

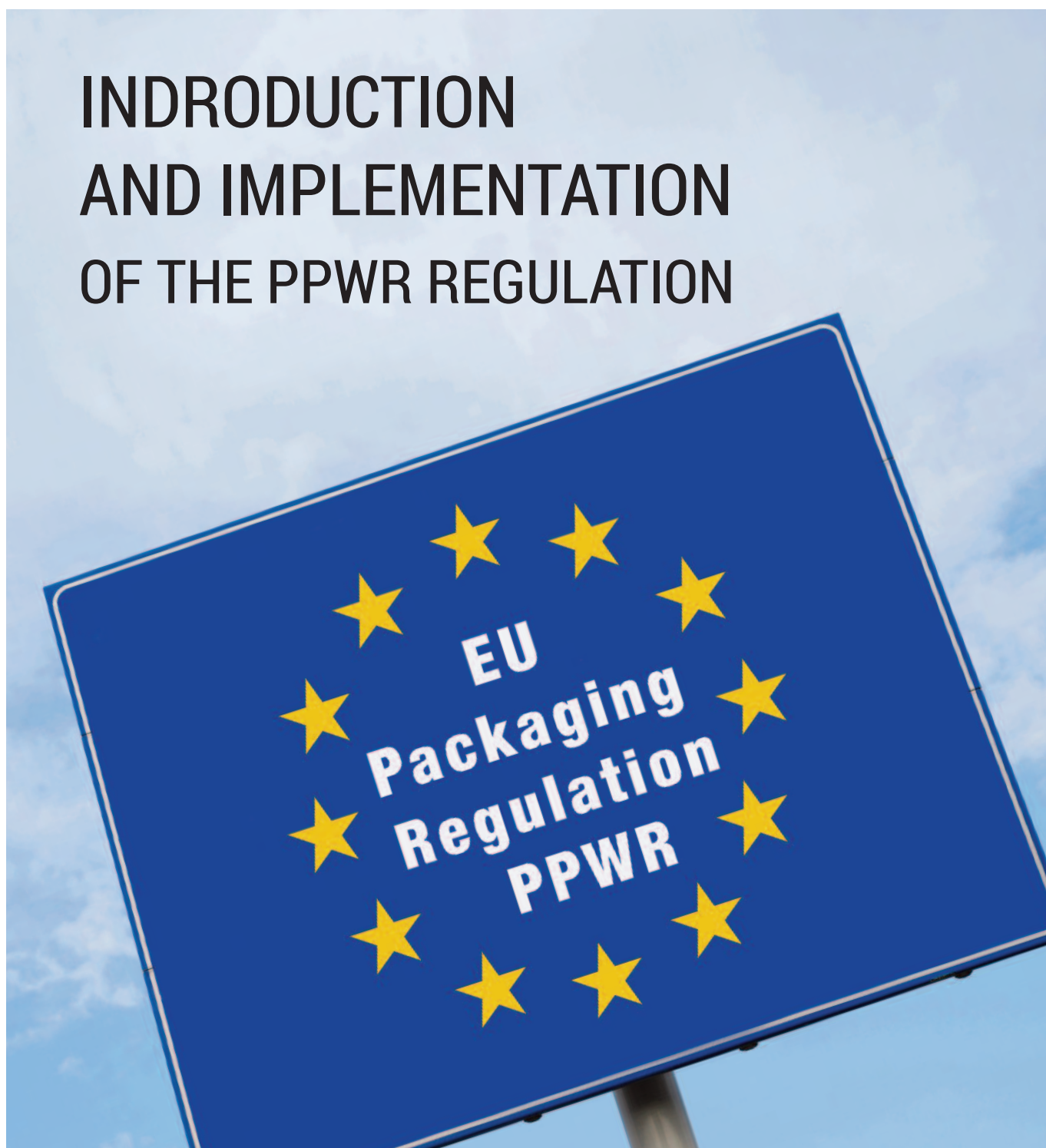
Packaging Review

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OF THE PACKAGING INDUSTRY

INTRODUCTION AND IMPLEMENTATION OF THE PPWR REGULATION



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On June 9, I had the pleasure of attending the "BrauBeviale meets Europe" meeting in Warsaw and learning about the findings of a report on beverage markets in Poland, Ukraine and the Baltic States. It reveals an industry shaped not only by changes in what people drink, but also by why they choose a particular product.

Interest in health, functional drinks and alcohol-free options is growing. At the same time, consumers continue to seek shared experiences, pleasure and a sense of belonging. For packaging professionals, this sends a clear message: new formulations and drinking occasions call for a fresh look at packaging functions, formats and communication.

Attractive design alone is not enough. Product protection and convenience must be balanced with material efficiency, logistics, reuse and recycling. This requires an assessment of the whole system, rather than the bottle or can in isolation.

This approach reflects the theme of BrauBeviale 2026: "Time for Opportunities". The November event in Nuremberg will explore practical responses to market challenges, from resource savings and flexible production to turning by-products into valuable resources, including packaging materials.

At Packaging Review, we encourage readers to consider these changes through research and practical application. The future of beverage packaging depends not only on new materials, but also on a sound understanding of consumer needs.

Anna Naruszko, M.Sc. Graduate of the Institute of Printing at Warsaw University of Technology (currently the Department of Printing Technologies, Faculty of Mechanical and Industrial Engineering, Warsaw University of Technology). Editor-in-chief of the monthly trade magazines "Poligrafika" and "Opakowanie", CEO of Alfa-Print Sp. z o.o, publisher of these magazines and of the scientific quarterly "Packaging Review".

9 czerwca br. miałam przyjemność uczestniczyć w warszawskim spotkaniu „BrauBeviale meets Europe” i zapoznać się z wynikami raportu dotyczącego rynków napojów w Polsce, Ukrainie i krajach bałtyckich. Wyłania się z niego obraz branży, w której zmienia się nie tylko to, co pijemy, lecz także powód, dla którego sięgamy po dany produkt.

Z jednej strony rośnie zainteresowanie zdrowiem, napojami funkcjonalnymi i ofertą bezalkoholową. Z drugiej nie słabnie potrzeba wspólnoty, przyjemności i doświadczeń związanych z konsumpcją. Dla branży opakowaniowej to ważny sygnał: nowe receptury i okazje do konsumpcji wymagają przemyślenia funkcji, formy oraz sposobu komunikacji opakowania.

Nie wystarczy jednak atrakcyjny projekt. Ochronę produktu i wygodę użytkowania trzeba pogodzić z efektywnością materiałową, logistyką i możliwością ponownego wykorzystania lub recyklingu. Warto przy tym oceniać cały system, a nie tylko pojedynczą butelkę czy puszkę. Takie spojrzenie wpisuje się w hasło tegorocznych targów BrauBeviale: „Time for Opportunities”. Listopadowe spotkanie w Norymberdze ma pokazać praktyczne odpowiedzi na wyzwania rynku: od oszczędzania zasobów i elastycznej produkcji po wykorzystanie produktów ubocznych, także do wytwarzania materiałów opakowaniowych.

W Packaging Review zachęcamy do patrzenia na te zmiany przez pryzmat badań i wdrożeń. Przyszłość opakowań napojowych zależy bowiem nie tylko od nowych materiałów, lecz także od trafnego rozpoznania potrzeb konsumenta.

Mgr inż. Anna Naruszko. Absolwentka Instytutu Poligrafii Politechniki Warszawskiej (obecnie Zakład Technologii Poligraficznych, Wydział Mechaniczny Technologiczny PW). Redaktor naczelna miesięczników branżowych „Poligrafika” i „Opakowanie”, prezes zarządu Alfa-Print Sp. z o. o, wydawcy tych miesięczników oraz kwartalnika „Packaging Review”.

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FUNCTIONAL QUALIFICATION OF COMPACT LIQUID-DEVICE PACKAGING: TREATING THE DEVICE AND PACK AS ONE SYSTEM

**KWALIFIKACJA FUNKCJONALNA OPAKOWAŃ KOMPAKTOWYCH URZĄDZEŃ DO PŁYNÓW:
URZĄDZENIE I OPAKOWANIE JAKO JEDEN SYSTEM**

ABSTRACT: Compact liquid devices are often approved as separate components even though the device, closure, protective insert and outer pack perform as one system during storage, transport and handling. A change to resin, dimensions, supplier, tooling or closure geometry can alter fit, contact, leakage resistance or protection without changing the product specification on paper. This practical, vendor-neutral article presents a qualification framework for packaging and quality teams. It connects boundary conditions to observable acceptance criteria, representative assembled samples and proportionate change-control decisions. The framework is intended to help teams document what changed, what could be affected and what evidence is sufficient before a revised configuration enters routine production.

Key words: packaging qualification; supplier change control; lot traceability; compact liquid devices; incoming release; functional testing

STRESZCZENIE: Kompaktowe urządzenia do płynów są często zatwierdzane jako odrębne komponenty, mimo że podczas przechowywania, transportu i przemieszczania urządzenie, zamknięcie, wkładka ochronna oraz opakowanie zewnętrzne funkcjonują jako jeden system. Zmiana tworzywa, wymiarów, dostawcy, oprzyrządowania lub geometrii zamknięcia może wpłynąć na dopasowanie elementów, ich wzajemny kontakt, szczelność lub poziom ochrony, nawet jeśli formalna specyfikacja produktu pozostaje niezmienną.

Ten praktyczny artykuł, niezależny od konkretnych dostawców, przedstawia ramowe zasady kwalifikacji przeznaczone dla zespołów zajmujących się opakowaniami i jakością. Łączy warunki brzegowe z możliwymi do zaobserwowania kryteriami akceptacji, reprezentatywnymi próbkami kompletnych zestawów oraz decyzjami dotyczącymi kontroli zmian, adekwatnymi do ich zakresu i ryzyka. Celem tego podejścia jest ułatwienie zespołom dokumentowania, co uległo zmianie, na jakie właściwości mogło to wpłynąć oraz jakie dowody są wystarczające, zanim zmodyfikowana konfiguracja zostanie wprowadzona do bieżącej produkcji.

Słowa kluczowe: kwalifikacja opakowań; kontrola zmian u dostawców; identyfikowalność partii; kompaktowe urządzenia do płynów; dopuszczenie dostaw do produkcji; badania funkcjonalne

1. WHY COMPONENT

APPROVAL IS NOT SYSTEM APPROVAL

A component can meet its drawing and still fail in the assembled pack. The relevant question is not only whether a cartridge, closure or insert conforms individually, but whether the interfaces remain functional together. Small dimensional differences may change seating, compression, clearance or

contact with a barrier surface. A packaging change can also alter orientation stability, protection from impact and the conditions seen by the device during storage.

A system-level qualification begins by defining the intended use and the failure modes that matter. Examples include movement inside the pack, closure interference, damage caused by compression, loss of protective separation and an

Functional qualification follows the component

A neutral change-control path for compact liquid-device packaging

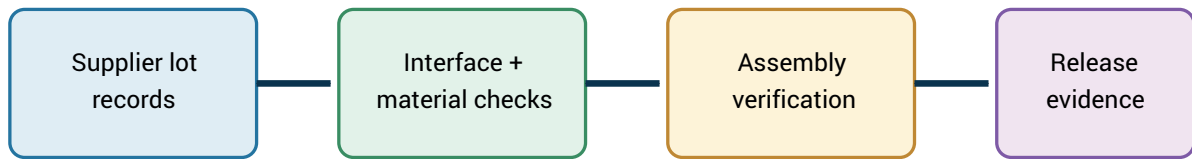


FIGURE 1. EACH SUPPLIER OR INTERFACE CHANGE CARRIES ITS EVIDENCE FORWARD TO THE RELEASE DECISION

inability to identify the affected lot after a supplier change. The aim is not to make a universal performance claim. It is to create a repeatable decision record for a specific configuration.

2. DEFINE THE FUNCTIONAL INTERFACES

Map every interface that can affect protection or release:

- device to closure or mouthpiece;
- device to insert, tray or divider;
- closure to secondary pack;
- pack to label, tamper feature or protective barrier;
- pack to shipping orientation and handling environment.

For each interface, record the controlled characteristic, the expected condition and the evidence used to verify it. Useful characteristics may include critical dimensions, material identity, hardness or stiffness range, surface contact, compression allowance, orientation, retention and clearance. The record should identify which characteristics are supplier-controlled and which are verified at incoming inspection or assembly.

3. BUILD A BOUNDARY-CONDITION MATRIX

A simple matrix makes assumptions visible. Columns can include condition, configuration, sample requirement, measurement, acceptance criterion, owner and disposition. Conditions may include temperature range, storage duration, orientation, vibration or drop exposure, pressure changes, device dimensional variation and contact with the packaging material.

Established transport-packaging methods such as ASTM D4169 and ISTA Procedure 3A can help teams translate the distribution profile into a sequence of laboratory challenges [1,2]. Acceptance criteria should be observable and proportionate. For example, a team may define retention without movement

beyond a specified limit, no visible damage after a handling sequence, no loss of closure function and complete traceability to the tested lot.

Criteria should be agreed before testing begins. If a condition is not relevant to the intended distribution or use, document the rationale rather than silently omitting it.

4. USE REPRESENTATIVE ASSEMBLED CONFIGURATIONS

Testing only ideal parts can hide interface risk. Select samples that represent the approved range, including normal dimensional variation and the actual closure, insert and outer-pack configuration. Keep a configuration record that identifies supplier, lot, drawing or revision, tooling, assembly date and test sequence.

Sampling should answer the decision being made. A limited engineering screen may be appropriate for early comparison, while a broader qualification may be needed before routine release. The important control is to define the purpose, sample basis and acceptance rule in advance, then preserve the result with the configuration record.

5. CONNECT SUPPLIER CHANGES TO EVIDENCE

A supplier-change request should not end with a revised PDF. It should identify the changed characteristic, affected interface, risk rationale and required verification. Changes can include resin or grade, colorant, mold, dimensional tolerance, surface finish, manufacturing location, sub-tier supplier or closure component.

Use a tiered response. A documentation-only change may require record review and incoming verification. An interface or material change may require assembled fit checks, functional

Evidence map for a compact packaging change

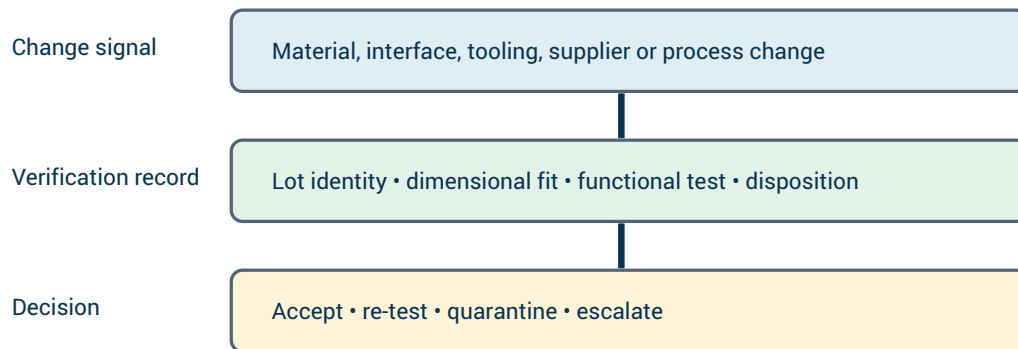


FIGURE 2. A RELEASE DECISION IS STRONGER WHEN THE CHANGE SIGNAL AND ITS TEST EVIDENCE SHARE ONE TRACEABLE RECORD

testing or transport simulation. A change that could affect barrier contact, retention or product protection should remain on hold until the defined evidence is reviewed and approved. The tier and rationale should be visible to procurement, quality and operations.

This risk-based approach is consistent with ISO/IAF guidance on controlling external providers [3].

6. INCOMING RELEASE AND LOT TRACEABILITY

Incoming checks should verify the characteristics that support the qualification decision, not merely count cartons. Record supplier, lot, receipt date, revision, quantity, inspection result and disposition. When a lot is rejected, reworked or conditionally released, link that decision to the affected configuration and downstream assemblies.

Traceability is most useful when it can be followed in both directions: from a finished assembly back to the input lots, and from a changed input lot forward to every potentially affected assembly. Clear identifiers reduce the risk of mixing approved and unapproved configurations during a transition.

7. A PRACTICAL IMPLEMENTATION CHECKLIST

Before approving a packaging change, ask:

1. Which interface or protection function could change?
2. Which suppliers, lots, drawings, tools and revisions are involved?
3. Which boundary conditions represent the intended distribution and storage?

4. What observable acceptance criteria were agreed before testing?
5. Are the samples representative of the assembled configuration?
6. Can every tested unit be traced to its input lots and configuration?
7. Who reviews the evidence and records the release decision?
8. What monitoring is required after the change enters routine production?

CONCLUSION

Treating compact liquid-device packaging as a system makes change decisions more disciplined and more explainable. An interface map, boundary-condition matrix, representative assembled samples and two-way lot traceability provide a practical foundation for procurement, quality and operations teams. The result is not a promise that one design fits every application; it is a controlled method for deciding what must be verified before a packaging change is released.

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INTRODUCTION AND IMPLEMENTATION OF THE PPWR REGULATION¹

RELATIONS “MANUFACTURER - PRODUCER”, DECLARATION OF CONFORMITY AND PRODUCT FEE

WPROWADZENIE I WDROŻENIE ROZPORZĄDZENIA PPWR

RELACJE: WYTWÓRCA–PRODUCENT, DEKLARACJA ZGODNOŚCI ORAZ OPŁATY PRODUKTOWE

ABSTRACT: In the present paper, there were analyzed the crucial consequences of the implementation of Regulation (UE) 2025/40 (being called hereinafter PPWR) on packaging and packaging waste, which (inter alia) introduces 71 definitions relating to packaging and, separately defines the obligations of the manufacturer and producer in respect of the compliance of the packaging with the EU standards.

According to the Regulation, the manufacturer is an economic operator who manufactures the packaging or has it designed or manufactured under its own name or trademark, and is responsible for its compliance with the rules, and issues the so-called declaration of conformity of the packaging with PPWR. In the case of micro-enterprises, where the packaging supplier is established in the same Member State, the packaging supplier acts as the manufacturer and is responsible for its technical compliance and declaration of conformity. The text of the declaration is issued on the grounds of technical documentation (containing, inter alia, information on the composition, dimensions and weight) and on the basis of the tests, or declaration of the packaging suppliers on the compliance of the composition with the limits of metals' concentration according to PPWR. For food-contact packaging, there is required the confirmation of compliance with the PFAS limit values.

On the other hand, the producer means any manufacturer, importer and also, distributor who as the first introduces packaging or the packaged product on the EU market or in Poland under his brand. It concerns also (in specified circumstances) e-commerce operators and agreements. The duty of the producer is to make documentation of the weight of the packaging and its recovery and, in the case of failure to obtain a defined level of the recovery, to pay a product fee, resulting from the Law on packaging (...) and the act on the obligations of the entrepreneurs (...) and on the product fee.

In this paper, the authors refer to the obligations, as being imposed by the discussed PPWR Regulation on the producer and manufacturer of apple juice (employing staff >10 persons) in cartons under its own mark.

Key words: PPWR, packaging, manufacturer, EU declaration of conformity, PFAS, heavy metals, recyclability, producer of juices, technical documentation, product payment, product fee

STRESZCZENIE: W niniejszym artykule przeanalizowano kluczowe skutki stosowania rozporządzenia (UE) 2025/40 (dalej: PPWR) w sprawie opakowań i odpadów opakowaniowych. Rozporządzenie wprowadza m.in. katalog definicji dotyczących opakowań (art. 3) oraz odrębnie określa obowiązki wytwórcy i producenta w zakresie zgodności opakowań z wymaganiami unijnymi.

Zgodnie z rozporządzeniem, wytwórca to podmiot gospodarczy, który wytwarza opakowanie lub zamawia jego zaprojektowanie lub wytworzenie pod własną nazwą lub znakiem towarowym, odpowiada za jego zgodność z przepisami oraz wystawia tzw. deklarację zgodności opakowania z wymogami PPWR. W przypadku mikroprzedsiębiorstw, jeżeli dostawca opakowania ma siedzibę w tym samym państwie członkowskim,** za zgodność opakowania odpowiada jego dostawca. Treść deklaracji opracowuje się na podstawie dokumentacji technicznej (zawierającej m.in. informacje o składzie, wymiarach i masie) oraz wyników badań lub oświadczenia dostawców o zgodności składu z limitami stężenia metali określonymi w PPWR. W przypadku opakowań przeznaczonych do kontaktu z żywnością wymagane jest potwierdzenie zgodności z limitami substancji PFAS.

Z kolei producentem jest wytwórca, importer lub dystrybutor, który jako pierwszy udostępnia opakowanie lub produkt w opakowaniu na rynku danego państwa członkowskiego, w tym w ramach sprzedaży na odległość. W ramach rozszerzonej odpowiedzialności producenta ma on obowiązek ewidencjonować masę wprowadzanych opakowań oraz osiągać wymagane poziomy odzysku i recyklingu. W razie ich nieosiągnięcia producent uiszcza opłatę produktową na podstawie ustawy o gospodarce opakowaniami i odpadami opakowaniowymi.

Autory omawiają obowiązki nakładane przez PPWR na producenta soku jabłkowego niebędącego mikroprzedsiębiorstwem, który wprowadza sok w kartonach pod własną marką.

Słowa kluczowe: PPWR, opakowania, wytwórca, deklaracja zgodności UE, PFAS, metale ciężkie, recyklowalność, producent soków, dokumentacja techniczna, opłata produktowa

1 Regulation (EU) 2025/40 of the European Parliament and of the Council of 19 December 2024 on packaging and packaging waste - (PPWR), Off. J. of UE L. 2025/40, 22.01.2025

RELATIONS “MANUFACTURER – PRODUCER”

The EU Regulation 2025/40, which has been binding in Poland since 12 August 2026, applies to hundreds of thousands of economic operators involved in commercial trade. It introduces several definitions that differ from standard business practice, notably regarding the terms 'producer' and 'manufacturer', which were not previously used in domestic Polish packaging legislation. In June 2026, the European Commission published the Notice concerning the discussed Regulation (...) (EC)². It will be briefly discussed by the authors of the present paper below.

1. WHAT DOES IT CONCERN?

PPWR establishes the EU consolidated requirements for packaging and packaging waste and introduces the harmonization of the national regulations – in order “to avoid distortion in trade and disturbances and restrictions of the competition within the Union...” (Art.1, PPWR). The packaging includes not only cartons, bags and foils but also (inter alia) pallets, adhesive tapes, stretch films, labels and fillers.

PPWR Regulation is connected with the national system of the documentation of packaging, introduced on the market – within the frames of the extended responsibility of the producer – , documentation of the wastes in BDO (the Polish national Database on Products and Packaging and on Waste Management) and of the payments, if the required levels of recovery are not achieved.

The common target of the mentioned regulations is to reduce the weight of the packaging and packaging waste via standardization of the dimensions, material requirements, re-use and recycling. In total, the mentioned measures – in spite of the increase of the quantity of packaging, caused by e-commerce – should result in the reduction of packaging waste generated per capita by 5% by 2030, 10% by 2035 and 15% by 2040 (Art.43 of PPWR).

2. WHOM DOES IT CONCERN?

It concerns the participants of the placing on the market in which the following operators have been distinguished:

a) **“Producer”** – means any manufacturer, importer or distributor (including e-commerce) **who introduces for the first time the packaging or the product in the packaging** into the EU market in Poland under his own brand. It refers also to on-line sale agreements (e-commerce).

Online platforms and distance sales: “acc. to “Guidance document for the Regulation (...), p.12 : “The first offer of the product shall be recognized as making it available in understanding of the definition of the producer”.

It should be added that the producer of the packaging has the obligation to run the documentation of the recovery – recycling, and to pay the product fee.

b) **“Manufacturer”** means any physical or legal person that manufactures packaging or a packaged product, with the additional stipulation, which was defined by a word: “however” in PPWR (Art.3 par.1p.13 a) and b):

- a) *In the case where a natural or legal person has packaging or a packaged product designed or manufactured under its own name or trademark (...) “manufacturer” means that natural or legal person,*
- b) *In the case where the natural or legal person that has the packaging or packaged product designed or manufactured under its own name or trademark is a micro-enterprise and the supplier is established in the same Member State, “manufacturer” means the natural or legal person that supplies the packaging.*

Obligations of the “Manufacturer”: The Manufacturer draws up the EU Declaration of conformity of the packaging (Art. 39 of PPWR) on the grounds of the conducted analyses or information, received from the suppliers pursuant to Art.16. par.1. It means that the manufacturer is the economic operator

2 The European Commission Notice. Guidance Document for the Regulation (EU) 2025/40 on the packaging and packaging waste (C/2026/3084)

TAB.1. DISCUSSION OF THE RELATIONS BETWEEN THE MANUFACTURER AND PRODUCER

No	Variants of placing the products on the market	Who is the manufacturer of packaging	Who is the producer of packaging	Who pays the product fee
1	Import of goods from the outside of the EU by importer	Economic operator e.g. China	That one who introduces the first to the market	That one who introduces the first to the market
2	Import of goods via trade network from the outside of the EU	Commercial network designs and order the packaging	Commercial network	Commercial network
3	Dairy plant „X” – Butter produced at the order of brand (e.g. Mlekowita group)	E.g. Mlekovita group	Mlekovita group; has introduced the first to the market	Mlekovita group
4	Juice producer: the product is delivered in the packaging with the trademark of the network	The operator, ordering the package under his own trademark, e.g. Hortex	The operator, ordering the packaging	The operator, ordering the packaging
5	Micro-entrepreneur (<10 employees, total annual balance <2 million EURO). It orders the packaging and fills it with the own product	The company supplying the packaging. Information on the juice producer on the label	The micro-entrepreneur	The micro-entrepreneur

solely responsible, bearing the legal responsibility for the compliance of the packaging with the requirements in respect of sustainability and labeling, irrespective of the person who drew up the declaration of conformity.

Stipulation: If the natural or legal person that has the packaging designed or manufactured under its own name or trademark is a **micro-enterprise** and the supplier of packaging is located in the same Member State, the **supplier of the packaging** is the manufacturer of the packaging (Art. 3, par.1p.13b).

3. THE RELATIONS: MANUFACTURER

– PRODUCER IN THE SELECTED EXAMPLES

TABLE.1.

The comments to the relations:

- Manufacturer: the operator who designs/orders production of the packaging
- Producer: who the first introduces /makes available the packaging to a given market
- A company may be simultaneously the manufacturer and producer of the packaging when it orders the manufacture

under its own trademark and, at the same time, the first makes the packaging with the packaged product available on the market of a Member State (here: Poland).

TABLE.2.

In the Regulation, there were also discussed the definitions of importer and distributor, the most important of them being given below:

Importer means any physical or legal person, established within the Union that places packaging from a third country on the market. According to the Regulation, importer is a producer of the packaging and pays the product fee (product fee). Importer has also the obligation to check the documentation of the packaging in the following respect:

- whether the manufacturer has conducted the procedure of assessing the compliance with PPWR;
- whether the access to technical documentation and the required tests has been assured;
- whether the labels, specified in PPWR, have been placed on the packaging.

TAB.2. THE RELATIONS: PRODUCER – MANUFACTURER PURSUANT TO THE EC GUIDANCE DOCUMENT

If the producer of the complete empty package or of the products in the package is located in the Member State of the EU, in which the packaging becomes the waste, then he is the PRODUCER:	
In the case of transport and service packaging and of that one intended for primary production, the manufacturer of the complete empty packaging is the producer	In the case of sales packaging / grouped packaging / transport packaging, the manufacturer of the product in the packaging is the producer
If the manufacturer of the complete empty packaging or the products in the packaging is NOT located in the Member State of the EU in which the packaging becomes the waste, then he is the PRODUCER:	
The distributor, importer or the unpacking operator is the producer	The operator performing the e-commerce sale is the producer. The Internet platforms have to check the fulfilment of the obligations in respect of the extended responsibility – under the condition that the supply was delivered (implemented) directly to a final user of the product

Distributor may be recognized as the manufacturer/producer of the packaging when:

- introduces the packaging on the market under the own brand or trademark;
- modifies the packaging, introduced on the market in the way which may have the impact on PPWR and the weight of the packaging.

Attention: PPWR Regulation (Art.3) gives 71 definitions connected with the packaging (including 6 types of packaging). They should be applied consistently in orders, documentation and supply-chain communication.

DECLARATION OF CONFORMITY OF THE PACKAGING

In Polish legislation, Art.5 p.10 of the Law “On assessment of conformity” stresses that the “Declaration of conformity”³ should be understood as “declaration of the producer or his authorized representative, stating – at his exclusive responsibility – that the product is compliant with the principal requirements”. The mentioned requirements must be documented in the technical documentation, covering the

results of the laboratory tests and the declarations of the suppliers of the materials.

In practice, it means the necessity to carry out the analysis of chemical composition of the packaging and update the purchase procedures as to ensure the complete conformity with PPWR since the day of its application. The EU declaration of conformity confirms, inter alia, that the sum of concentration levels of lead, cadmium, mercury and hexavalent chromium in packaging does not exceed 100 mg/kg (Art. 5(4) PPWR - applies to all packaging). For food-contact packaging, compliance with the PFAS limit values (Art. 5(5) PPWR) must additionally be confirmed.

WHO HAS TO FULFIL THE DECLARATION OF CONFORMITY?

The requirements have been specified in Annex VIII to PPWR. They are as follows:

- The manufacturer conducts the assessment of conformity, collects technical documentation, packaging specification and prepares the declaration of conformity with PPWR;
- The owner of the own brand is the manufacturer if he introduces the packaging and the packaged product on the

3 The Act of 30, August, 2002 on the system of assessment of conformity (Official Journal of Laws of 2025, item 215 of 2025, item 1826)

market under his own trademark and draws up the declaration himself;

- The company, packing its own product in the purchased packaging is the manufacturer and has the obligation to make the declaration for the mentioned packaging, excluding the micro-enterprises which have to obtain the EU declaration of conformity from the packaging supplier (where established in the same Member State);
- Importer of the goods from the countries outside the EU does not prepare the declaration but must verify whether the Manufacturer drew it up, and has to possess its copies. But if the importer introduces the packaging on the EU market under his own brand or modifies it in the way, affecting the conformity, he becomes manufacturer alone and he alone has to draw up the PPWR declaration.
- Distributor – verifies the existence of the declaration in the supply chain but he does not make it.

WHAT DOES THE DECLARATION OF CONFORMITY CONTAIN?

Pursuant to Annex VIII to PPWR, the Declaration of conformity should contain the following information:

- The number of Declaration – given by the manufacturer, enabling the relating the declaration to the specified (concrete) type/batch of packaging;
- Name and address of the manufacturer: full name of the company, the registered address, contact data; in the case of the manufacturer established outside the EU (Art. 39, Annex VIII), the data of the authorized representative in the European Union;
- Identification of the packaging: brand name, model/ /name of the product, description, material, destination, number of a lot and other data identifying the type of packaging;
- Declaration of the conformity, the statement that the packaging meets the requirements of PPWR including especially (art 5-12): minimization, recyclability, the content of raw materials from recycling, reduction of substances of concern, labeling;
- Information on technical documentation: material specifications concerning the main material of the



packaging such as assessment of recyclability, the results of the tests etc.) including information where it is stored and the information on satisfying the requirements

- Declaration shall be signed by the person, authorized to represent the enterprise.

The current EU declaration of conformity shall be supplemented by the technical documentation and test results confirming compliance with the heavy-metal limit (all packaging) and, for food-contact packaging, with the PFAS limits according to PPWR requirements.

PRODUCT FEE

The implementation of PPWR Regulation is connected with the fee born due to the introduction of the packaging to the

making available on the market. The mentioned fee concerns the producers, whose manufacturing plants have not reached the required level of the packaging recovery.

In Poland, the mentioned payment is regulated by the following legislative acts:

- Act of 13 June 2013 on the management of packaging and packaging waste. The up-to-date consolidated text – Official J. of Laws of 2026, item 619
- The Regulation of the Minister of Climate and Environment of 22 November 2023 on the minimal annual levels of recycling for multi-material packaging (....) (Official J. of Laws 2023, item 2550)
- The Regulation of the Minister of Climate and Environment of 9 December, 2023 on the product fee rates for the particular types of the packaging (Official J. of Laws, 2023, item 2683).

Examples of current product fee rates (product fees) applied when required recycling levels have not been achieved are as follows: 2.70 PLN/kg for plastics and 0.70 PLN/kg for paper.

SUMMING UP FOR PRACTITIONER.

VARIANTS: A, B AND C

VARIANT A.

What obligations are imposed by PPWR Regulation on the producer and manufacturer of apple juice (> 10 employees), in cartons with the own trademark?

The producer produces juices according to the requirements as regards the commercial quality of fruit juices and nectars (Official J. of Laws 2014, item 4940, with amendments). He orders and gives the task to perform the packaging with his own brand and introduces the packed product to the market; then, he is simultaneously, the manufacturer and producer of the packaging and he bears the following obligations:

- a) Drawing up the PPWR Declaration of conformity for a given packaging, being the statement that the packaging meets the requirements of PPWR Regulation. The label on the packaging shall contain the information, identifying the producer (address, code bar) and the product (e.g. apple

juice 100%, nutritive value per 100 ml of juice), the conditions for storage after opening the carton, date of shelf-life (the best to..), information on materials, information for recycling e.g. 'throw away the used packaging to yellow container' (Metals and plastics);

- b) Registration in the BDO database, kept by the marshal of the voivodeship competent for the place of business, as an entity placing packaged products on the market.
- c) Used cartons are recycled via collection and waste-processing operators; the achieved recycling level is documented with recycling confirmation documents issued by those operators.

The producer of packaging should sign the agreement with the selected packaging recovery organisation (PRO) which runs the documentation of the waste introduced to the market by the specified groups of the producers, and computes the obtained levels of recycling. The packaging recovery organisation (PRO) informs the producer about the weight of the waste which was lacking to the required level of recovery and about the related fee.

Based upon the information of the packaging recovery organisation (PRO), the producer draws up the annual report until 15 March of the next year and pays the product fee to the marshal of the voivodeship.

VARIANT B.

When the fruit grower is a micro-entrepreneur (<10 employees) and produces juice and orders the sales packaging / grouped packaging / transport packaging under their own brand or his commercial trademark and is located in the same EU Member State as the packaging supplier, then, the company supplying the packaging is considered the Manufacturer (Art. 3(1)(13)(b) of PPWR). The EU declaration of conformity for the packaging is drawn up by the packaging supplier. However, the fruit grower remains obligated to register in the national BDO database and pay the product fee.

VARIANT C.

If the orchard keeper is the manufacturer of apple juice and delivers the product under the own brand of the group of the

producers (e.g. Hortex, Tymbark), the group of the producers is the Producer. It draws up the Declaration of conformity and is obliged to pay the product fee. The relations between the manufacturer of apple juice (who is responsible for its quality) and the brand, introducing the packaged product on the market are recorded in bilateral agreement.

THE STAGE OF IMPLEMENTATION OF THE PPWR REGULATION

PPWR will be implemented gradually, according to the schedule (the selected dates):

- a) 12 August 2026 – general date of application of PPWR;
- b) 12 August 2026 – the Commission adopts the implementing acts concerning the labels;
- c) Up to 12 February 2027 - the Commission will specify the minimum quantity of rotations for reusable packaging;
- d) Up to 12 February 2027 - "the final distributors" (HoReCa sector) will make possible for the consumers to bring own packaging (reusable) for drinks and ready-to-use food;
- e) Up to 12 February 2027 - the Commission will specify the methodology of computing the use of the quantity of the produced packaging waste and the method for calculating the wear of light bags per inhabitant;
- f) Up to 12 February 2027 – the Member States will establish the rules, specifying the penalties in the cases of failure to apply the requirements of PPWR Regulation;
- g) Up to 12 February 2028 – the Commission will specify the indices of empty space;
- h) Since 12 August 2028 – the packaging shall have the obligatory pictograms, determination of the material content, QR codes (Art.12 – 15);
- i) Up to 12 February 2028 – all packaging made from plastics and other materials must be designed for recycling of materials (art.9);
- j) On January, 1, 2030 – All packaging shall be recyclable $\geq 70\%$ (Art.6);
- k) On January 1, 2030 – The obligations to minimize the packaging and the bans pursuant to Annex V to PPWR – the restrictions in the application of the defined formats of packaging;

- l) Since January, 1, 2030 – the economic operators, employing the transport or commercial packaging, used in the transport of the products (...) will ensure (...) that at least 40% of the mentioned packaging will be reusable packaging within the frames of the reuse system (Art.29 par.1).

Conclusions. The implementation of Regulation 2025/40 (PPWR) (directly binding) requires from the fruit and vegetable-processing plant to assess the currently employed packaging in aspect of their dimensional and material optimization, to evaluate their function in the production chain (relation: manufacturer – producer) and to implement the obligations connected with the issuing of EU declaration of conformity.

The manufacturer/producer should also pay attention to the required information on the labels such as, inter alia, QR codes and the introduced changes in classification of the packaging in the specified group of the waste.

When considering a wide range of the mentioned Regulation, and the resulting spectrum of the obligations connected with the product's package, the intention of the Foundation was to discuss the practical elements which may be utilized by the producers.

LEGAL ACTS:

1. The Regulation (EU) 2025/40 of the European Parliament and of the Council of 19 December 2024 on packaging and packaging waste - (PPWR), Off. J. of UE L. 2025/40, 22.01.2025
2. The European Commission Notice. Guidance Document for the Regulation (EU) 2025/40 on the packaging and packaging waste (C/2026/3084)
3. The European Commission, New EU packaging rules start to apply, including restrictions on PFAS in food-contact packaging, DG Environment, 11.08.2026
4. Act of 13 June 2013 on the management of packaging and packaging waste. The up-to-date consolidated text – Official J. of Laws 2026, item 619
5. The regulation of the Minister of Climate and Environment of 22 November 2023 on minimal annual levels of recycling for multi-material packaging (...) (Official J. of Laws 2023, item 2550)
6. The Regulation of the Minister of Climate and Environment of 9 December 2023 on the rates of the packaging (product) fees for the particular types of the packaging (Official J. of Laws 2023, item 2683).

ITEM INTERLOCKING AS A MEANS OF IMPROVING SHIPPING CARTON UTILISATION

SPLATANIE ELEMENTÓW JAKO SPOSÓB LEPSZEGO WYKORZYSTANIA OPAKOWANIA ZBIORCZEGO

ABSTRACT: Items that do not completely fill their own bounding box - angle profiles, sections, wedges - occupy less space in a shipping carton than simple multiplication of dimensions suggests, provided neighbouring pieces can be interlocked. This paper presents a packing method exploiting this effect and reports the measured increase in the number of items fitting into the carton. For the shapes examined the increase ranged from 13 to 106 percent, with none for a control solid filling its bounding box completely. The largest increase was obtained for a convex solid, indicating that the effect stems from unfilled bounding-box volume rather than from concavity.

Key words: shipping cartons; item interlocking; packing; space utilisation; packaging design

STRESZCZENIE: Elementy, które nie wypełniają swojego gabarytu - kątowniki, profile, kliny - zajmują w opakowaniu zbiorczym mniej miejsca, niż wynika z prostego mnożenia wymiarów, o ile sąsiadujące sztuki dają się wzajemnie spleść. W artykule przedstawiono metodę pakowania wykorzystującą to zjawisko oraz zmierzony przyrost liczby elementów mieszczących się w opakowaniu. Dla badanych kształtów wyniósł on od 13 do 106 procent, przy braku przyrostu dla kontrolnej bryły wypełniającej gabaryt w całości. Największy przyrost uzyskano dla bryły wypukłej, co wskazuje, że źródłem efektu jest niewypełnianie gabarytu, nie zaś wklęsłość.

Słowa kluczowe: pakowania zbiorcze, splatanie elementów, pakowanie, wykorzystanie przestrzeni, projektowanie opakowań

INTRODUCTION

The dimensions of a shipping carton are set once, at the stage of designing and they are employed throughout the whole period of its utilization. In spite of this fact, the mentioned decision is most frequently undertaken on the grounds of the external bounding dimensions of a given product and a simple multiplication of the dimensions.

Such approach is sufficient for the elements which fill their bounding box completely. It fails in the case where an element leaves a free space inside the bounding box: for angle profiles, T-beams and channel sections and also, in the case of convex solids with skew walls such as wedges, the discussed element occupies less space than it results from the bounding box

under the condition that the neighbouring piece may be fitted in the mentioned space.

The aim of the present work is to describe the method for determination of the system, utilizing the mentioned above phenomenon and to measure its effectiveness for the shapes, filling the bounding box to a different degree.

WHY THE BOUNDING BOX OVERESTIMATES THE DEMAND

The scale of the phenomenon is visible as early as in the case deprived of any complexity of the shape. The piece with perpendicular walls (cuboid), having the dimensions

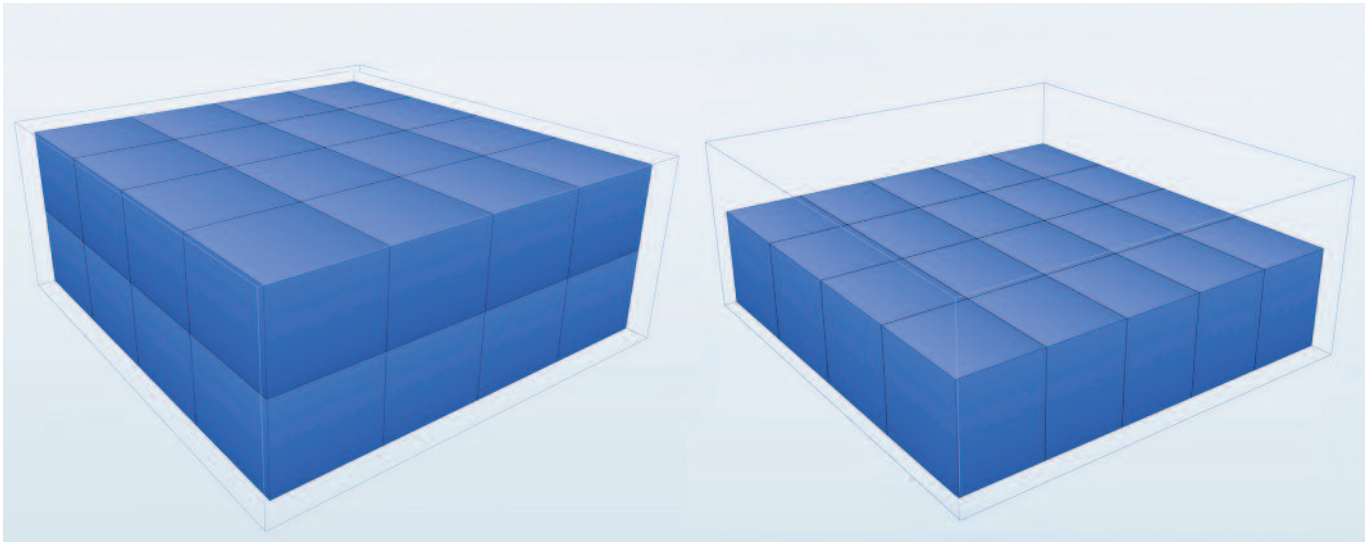


FIG.1. THE SAME PIECE AND THE SAME PACKAGING IN TWO SETTINGS OF AXIS. ON THE LEFT: THE ARRANGEMENT ALLOWING TWO LAYERS – 32 PCS; ON THE RIGHT – ADMITTING ONLY ONE LAYER – 20 PCS

110 x 85 x 105 mm, being packed to carton with internal dimensions 464 x 439 x 184 mm, is fitted in the number from 20 to 32 pieces, depending exclusively on the fact how it will be arranged regarding its axes. The span is equal to 1.6 times. In the case of the side amounting to 105 mm in vertical position, one layer is possible because two layers would require 210 mm vs. 184 mm available; the base contains then 4 x 5 pieces = 20 pcs. After rotating the element so as to obtain the side of 85 mm in vertical position, we may place two layers, 16 pieces in each, i.e. 32 pcs. The both settings are correct; in manual counting, however, only the setting which comes to mind first is usually checked.

The second mechanism concerns the pieces, not-filling their bounding box. In the square with the cut-out quarter, a single element fills 75% of the box and two pieces, being rotated by 180° each other, make the complete rectangular shape. The same situation occurs for a wedge with the triangle cross-section, being a convex solid: two wedges, as rotated relative each other compose a perpendicular solid without a loss in space. A difference between the filling of a single piece and filling of the pair is the essence of the problem and cannot be determined by multiplication of the dimensions.

Arrangement of the solids in a limited space belongs to the cutting and packing problems, described in Dyckhoff typology

[1], précised by Wäscher et al. [2]. The mentioned task is NP-hard problem: the number of configurations is growing exponentially with the number of elements. For the rectangular case, the accurate [3] and heuristic [4] methods have been developed and the review of practical constraints has been submitted by Bortfeldt and Wäscher [5]. Packing of irregular shapes is a separate problem, the background of which has been discussed by Bennell and Oliveira [6, 7] and the searching methods – by Egeblad et al. [8].

THE METHOD FOR DETERMINATION OF THE SYSTEM

The componential elements of the approach – voxel discretization, detection of collisions, employing Minkowski difference, a review of periodical grids – are known in literature. The subject of the work is to combine them into the method, considering the storage constraints, and to assess quantitatively the effect in the packaging application. The mentioned method was implemented in a browser-based tool [9].

Representation of the shape. The shape is described on the grid of 5 x 5 x 5 cells, from which each one is filled or empty. A free space inside the bounding box is mapped directly, without unfolding the shape into componential rectangular forms. The representations of this type, being called the raster methods, are

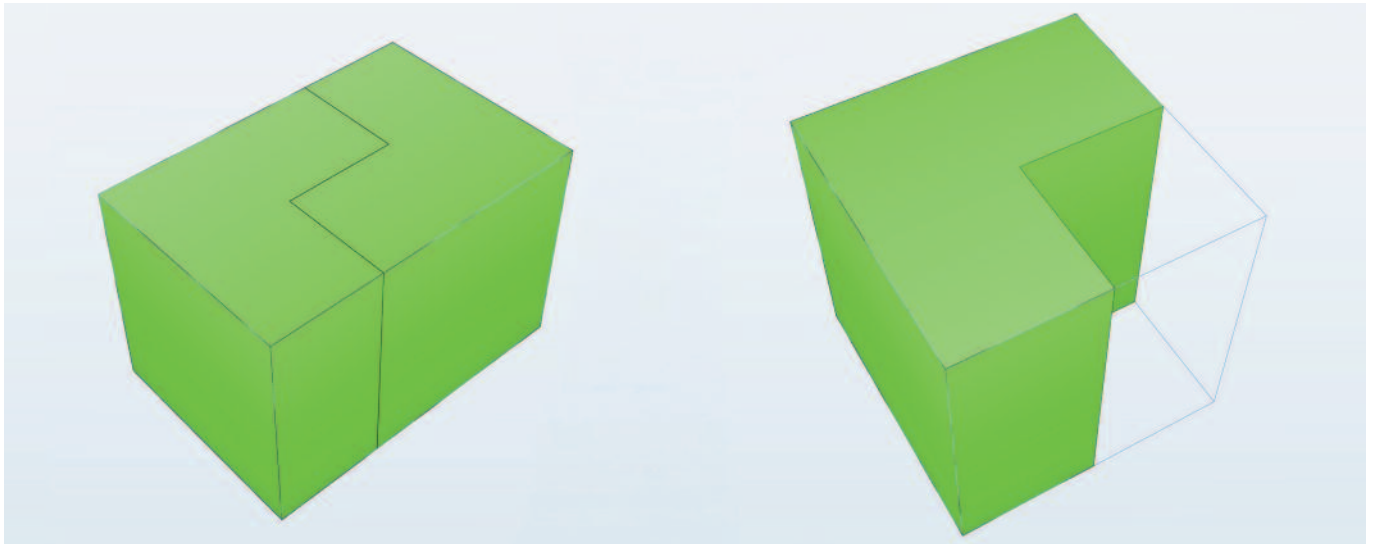


FIG.2. TWO-ELEMENT MOTIF. ON THE LEFT SIDE: THE PAIR OF THE PIECES ROTATED RELATIVE EACH OTHER BY 180°, FORMING THE COMPLETE PERPENDICULAR SOLID; ON THE RIGHT SIDE: A SINGLE ELEMENT WITH AN OUTLINE OF THE BOUNDING BOX AND NON-UTILIZED CAVITY

discussed by Bennell and Oliveira [6], indicating their limitations: the accuracy (precision) grows together with the density of the grid but at the cost of memory and time of calculations.

The dimensions of the packaging interior are rounded down when calculating into net and dimensions of the element are rounded up. The mentioned asymmetry ensures the preservative nature of the result: the element on the grid is never smaller than in reality and the packaging is never greater. Every configuration admitted on the grid is, therefore, feasible whereas the physically possible configuration may be discarded by the model. This guarantee is obtained at the cost of limited precision: the differences smaller than one cell are not differentiated.

Settings of element. There are considered 24 specific rotations; mirror reflections were discarded as the mirror reflection of a solid as another physical object which cannot be obtained by the rotation of the original. The collection is reduced via removal of the indistinguishable settings.

Detection of collisions. For each pair of settings, there is a priori determined collection of displacements at which the solids overlap each other – in geometry, we call it as Minkowski difference. Owing to this, checking whether a given piece will fit in a given place consists in a single readout from the table. The discussed approach in packaging of irregular shapes is known [6] and plays only the accelerating function.

Searches for periodical formula. Instead of inserting the elements individually, the mentioned method looks for the repeatable formula. There is considered a narrowed configuration class: regular placement lattices with bases $(a, 0, 0)$, $(c, d, 0)$, $(0, 0, p)$ at $0 \leq c < a$, thus, described by four whole numbers (integers). It is a normal Hermite form, limited to the grids with the third vertical vector; each grid has exactly one such record; therefore, the review includes it once, without repetitions or omissions.

The mentioned univocality concerns only the discussed class: the non-periodical configurations and the periodical ones with the parameters outside the adopted ranges remain outside the range of the review. The grid is admitted when none of its shifts belongs to the collection of the collisions.

Two-element motif. The pattern constructed from a single setting replicates the element solely by shifting (displacement) what frequently is not sufficient: a free space in the bounding box has the orientation in contrary to material, thus, the displaced copy does not enter into it. The method makes, therefore, a review of the pairs of settings and their mutual positions, selecting those ones with the smallest bounding box of the glued pair: the glued pair enters for search of the formula as a single solid.

Storage constraints. Apart from geometry, three practical conditions were considered: the required participation of the

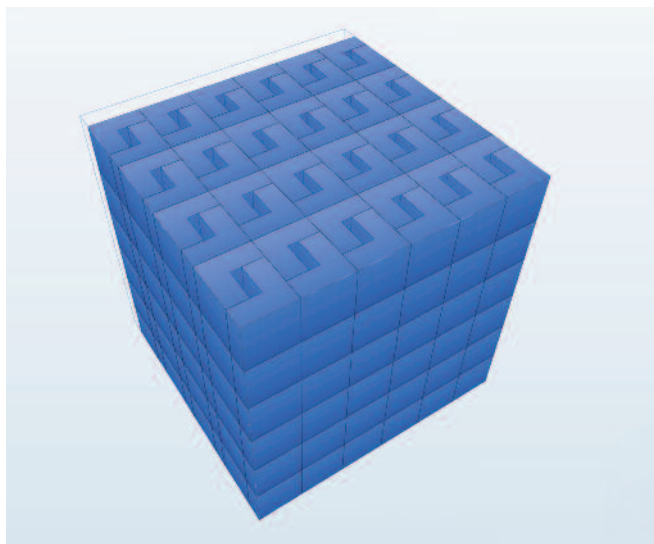


FIG.3. CONFIGURATION OF 288 ANGLE PROFILES IN PACKAGING OF 30 X 30 X 30 CELLS, AS DETERMINED WITH THE CONSIDERATION OF INTERLOCKING. VARIANT WITHOUT INTERLOCKING CONTAINS 216 PIECES IN THE SAME PACKING; THE DIFFERENCE IS MADE BY THE FILLING OF THE NICHES (CAVITIES) WITH THE ROTATED ELEMENTS IN RELATION TO THE NEIGHBOURING PIECES

bottom support, ban for placing the element on the lighter one and marking of the fragile elements, blocking the space above them.

PLAN OF THE STUDY

The study consisted in the comparison of the number of elements, fitted in the packaging when the described method and the base configuration were applied.

Reference variant. As a reference, the same algorithm with the excluded search for interlocking was used: in such case, there are considered two strategies: a greedy one and one based upon the review of periodical grids whereas in the full variant, there is added the strategy, utilizing two-element motives. The presence of interlocking mechanism is, therefore, the only one variable.

The collection of the complete variant's strategies contains the collection of strategies due to its construction, of reference variant and the best solution from among the considered ones, as a result. The complete variant cannot, therefore, be worse.

Thus, the object of the measurement is not whether the increase will occur but what is its size and whether it is dependent on the concavity of the shape.

Settings of the measurements. All runs were carried out at the same settings: the required support of the bottom – 100%, the rotations limited to the horizontal ones, a rule of distributing the mass being excluded; lining and wrapping equal to zero. The requirement of the complete support is the most severe condition from the possible ones.

Choice of the test cases. The study was so planned as to separate two factors which may be easily confused: concavity of the shape and degree of filling the bounding box. There were selected three concave, typical-in-practice shapes: angle profiles (L), T-profiles and channels (U), and a wedge with a triangle cross-section, being a convex solid which – despite this fact – does not fill the bounding box. A cube, filling the bounding box completely was adopted as a control sample.

Such setting allows deciding whether the increase stems simply from the total advantage of one configuration of algorithm as compared to another, or whether it occurs in the case of the convex solid, and whether it disappears when a given piece does not leave a free space inside the bounding box.

All five shapes were defined on the grid of 5 x 5 x 5 cells as prisms with a constant cross-section what corresponds to the shape of the extruded and rolled products. The bounding box is identical, so the differences result solely from the participation of the filled cells: 125 per 125 for the control cube (100% of the bounding box), 80 per 125 for angle profile (64%), 75 per 125 for the wedge profile (60%) and 65 per 125 for T-profile and channel (U) (52%).

The dimensions of the packaging were given in the same units, including the cubic proportions (20 x 20 x 20 and 30 x 30 x 30) and the flattened ones (24 x 24 x 12).

The scope of the study. The present experiment has a form of the case study: the number of the considered configurations does not entitle to make the quantitative generalization, with the exception for the studied cases.

The measure of the comparison. The basic measure is a number of pieces, fitted in the packaging. Value given in Table 1 as a profit (gain) means a relative increase of the mentioned

TAB.1. THE NUMBER OF ELEMENTS FITTED IN THE PACKAGING: THE REFERENCE VARIANT WITHOUT SEARCH FOR INTERLOCKING AS COMPARED TO THE COMPLETE VARIANT. THE DIMENSIONS OF THE PACKAGING ARE GIVEN IN THE NET CELLS; THE COLUMN OF FILLING MEANS THE PARTICIPATION OF THE CELLS, FILLED IN THE BOUNDING BOX OF THE ELEMENT; THE INCREASES WERE ROUNDED TO THE WHOLE NUMBERS

Shape	Filling	Packaging	Without interlocking	With interlocking	Increase
Wedge (convex)	60%	20 × 20 × 20	64	96	+50%
Wedge (convex)	60%	24 × 24 × 12	32	66	+106%
Wedge (convex)	60%	30 × 30 × 30	216	360	+67%
Angle profile (L)	64%	20 × 20 × 20	64	80	+25%
Angle profile (L)	64%	24 × 24 × 12	32	58	+81%
Angle profile (L)	64%	30 × 30 × 30	216	288	+33%
T-profile (T)	52%	20 × 20 × 20	64	96	+50%
T-profile (T)	52%	24 × 24 × 12	32	57	+78%
Channel section (U)	52%	20 × 20 × 20	64	72	+13%
Channel section (U)	52%	24 × 24 × 12	32	64	+100%
Cube - control	100%	20 × 20 × 20	64	64	0%
Cube - control	100%	24 × 24 × 12	32	32	0%

number, determined as quotient of difference between the result of the method and the result of the basic configuration, divided by the result of basic configuration, expressed in %. The mentioned measure concerns the number of pieces and not the degree of filling the volume; these values are not identical and are not employed alternatively.

Verification of feasibility. The feasibility of the configurations results from the conservative nature of discretization and has the analytical justification; the experimental verification was not carried out. To check the repeatability, the series was repeated in millimetres, with the cell of 20 mm, the results of the both series occurred to be identical.

RESULTS

The results are given in Table 1. For all four shapes which did not fill the bounding box, the increase of the number of elements fitted in the packaging was equal to 13 – 106 %. For the cube, filling the bounding box completely, the increase was not obtained in any studied packaging.

Zero increase for the cube excludes the assumption that the difference should be found in general advantage of one

configuration of algorithm as compared to the other one – if such situation had existed, it would have appeared also in it.

The second conclusion is more significant. The wedge, as being a convex solid and deprived of cavity, gave the increase comparable to the concave shapes and in the flattened packaging box – the greatest one in the total study. The source of the effect is, therefore, not the concavity but the fact alone that element does not fill its box, and the possibility of fitting the neighbouring rotated element into the mentioned space. The concave shapes are the most frequent practical case of such elements, they are not, however, the only case.

We should pay attention to the result obtained for the wedge in packaging box of 30 x 30 x 30: The obtained 360 pcs, each having 75 cells gives 27 000 cells, i.e. exactly the volume of the packaging box. The utilization of the space is, therefore, equal to 100% and the solution is optimum in sensu stricto, as the better one does not exist.

The level of the increase is dependent not only on the shape but strongly also on the proportion of packaging: the same channel section(U) gives 13% in cube packaging and 100% in flattened bounding box. The effect is not, therefore, the property of the shape alone but its combination with the packaging.

LIMITATIONS OF THE METHOD AND DIRECTIONS OF THE FUTURE STUDIES

The discussed method has a heuristic character and it is a conscious choice: the solution, being precise for NP-hard task, requires exponentially growing time what excludes its application in the interactive work. The method does not, therefore, guarantee the optimality, and the proof for it has not been submitted.

The source of deviation from optimum is known: the types of elements are considered successively, so the pieces of the first type are inserted until they are filled and then, the successive one is considered. In the case of mixed shipments, having different dimensions, the mentioned scheme may leave a space which cannot be longer utilized. The extension of the method by interlocking of the types is the first step towards further studies. The second direction includes a motif, interlocking the elements of various types. At present, the motives are defined within one type what corresponds to the most frequent practical case but it narrows the applicability of the multi-assortment dispatches. The third problem covers the effect the discretization density which has not been studied. The grid being denser than the adopted one of 5 x 5 x 5 cells would allow more precise mapping of the shape at the cost of the time of calculations; checking whether the increase will be maintained with the higher resolution, requires a separate series of measurements. The range of the model embraces the geometry of the configuration and three storage conditions, being described earlier. Apart from it, there are also the problems requiring a separate measuring or normative background: resistance of the packaging, loading capacity of the pallet and vehicle, position of gravity centre, limit of the stacked layers, overhang beyond the outline of the pallet, fixation of the load and segregation of dangerous products. The result has a discrete character and the rotations were limited to those of axes.

CONCLUSIONS

For the studied elements which do not fill their bounding box, the utilization of mutual interlocking has increased the number of the pieces fitted in the packaging from 13 to 106 %, depending on the shape and proportions of packaging. The

mentioned value cannot be determined on the grounds of the bounding box itself, without determination of configuration.

The increase of the number of pieces in packaging may potentially lead to the decrease of the number of packaging boxes in the volume, and then, to limitation of the consumption of materials and the number of load units. The mentioned results were not, however, the subject of the measurement.

For designing the bounding boxes (bulk packages), the result means that the dimension being selected by the bounding-box method leads to a greater package than it stems from the real demand; it concerns each element, not filling the bounding box, irrespectively of being concave or not. As the dimensions of the packaging are set once and employed for the whole utilization period, determination of the configuration before taking the mentioned decision is all the more justified.

LITERATURE

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MARKET DEVELOPMENTS AND GROWTH EXPECTATIONS IN THE BEVERAGE SECTOR IN POLAND, UKRAINE AND THE BALTIC STATES

Beverage markets are currently developing in two directions at the same time: driven by consumers' desire for self-optimisation, energy drinks, functional beverages and alcohol-free concepts are continuing to grow. At the same time, the need for community, atmosphere and shared experiences remains high – particularly in economically and socially challenging times. The “BrauBeviale meets Europe” tour addressed the background to these developments and stopped in Warsaw on 9 June 2026.

The markets in Poland and the Baltic States are showing similar tendencies to other European regions. The consumption of alcoholic beverages remains stable or is even declining, while the alcohol-free beverages market is growing in selected segments. Owing to the current situation, the Ukrainian beverage market is developing differently, with declining volumes forecast across almost all beverage categories.

POLAND IN DETAIL

Looking at the alcohol-free beverages market, Poland presents a similarly stable picture to the wider European average. Total per capita consumption of alcohol-free beverages in Poland is expected to reach 227 litres in 2025, compared with a European average of 179 litres.

In the soft drinks category, the European average market volume in 2025 stands at 65.4 litres per capita, according to Statista Market Insights, and is expected to remain at this level. Poland

records a volume of 79.6 litres in this beverage segment. Growth forecasts are particularly positive for energy drinks, with growth of approximately 10 per cent expected by 2030, based on a per capita volume of almost 12 litres in 2025.

In the mineral water segment, Poland could achieve growth of around 3 per cent by 2030, based on a per capita volume of 123.73 litres in 2025. This is particularly noteworthy given that the European average for this category is expected to decline by approximately 3.7 per cent.

The outlook for RTD beverages is also developing in line with the European average: across Europe, growth of 7 per cent is expected for this beverage category, based on a per capita volume of 1.28 litres. Poland records a volume of 1.04 litres per capita in 2025, while forecasts predict growth of 10.6 per cent by 2030.

BALTIC STATES IN DETAIL

In 2025, the total volume of alcohol-free beverages across Europe is expected to average around 179 litres per capita, while the Baltic States are forecast to reach 144.4 litres per capita.

In the soft drinks category, the Baltic States record a per capita volume of 66.2 litres, compared with the European average of 65.38 litres per capita in 2025, according to Statista Market Insights. While no significant changes are expected across Europe overall, market researchers forecast growth opportunities for this category in the Baltic region. Growth of 7.4 per cent is expected by 2030.

Unlike broader market developments, the mineral water segment in the Baltic States is also expected to grow. In 2025, per capita consumption is forecast to reach 66.1 litres, with growth of around 15 per cent expected by 2030.

The outlook for RTD beverages is likewise positive. Across Europe, growth of 7 per cent is forecast for this category based on a per capita volume of 1.28 litres. In the Baltic States, growth of 13.4 per cent is expected by 2030, based on a per capita volume of 4.4 litres in 2025.

for future market development are currently difficult to provide. The Statista data indicates a further decline in overall market volume.

BEER AS A “SOCIAL LUBRICANT”

Alcohol-free beer offerings are also gaining importance. In 2025, per capita consumption of alcohol-free beer stood at 5.1 litres in Poland, 2.2 litres in the Baltic States and around 1 litre in Ukraine. Across Europe, the figure reached 2.7 litres per capita.



THE CONSUMPTION OF ALCOHOLIC BEVERAGES REMAINS STABLE OR IS EVEN DECLINING,

WHILE THE ALCOHOL-FREE BEVERAGES MARKET IS GROWING IN SELECTED SEGMENTS | © YONTEX GMBH & CO. KG

UKRAINE – MARKET DEVELOPMENT REMAINS UNCERTAIN

In 2025, the total volume of alcohol-free beverages across Europe is expected to average around 179 litres per capita, while Ukraine is forecast to reach 80.8 litres per capita. In the soft drinks category, Ukraine records a per capita volume of 38.2 litres, compared with the European average of 65.4 litres per capita in 2025, according to Statista Market Insights. For alcoholic beverages, per capita market volume in Ukraine is estimated at 39.3 litres in 2025. Comprehensive forecasts

Growth expectations for this beverage category range between 8 and 12 per cent across all three markets, broadly in line with the European average, where growth of 9 per cent is expected. Alcoholic beer is associated with largely stagnant expectations across all markets. In 2025, per capita beer consumption stood at around 82 litres in Poland and 84 litres in the Baltic States. The European average for this beverage category was approximately 47 litres per capita in 2025.

Analyses by the rheingold Institute indicate that these developments go beyond a short-term lifestyle trend. In an



increasingly uncertain and difficult-to-control world, many people are focusing more strongly on what they can influence themselves: health, performance, flexibility and personal stability. The institute describes this development as an attempt to remain as stable and capable of acting as possible within a complex reality. An aspiration that is also changing the beverage industry.

At the same time, the need for community and a sense of security is growing. This is precisely why beverage segments such as beer remain relevant. Beer stands for something familiar – craftsmanship, origin and tradition. In an uncertain world shaped by technological, social and economic disruption, this sense of groundedness is becoming increasingly important once again.

Beer brands are ideally suited to creating places, atmospheres and moods in which a sense of community can be experienced and placed at the centre of the occasion, explained **institute expert Paul Bremer** during the first stop of the BrauBeviale meets Europe tour in Copenhagen. *Beer brands and gastronomy should offer places that convey a sense of togetherness.*

WHERE THE BEVERAGE INDUSTRY FINDS ANSWERS

We are currently witnessing some very exciting developments in the market, said **Markus Kosak, Executive Director at YONTEX GmbH & Co. KG**. *Consumers want to remain productive and capable – while at the same time continuing to enjoy shared experiences. This means that our established and traditional*

beverage segments, such as beer, can continue to strengthen their role in the market. At the same time, the desire for self-optimisation is creating new opportunities for beverage manufacturers. Our exhibitors understand this and are presenting solutions for all the requirements facing the industry in Europe.

The entire supporting programme of BrauBeviale 2026, taking place in Nuremberg from 10 to 12 November 2026, is geared towards the challenges facing the European beverage industry. Topics covered in the programme include changing consumption habits, alcohol-free concepts, flexible production requirements and the question of how manufacturers can economically serve different consumption occasions. On the Main Stage in Hall 9, beverage expert Charles Nouwen from Peer to Beer will discuss the role of beer between tradition, community and changing consumption habits.

It is already worth regularly visiting the BrauBeviale website: the exhibitor and product database is online, further information about the supporting programme is continuously being added, and the ticket shop for visitors is also open.

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BRAUBEVIALE 2026: FOCUSING ON WHAT'S FEASIBLE

New workshop formats, practical pilot projects, beverage concepts to taste and a programme of talks with plenty to offer: from 10 to 12 November 2026, BrauBeviale at the Nuremberg Exhibition Centre will showcase what is possible in the beverage industry - for beer as well as wine and non-alcoholic beverages.

Whether the market is changing is no longer a question. What is interesting is who makes use of this change. Changing consumer behaviour, non-alcoholic beverages, energy costs and regulation are challenging the beverage industry while at the same time opening up scope for new products and processes. This is precisely what the key theme "Time for Opportunities",

under which BrauBeviale 2026 presents its supporting programme, is aimed at. The focus is on specific practical questions: How can resources be used more effectively, from energy to water treatment? How can an existing system be optimally used with regard to the product scenario? And which technologies are ready for day-to-day operations?

Time for Opportunities means not only talking about changes in the market, but showing what opportunities they create, says Markus Kosak, Executive Director of YONTEX GmbH & Co. KG. At BrauBeviale, concrete challenges meet technologies, ideas and experience that can make a difference today.

Visitors will find answers in Hall 9 on the Main Stage, in the new Focus Corner and Pilot Area, as well as in the Discovery Bar in Hall 6.

ON THE MAIN STAGE IN HALL 9, THE PROGRAMME OFFERS A BROAD SPECTRUM: FOR BREWERY PROFESSIONALS AS WELL AS FOR WINEGROWERS AND SOFT DRINKS MANUFACTURERS. WHEN IT COMES TO RESOURCES, TOPICS INCLUDE SMART ENERGY MANAGEMENT AND BALANCING PEAK LOADS, THE COMPARISON OF GLASS, PET AND PLASMA TECHNOLOGIES FOR WINE BOTTLES BETWEEN CARBON FOOTPRINT AND SUSTAINABLE TASTE, AS WELL AS AN IRRIGATION TOOL FOR SPECIALITY CROPS IN WINE AND HOP GROWING | © YONTEX GMBH & CO. KG



MAIN STAGE IN HALL 9: SMART ENERGY MANAGEMENT, ROBOTICS & ALTERNATIVE BEVERAGES

On the Main Stage in Hall 9, the programme offers a broad spectrum: for brewery professionals as well as for winegrowers and soft drinks manufacturers. When it comes to resources, topics include smart energy management and balancing peak loads, the comparison of glass, PET and plasma technologies for wine bottles between carbon footprint and sustainable taste, as well as an irrigation tool for speciality crops in wine and hop growing.

Technology topics include robotics and AI to reduce energy and operating costs, international benchmarks for brewery KPIs and the question of how data can be used to develop optimised solutions for day-to-day operations. On the product side, the focus is on producing alternative beverages on existing systems, special yeasts for these very beverages and alcohol reduction through sugar removal from must.

THREE DAYS, THREE KEYNOTES, THREE PERSPECTIVES

Three keynotes, each at 11.30 am, will set different accents. On Tuesday, 10 November, Charles Nouwen of Peer to Beer asks, under the title “Going Beyond Beer or Taking Beer Beyond?”, how adaptable beer needs to be. Because consumers today choose from an unprecedented variety of beverages, it is important to look beyond one’s own category without giving up what has made beer the world’s most popular alcoholic beverage.

On Wednesday, Charles Banks of thefoodpeople follows with “The Beverage Foresight Play Book: Trends, Tensions, and Untapped Opportunities”. His observation: the biggest shift is not about the what, but the why. Wellbeing, moderation, functionality, sustainability and experience are currently reshaping every category. The boundaries between them are becoming increasingly blurred.

Thursday will turn to regulation. Under the title “The PPWR and its impact on the beverage industry in the coming



years”, Peter Désilets of pacocon Sustainability Concepts will explain what manufacturers need to prepare for. With regard to the declaration of conformity, 2030 is already coming into focus, although individual stages will take effect earlier for the beverage industry.

ON THE PANEL: SUGAR TAX AND NON-ALCOHOLIC BEER

On Wednesday, 11 November, from 2.30 to 3.30 pm, the panel “Sugar Tax/Sugar Levy: Different Approaches Across Europe” on the Main Stage will examine how differently European markets deal with the sugar tax. The focus will be on reformulation, consumer reactions, retail and pricing, as well as the economic implications for manufacturers. The emphasis will not be on the pros and cons, but on the experiences of producers and association representatives from Germany, the UK and Lithuania.

At the same time on Thursday, the panel discussion will turn its attention to successful strategies for small and independent breweries in Europe. Private Brauereien Bayern e. V. as well as stakeholders from Italy, Greece, Poland, Austria, the UK and the Czech Republic will provide a picture of their respective markets and make forecasts about where, for example, the non-alcoholic beer segment is heading.

NEW FORMAT:**FOCUS CORNER IN HALL 9**

New to the programme is the Focus Corner in Hall 9. It breaks with the presentation format: in 90-minute workshops, a maximum of 30 participants work on a topic together with the speakers. The focus here is on exchange on an equal footing – entirely in keeping with BrauBeviale's character as a working trade fair. Participation is free of charge but requires advance registration.

The list of topics includes a sustainability assessment for breweries, logistics processes as a driver of productivity, non-alcoholic enjoyment in the hospitality sector, appreciation and value creation with beer as a product for enjoyment, the new regulations on environmental labelling under the EmpCo Directive, as well as an offering from the women4beverages network focusing on "Commercial Leadership in Motion".

PILOT AREA IN HALL 9:**WHAT IS ALREADY RUNNING TODAY**

The Pilot Area in Hall 9 directly contributes to the theme of the supporting programme. Pilot projects along the value chain show what is already working today and what potential the new solutions offer the industry. The area is deliberately designed as an invitation to dialogue.

The topics in detail: several project partners are working on the utilisation of side streams, from processing spent grain into proteins for meat substitute products or biopolymers for new packaging to data-based waste-to-value concepts. Further topics include an ultra-dynamic high-temperature heat storage system that flexibly provides process steam from renewable energy, or a multiplex rapid test that detects spoilage organisms in fermented beverages on site in under an hour, with evaluation via a smartphone app.

NEW BEVERAGE IDEAS**IN THE DISCOVERY BAR IN HALL 6**

More than 50 beverages in one area, served by those who created them: the Discovery Bar in Hall 6 is launching with a new tasting format and makes the creativity of the industry directly tangible. Behind the bar are start-ups as well as career

changers and established beverage manufacturers who are bringing unusual impulses to the beverage industry.

The range extends from beverages with electrolytes, probiotics, collagen or protein to fermented non-alcoholic beverages, infused water and drinking vinegar, as well as premium cocktail bitters, mate liqueur, non-alcoholic aperitifs, Lion's Mane soda and RTDs with and without alcohol. The focus is clearly on the non-alcoholic segment.

On Wednesday evening, from 5.00 to 7.00 pm, the Discovery Bar will become a meeting point: at a get-together, beverage wholesalers, specialist beverage retailers and food retailers will meet precisely those manufacturers that are newly entering the market.

The full programme, including all speakers, will be published continuously on www.braubeviale.com from the end of August. Registration for the Focus Corner workshops will start in September via the ticket shop.

SPECIALISED EXHIBITOR AREAS IN HALL 7

The Wine Area shows exhibitors who specialise in products and solutions for wine production and wine packaging. It is the central point of contact for winegrowers at the trade fair and is supported by Deutscher Weinbauverband e.V.

The Startup Zone brings together the industry's newcomers: young companies with fresh concepts, technologies and products that are looking for partners, investors and new customers at the trade fair.

The Logistics Area covers the part of the part of the value chain that begins after filling and, in practice, has a direct impact on costs and delivery capability. Here, visitors will find experts covering topics such as reusable packaging and empty-container solutions, warehouse and transport organisation, and process digitalisation.

SOURCE: YONTEX

Packaging Review

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