

OWEN EVANS

MATERIALS AND INTRODUCTION TO PROCESSING
ACMA4000

2. BEER PACKAGING

a. GLASS BOTTLE WITH PRINTED LABEL

GLASS IS A SUITABLE CONTAINER FOR A CARBONATED BEVERAGE. IT IS A PERFECTLY ELASTIC MATERIAL, DISPLAYING NO PERMANENT DEFORMATION PRIOR TO BREAKING, IT CAN BE FRAGILE WHICH CAN LEAD TO RUPTURE OF THE VESSEL. THIS WOULD HAVE TO BE COMPENSATED FOR DURING THE DESIGN OF THE STORAGE AND SHIPPING METHOD. GLASS IS WEATHER RESISTANT AND CHEMICAL RESISTANT, PROVIDING PROTECTION FOR THE CONTENTS. THE MATERIAL DOES NOT ALLOW GAS TO PASS THROUGH IT, PREVENTING THE GAS IN THE LIQUID INSIDE FOR

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D. PRINTED CANS.

ALUMINUM CANS CAN BE USED TO STORE THE BEER. THE METAL WILL BE STRONGER THAN GLASS, WHICH WOULD MAKE IT EASIER TO STORE AND SHIP. ALUMINUM IS ALSO LIGHTWEIGHT, REDUCING SHIPPING COSTS. IT IS IMPERMEABLE, PREVENTING THE GAS IN THE BEER FROM ESCAPING. IT ALSO EXHIBITS GOOD CORROSION RESISTANCE, PROTECTING THE CONTENTS. THE CANS CAN BE WIDELY RECYCLED.

THE TRADITIONAL METHOD TO IDENTIFY CANS IS TO PRINT THE CONTENTS ~~IN~~ INFORMATION DIRECTLY ONTO THE CAN. THIS APPROACH ELIMINATES THE USE OF

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THE POUCHES ARE LEAK PROOF, BUT CAN BURST MORE EASILY UNDER PRESSURE THAN AN CAN. THE POUCHES ARE NOT RECYCLABLE ~~THE~~ ^{DUE} TO COMBINED ALUMINIUM AND PLASTIC LAYERS, HAVING A NEGATIVE ENVIRONMENTAL EFFECT. THIS WOULD BE A NOVEL APPROACH TO BOTTLE PACKAGING. THE POUCHES ALSO RELY ON THE CONTENTS TO PROVIDE STABILITY, MEANING THE CONTAINER WILL BECOME LESS STABLE AS THE CONTENTS ARE REMOVED.

3.

a. METALLIC BONDS ARE LAYERS OF POSITIVE METAL IONS FORMED WITH THE FORCE OF ATTRACTION

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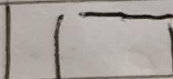
AMALGAMS

d. 60% TIN AT 600°C = LIQUID.

420°C - BOUNDARY BETWEEN LIQUID AND SILVER/TIN LIQUID COMPOUND. STATE OF MATERIAL IS LIQUID, HOWEVER, SMALL CRYSTALS OF SILVER AND OF TIN FORM WITHIN LIQUID.

221°C - BOUNDARY BETWEEN LIQUID AND SOLID. STATE OF MATERIAL IS NOW SOLID, WITH ENLARGED SILVER AND TIN CRYSTALS JOINING WITH EACH OTHER TO FORM GROWN BOUNDARIES.

e.



THERMAL ARREST

LIQUID

(LIQUID + SOLID)

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4. AS THE CAMBER WILL MOST LIKELY BE A BEAM SUPPORTED ONLY ONE END, THE GUIDELINE E/P WILL BE USED.

THIS GUIDELINE DISCTS THE TOP OF THE 'TECHNICAL CERAMICS', THE ALUMINIUM ALLOYS OF THE 'COMPOSITES' MATERIALS, 'NATURAL MATERIALS' OF WOOD AS WELL AS SOME RIGID POLYMER 'FOAMS'

ALL OF THESE MATERIALS HAVE A GOOD STRENGTH RELATIVE TO WEIGHT, WITH A POSITIVE WEIGHT TO STRENGTH CORRELATION.

b. ALTHOUGH FOAMS HAVE A GOOD STRENGTH TO WEIGHT RATIO, THIS IS LIMITED STRENGTH DUE TO ITS LIGHT

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d. AS STRENGTH IS A KEY CONSIDERATION, JOINING PROCESSES SHOULD BE KEPT LOW AS EACH JOIN WEAKENS THE OVERALL STRENGTH OF THE MATERIAL. WHERE JOINING IS REQUIRED, BROWNE IS PREFERRED AS IT MAINTAINS THE MATERIALS STRUCTURAL INTEGRITY.

THE PART WILL BE TOO LARGE FOR POWDER SINTERING TO BE CONSIDERED. ALTHOUGH CASTING IS CHEAP, IT IS COMPLEX IN NATURE, SO FORGING OF THE PART IS THE MOST LOGICAL CHOICE, ESPECIALLY AS THE PART IS GOING TO BE A SHORT PRODUCTION RUN.

DEFECTS CAUSED DURING FORGING CAN BE