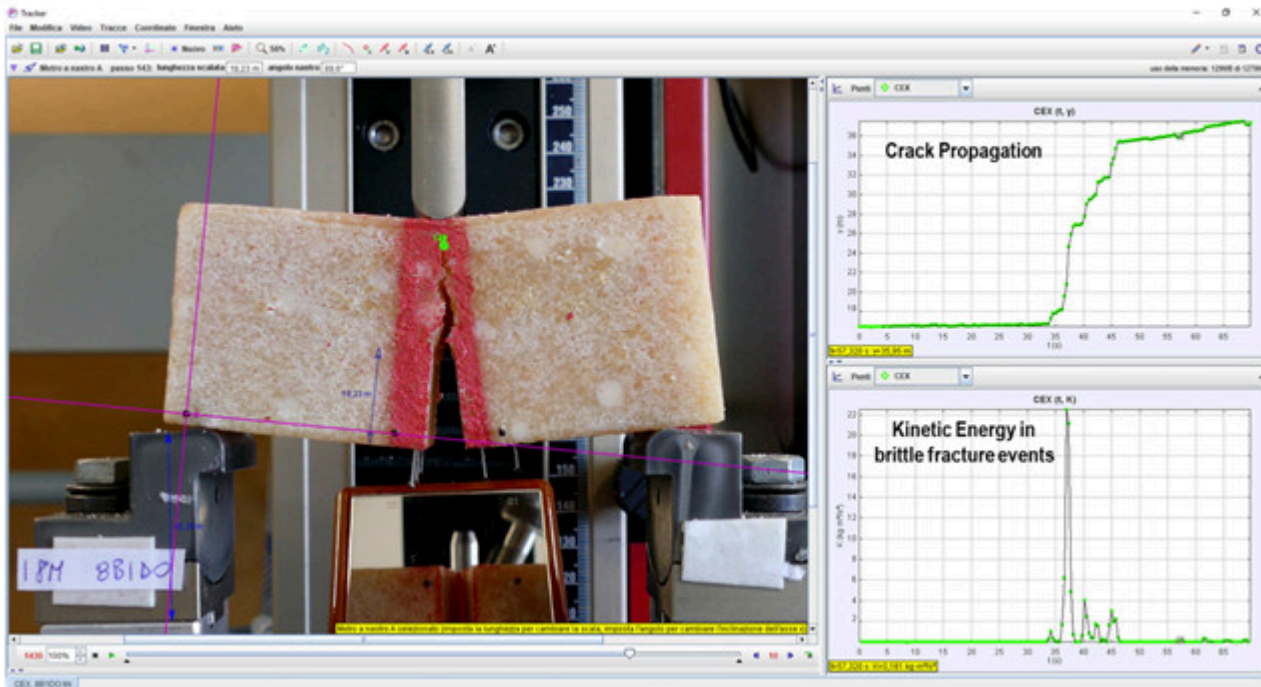


METHODOLOGY FOR DETERMINING THE FRACTURE RESISTANCE OF AGRI-FOOD PRODUCTS



The invention allows the thermodynamics and kinematics of the fracture process to be studied continuously and simultaneously for a wide variety of foods without limiting the linearity of the mechanical behavior. The methodology allows to construct the Resistance Curve and to determine some fundamental mechanical properties that quantitatively describe the resistance to fracture initiation and propagation in quasi-steady conditions, using a single specimen with standardized geometry. The kinematics of fracture propagation are characterized using a high resolution and non-destructive technique.



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KEYWORDS:

Agri-food products, Fracture kinematics, Fracture process, Fracture thermodynamics, Resistance curve.



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METHODOLOGY FOR DETERMINING THE FRACTURE RESISTANCE OF AGRI-FOOD PRODUCTS

DESCRIPTION

Patent is based on the original combination of the principles of the classical theory on the mechanics of the fracture of materials with the digital analysis of fracture process kinematics and is applicable to foods that show a mechanical behavior extended from the linear elastic regime to the non-linear one, viscoelastic or elastic-plastic. The experimental and calculation approach is functional to the construction of the Resistance Curve using only one specimen. For this purpose, the increase of the Integral-J, expressed as the minimum energy per unit of fracture surface required to propagate a quasi-steady fracture under plane deformation conditions, is determined with a 25s^{-1} sampling frequency during the entire fracture process within the process zone surrounding the crack apex. The present patent solves various problems highlighted in the scientific literature and in patents focused on non-biological materials fracture resistance determination.

APPLICATIONS

- Hard cheeses, fruit, tubers, frozen products
- Production energy consumption and waste reduction
- Desired texture optimization, products shelf-life stability and extension
- Scientific and industrial studies on relationships between mechanical properties and oral process of foods

ADVANTAGES

- Analysis of only one specimen in a few minutes
- Creations of specimens of standardized geometry
- Gives fundamental measurements independently from the geometry of the specimens and from the initial crack
- Analysis of the thermodynamics in a synchronized way to the kinematics

