PRODUCTION FORECASTING IN
PACKAGING

OUR STORY

1970

First prototype

for the family dairy

1985

March, 1st:

Galdi was founded

1993

First time

outside Italy

2010

Lean

Manufacturing

2011

Russia Strategic

Business Unit

2013

Morocco Strategic

Business Unit

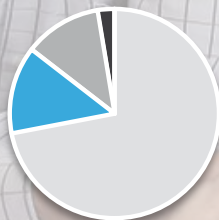**2015**

USA Strategic

Business Unit

2018

Algeria Strategic

Business Unit

2

WHO WE ARE

105 EMPLOYEES QUALIFICATION

89 ITALY
16 ABROAD

71,0% Engineering
12,0% Financial
15,0% Linguistic/Humanities
2,0% Others

2413 HOURS OF TRAINING

966 Improvement of technical, production, design and software skills.

1167 Communication and teamwork skills.

280 Rolling improvement, safety standards, certifications, corporate and innovation strategies.

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AFTER SALE

ENGINEERS ON THE FIELD   11

Our pro-active professionals support you in the training phase and in all technical aspects.

Benefit of their know-how to make the most of your packaging system!

ON DEMAND   CHECK-UP

Evaluation of the actual status of your Galdi filler with dedicated study of the revamping project. Experienced technical support into the evaluation of refurbishment of second-hand machines.

TAILOR MADE
MAINTENANCE SOLUTIONS   7

Dedicated maintenance solutions suitable for all kinds of production scenarios.

Ask our After-Sales Dept. for more details.

KEEPING UP WITH THE TIMES   UPGRADE

Extend your machine life-cycle by taking advantage of Galdi's innovative maintenance programmes; take care of the environment by reducing the use of energy and water, or improve your TCO by simply implementing dedicated technical solutions. **Just ask Galdi!**

RG SERIES

CAPACITY
2.000 – 7.000 pc/h

TECHNOLOGY
Clean / Ultra Clean / Hot Fill

FILLING SYSTEM
Flow Meter / Double Diaphragm Filler / HV Piston

MANY OPTIONS AND CUSTOMIZATIONS AVAILABLE

RG SOLUTIONS

ESL PRODUCTS   **VISCOUS**   **LIQUID EGG**   **HF JUICE**   **DRY FOOD**

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USE CASE: PERFORMANCE FORECAST

MES SYSTEMS? NO THANKS, THEY ARE ALWAYS IN LATE. WE NEED TO SEE IN THE NEAR FEATURE, NOW!

GOAL

Forecast production performance for an automatic filling machine designed for inline forming, filling and sealing of gable top cartons.

PERFORMANCE METRICS

- Machine Mechanical Efficiency (**MME**)

- Overall Equipment Effectiveness (**OEE**)

PERFORMANCE ESTIMATION FOR

- Predictive Maintenance/Service optimization actions

- Optimizing production related decisions (i.e., the production scheduling)

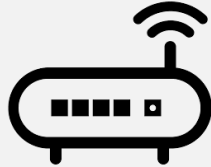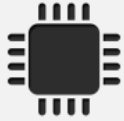## PRODUCTION PERFORMANCE IS PIVOTAL DUE TO

- Strict hygiene requirements (down time caused by packaging machines can lead to product waste)

- **The time to fix the equipment before products have to be discarded is very limited**

HOW WE DO IT

GALDI IIoT ARCHITECTURE

https://mash.galdi.it

HOW IT WORKS

MACHINE INTELLIGENCE VIA MACHINE LEARNING

Problem
- Definition
- Expected Impact
- Evaluation Metric

Cleaning
- Quality
- Reconciliation
- Missing Data Handling
- Denoising
- Outlier detection

Roll-out
- Online Implementation
- Business Outcome
- Improvement

Collection
- Conversion
- Parsing
- Aggregation
- Alignment

Modelling
- **Feature Extracion**
- **Building**
- **Evaluation**

LEARNING FROM DATA
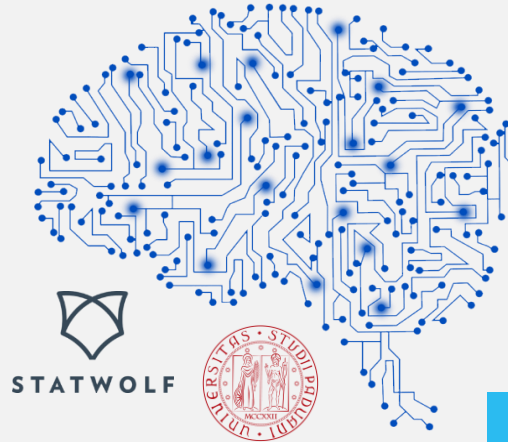
DEEP LEARNING ON PRODUCTION DATA

Alarm Counts

Machine
Time Intervals

Past values of
Performance
Index

STATWOLF

Forecast of
Performance
Index

Problem formulation: sequence
forecasting based on multiple inputs.

Based on Deep Learning to avoid
hand-engineered feature extraction

GALDI

PreMANI

- Accepted paper of preliminary results in:

L. Brunelli, C. Masiero, D. Tosato, A. Beghi, G.A. Susto
Deep Learning-based Production Forecasting in Manufacturing: a Packaging Equipment Case Study
29th International Conference on Flexible Automation and Intelligent Manufacturing
24th - 28th June 2019 @ Limerick (Ireland)

- Upgrade machine sensors

- Open dataset on Mendeley Data

be the change you wish to see in the world

Mahatma Gandhi

GALDI