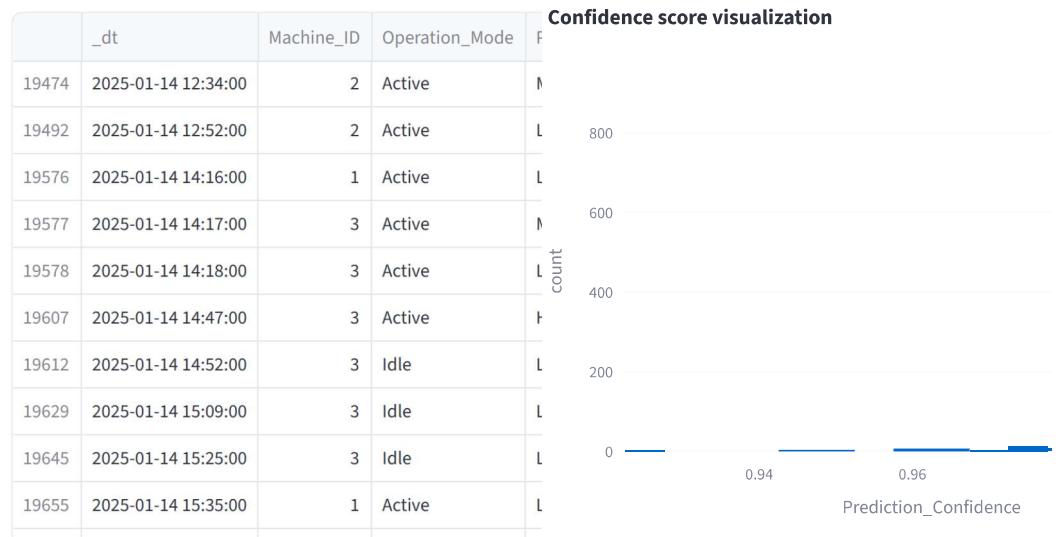
AI-Based Manufacturing Efficiency Classification

Operational Monitoring View

Rows	Avg Temp (C)	Avg Latency (ms)	Avg Reliability
1,188	**59.65**	**25.47**	**0.465**
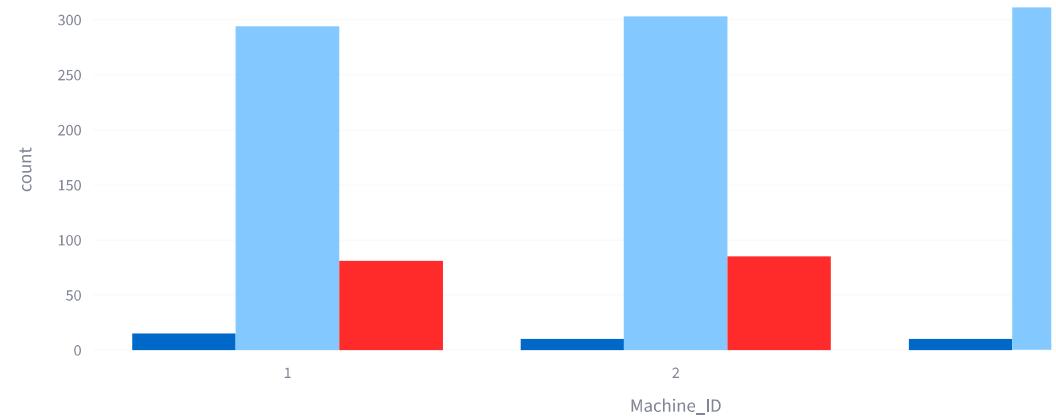
Efficiency Prediction Dashboard

Model in use: `rf`

	_dt	Machine_ID	Operation_Mode	
19474	2025-01-14 12:34:00	2	Active	N
19492	2025-01-14 12:52:00	2	Active	L
19576	2025-01-14 14:16:00	1	Active	L
19577	2025-01-14 14:17:00	3	Active	N
19578	2025-01-14 14:18:00	3	Active	L
19607	2025-01-14 14:47:00	3	Active	H
19612	2025-01-14 14:52:00	3	Idle	L
19629	2025-01-14 15:09:00	3	Idle	L
19645	2025-01-14 15:25:00	3	Idle	L
19655	2025-01-14 15:35:00	1	Active	L

Confidence score visualization


Machine-Level Insights
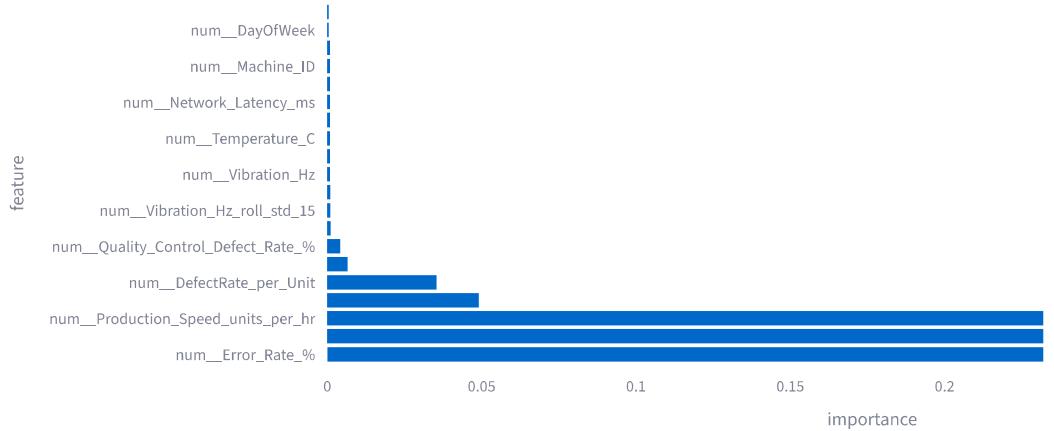
Efficiency trends per machine

Explainability Panel

Feature importance charts (model-dependent).

Top drivers of efficiency status

☐ Explain why a sample is classified as Low / Medium / High (SHAP)

Model Development Summary

```json
{
  "best_model_name" : "rf"
  "metrics_by_model" : {
    "logreg" : {
      "cv_accuracy_mean" : 0.9061682467298692
      "cv_accuracy_std" : 0.001897973703340129
      "last_fold_report" : {
        "High" : {
          "precision" : 0.6934812760055479
          "recall" : 0.9633911368015414
          "f1-score" : 0.8064516129032258
          "support" : 519
        }
        "Low" : {
          "precision" : 0.9872521246458924
          "recall" : 0.9094328037454908
          "f1-score" : 0.9467460349167033
          "support" : 13029
        }
        "Medium" : {
          "precision" : 0.6959168146081663
          "recall" : 0.8800513149454778
          "f1-score" : 0.7772270216683189
          "support" : 3118
        }
        "accuracy" : 0.905616224648986
        "macro avg" : {
          "precision" : 0.792216738419869
          "recall" : 0.9176250851641701
```

                    "f1-score" : 0.843474889829416
                    "support" : 16666
                }
              ▼ "weighted avg" : {
                    "precision" : 0.9235985444741674
                    "recall" : 0.905616224648986
                    "f1-score" : 0.9106622062635497
                    "support" : 16666
                }
            }
          ▼ "last_fold_confusion_matrix" : [
              ▼ 0 : [
                    0 : 500
                    1 : 0
                    2 : 19
                ]
              ▼ 1 : [
                    0 : 0
                    1 : 11849
                    2 : 1180
                ]
              ▼ 2 : [
                    0 : 221
                    1 : 153
                    2 : 2744
                ]
            ]
        }
      ▼ "rf" : {
            "cv_accuracy_mean" : 0.9996759870394815
            "cv_accuracy_std" : 0.00031886068056132834
          ▼ "last_fold_report" : {
              ▼ "High" : {
                    "precision" : 1
                    "recall" : 1
                    "f1-score" : 1
                    "support" : 519
                }
              ▼ "Low" : {
                    "precision" : 1
                    "recall" : 1
                    "f1-score" : 1
                    "support" : 13029
                }
              ▼ "Medium" : {
                    "precision" : 1
                    "recall" : 1
                    "f1-score" : 1
                    "support" : 3118
                }
                "accuracy" : 1
              ▼ "macro avg" : {
                    "precision" : 1
                    "recall" : 1

```
                "f1-score" : 1
                "support" : 16666
              }
            ▼ "weighted avg" : {
                "precision" : 1
                "recall" : 1
                "f1-score" : 1
                "support" : 16666
              }
          }
        ▼ "last_fold_confusion_matrix" : [
            ▼ 0 : [
                0 : 519
                1 : 0
                2 : 0
              ]
            ▼ 1 : [
                0 : 0
                1 : 13029
                2 : 0
              ]
            ▼ 2 : [
                0 : 0
                1 : 0
                2 : 3118
              ]
          ]
      }
    ▼ "xgb" : {
        "cv_accuracy_mean" : 0.9984759390375615
        "cv_accuracy_std" : 0.0005347961107681911
        ▼ "last_fold_report" : {
            ▼ "High" : {
                "precision" : 0.998062015503876
                "recall" : 0.9922928709055877
                "f1-score" : 0.9951690821256038
                "support" : 519
              }
            ▼ "Low" : {
                "precision" : 0.9990787655458314
                "recall" : 0.9988487220815104
                "f1-score" : 0.9989637305699481
                "support" : 13029
              }
            ▼ "Medium" : {
                "precision" : 0.9939180537772087
                "recall" : 0.995830660679923
                "f1-score" : 0.9948734380006409
                "support" : 3118
              }
            "accuracy" : 0.9980799231969278
            ▼ "macro avg" : {
                "precision" : 0.9970196116089721
                "recall" : 0.9956574178890071
```

          "f1-score" : 0.996335416898731
          "support" : 16666
        }
        ▼ "weighted avg" : {
          "precision" : 0.9980815981051535
          "recall" : 0.9980799231969278
          "f1-score" : 0.9980803179470205
          "support" : 16666
        }
      }
      ▼ "last_fold_confusion_matrix" : [
        ▼ 0 : [
          0 : 515
          1 : 0
          2 : 4
        ]
        ▼ 1 : [
          0 : 0
          1 : 13014
          2 : 15
        ]
        ▼ 2 : [
          0 : 1
          1 : 12
          2 : 3105
        ]
      ]
    }
  }
  ▼ "class_distribution" : {
    "Low" : 77825
    "Medium" : 19189
    "High" : 2986
  }
  "imbalance_ratio" : 26.063295378432684
  "class_weight" : "balanced"
}