UNOTECH®
LM GROUP

UPASMART®.
THE SMART CHANNEL BALING PRESS

Automatic Channel Baling Press
equipped with Artificial Intelligence.

Supported by:
Federal Ministry for Economic Affairs and Energy
on the basis of a decision by the German Bundestag

BALE CONTROL.
TODAY'S STATE OF THE ART.

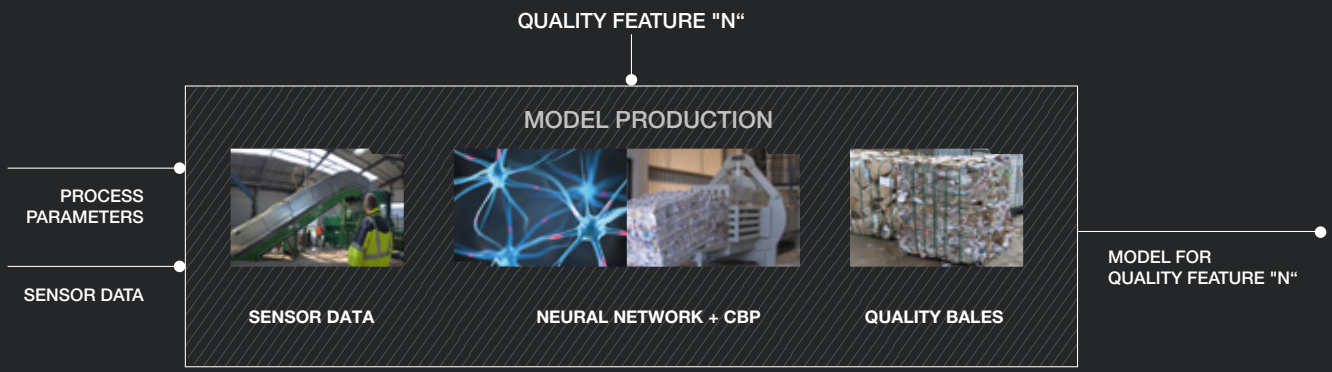
As an innovative developer and manufacturer of fully automatic channel baling presses (CBPs), unoTech® GmbH has developed eight different series of baling presses on the highest level of the state of the art.

According to the current state of the art, the presses, when purchased, have a specified number of settings/machine parameters (recipes).

Depending on the material, the operator can adjust these recipes by a push of the button or a selector switch. The specified recipe settings, which unoTech® compiled from variable process parameters, are the result of long-standing experience and engineering performance.

Our next phase of evolution provides smart control of the channel baling press (CBP) for improving the bale weights while saving energy. The methods of artificial intelligence help us produce compacted bales optimally.

PROCESSING DATA.



CHANNEL BALING PRESS WITH ARTIFICIAL INTELLIGENCE. PROCESSES AND TECHNOLOGY.

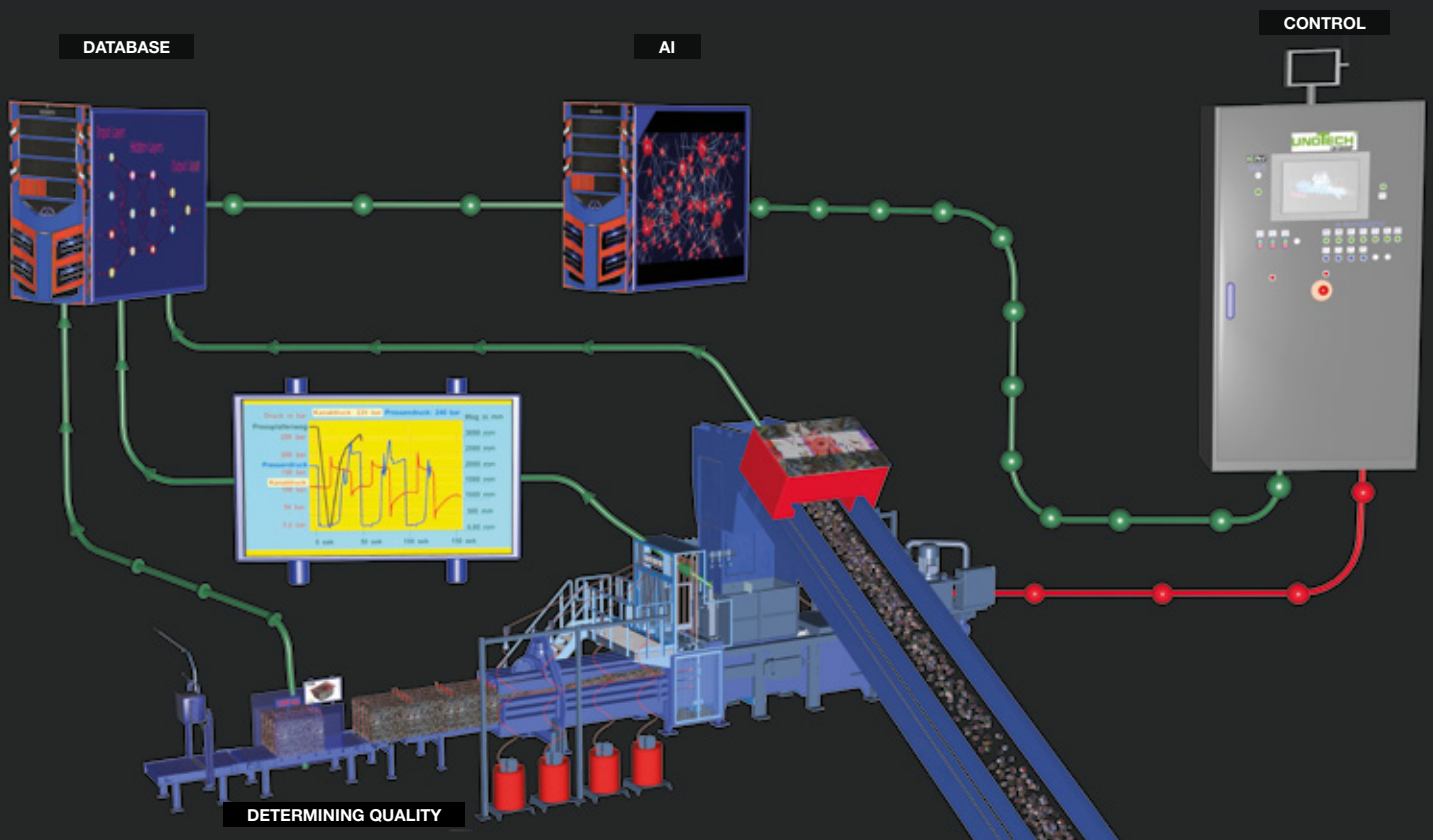
Together with the Bremen University (Institute for Integrated Product Development), the LM-GROUP has developed the fully automatic AI-based channel baling press (CBP), since September 2015 within the research and development project, FKZ 03ET1326A, as promoted by the Federal Ministry of Economics and Technology, The aim of the project is to increase energy efficiency during the compaction of secondary raw materials from waste.

Scientists just have dealt with quality assurance and quality evaluation of the „bale“ product over a long period of time. In particular, the determination of bale volumes was much more difficult than expected before since it requires extensive calculation models.

Determining the bale volume and shape deviation

ACQUISITION OF RAW DATA

DATABASE AND NEURAL NETWORK

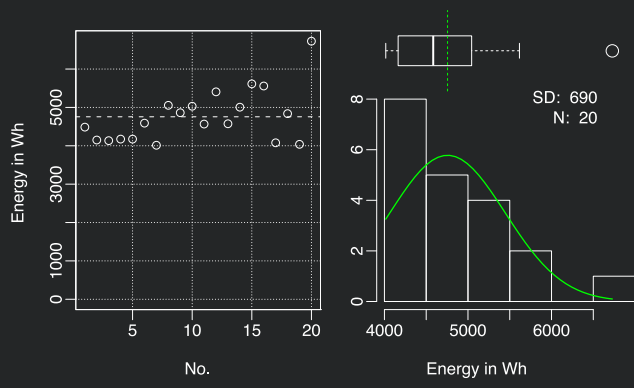


SCHEMATIC OF THE CHANNEL BALING PRESS WITH AI 1.0

PROGRAMMING AI.
DATA ANALYSIS AND EVALUATION.

Up to now, recyclable waste has been pressed to form bales by specified machine parameters to meet the required criteria (optimum density, stability, shape). The inhomogeneity of the input material is so complex that the machine parameters (recipes) can only be determined on the basis of empirical values. Optimizations in terms of bale quality and energy consumption were empirically determined because of lacking data.

Having the data of the input flow acquired by sensors on an AI-base, the R&D project was aimed at controlling CBP process parameters such that as little energy as possible is required for an optimum bale (in terms of density and shape). A learning phase of several years was necessary for AI until it could be used for an automatic control of the CBP. Due to the changing input flows and machine setups the use of recipes and their transfer to other applications it is very difficult to compare them or may not be possible at all.



Recording of data of energy consumption through the example of cardboard

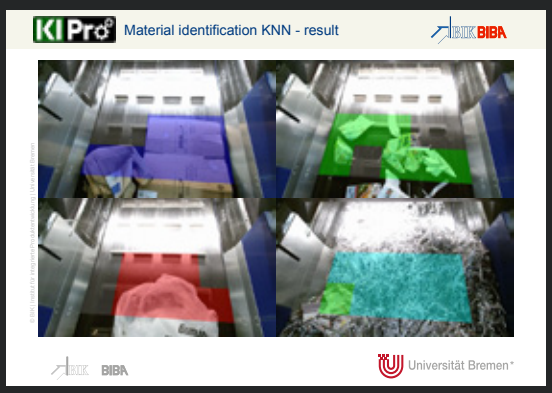
DECISION

PROCESS SETTINGS

STATE OF THE ART WITHOUT AI

ENERGY CONSUMPTION APPROX. 4,000 Wh/BALE

MATERIAL IDENTIFICATION BY AI



ENERGY CONSUMPTION APPROX. 3,600 Wh/BALES

By integrating AI-based control, we can achieve fully automatic and optimal operation of the plant, both in terms of energy input and the qualities to be produced.

Michael Ludden, Managing partner of the LM-GROUP

UPASMART® ADVANTAGES AT A GLANCE.

- Increase energy efficiency
- Automatically produced optimum bale
- Individual definition of the criteria with respect to the desired bale quality
- Assurance of the selected output qualities
- Production of integral bales
- Continuous acquisition and evaluation of all process data
- Simple labeling of bales
- Assurance of data security
- Saving of operating personnel
- High operational safety
- System updates by continuously acquired training data

ADVANTAGES BY PREDICTIVE MAINTENANCE:

- Data on the state of the press and operating data as well as the energy consumption can be retrieved
- Detailed maintenance messages on the maximum availability and optimal press operation

UNOTECH® GMBH. BALING PRESSES FOR OPTIMISING YOUR LOGISTICIS.

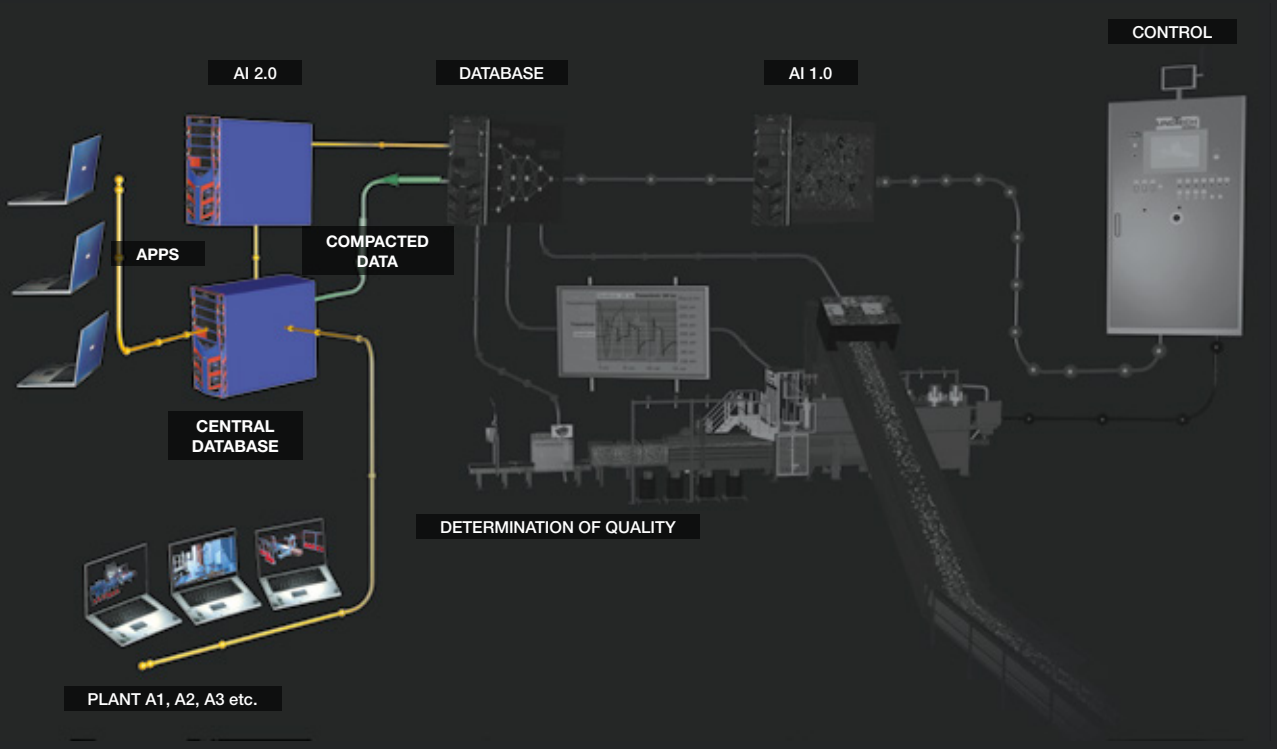
unoTech® GmbH is an internationally operating developer and manufacturer of automatic baling presses for compacting miscellaneous waste materials such as paper, cardboard, plastics, household waste or tin cans. The company, which has grown continuously since 2007, develops sturdy machine equipment for a maximum material compaction and for the production of sort-separated and optimally transportable bales.

Achieving pressing forces within a segment of 400 to 2,300 kN, the powerful unoTech® presses can reduce volumes to up to 95%. The powerful machines of the owner-managed company are customised to the miscellaneous target markets and the specific requirements of their customers.

UPASMART® CAN OFFER FURTHER FUNCTIONS AS "ADD-ON" FOR AI.

OD HOE 200 18 / 05

By being processed in AI, recorded process data can additionally be evaluated and provided by individually created apps to view processed operating figures. For the purpose of “predictive maintenance“, service may be scheduled in time, and the availability of the presses can be optimised to a maximum. For a further refinement of the first AI developed in the R&D project, the existing database and can be supplemented and extended permanently and site-wide by data from other systems. The basis for processing and compressing the digitized data has been created by the R&D project. It is then a matter of improving these models by additional data. The former models will then be superseded by the optimised models in the form of updates as AI 2.0, 3.0 etc..



YOU HAVE ANY QUESTIONS ABOUT THE PRODUCT?

We will be pleased to answer questions about the intelligent **UPASMART®** channel baling presses at upasmart@unotech.de.

UNOTECH® GMBH
Feldkoppel 17 ▪ 49779 Niederlangen
Germany

www.unoTech.de

UNIVERSITÄT BREMEN
Bibliothekstraße 1 ▪ 28359 Bremen
Germany

www.uni-bremen.de