"Dunarea de Jos" University of Galati

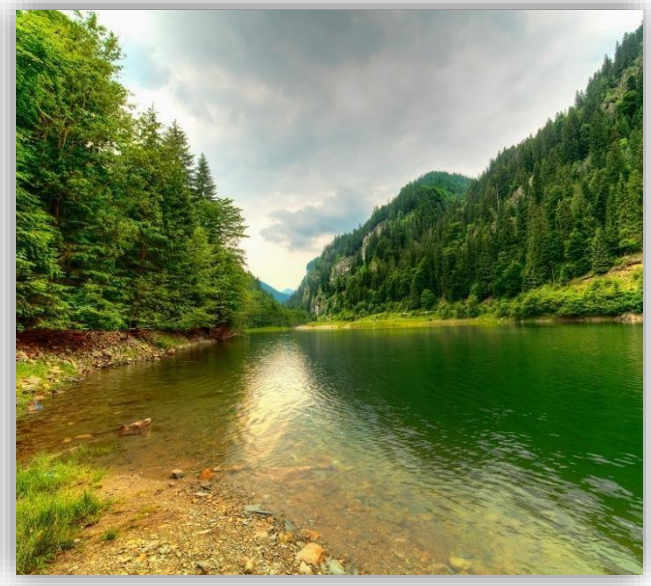
Tradition in performance since 1948

Where are ROMANIA and GALATI?

ROMANIA

THE GARDEN OF VIRGIN MARY

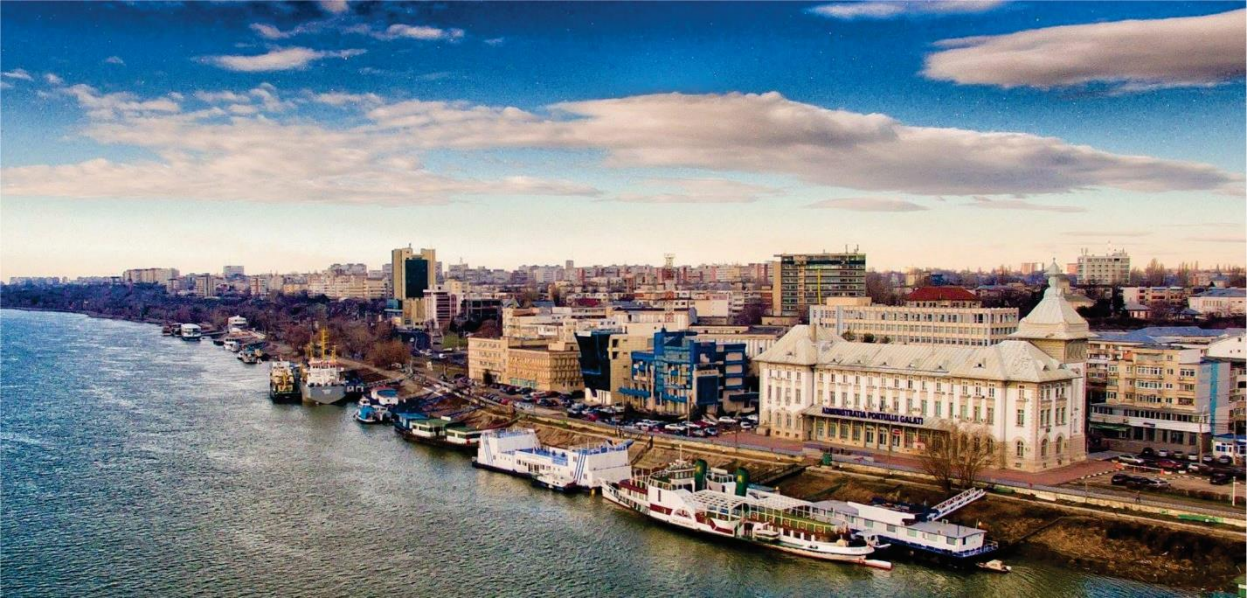
- BUCHAREST – capital & largest city
- ROMANIAN – official language
- POPULATION – 19 mil.
- CURRENCY - Romanian leu (RON)
- NATO member since 2004
- EU member since 2007
- Dominant religion – Christianity
- In full development
- Safe country – ranks 34 according to [wisevoter.com]



Let's Go!

https://youtu.be/ngaC1hTm7bQ


The city between the rivers and
the gate to the sea
GALAȚI



one of the largest economic centers in Romania due to its metallurgic, naval and construction industries (iron and steel plant and shipyard)

located at the Romanian and EU eastern border; neighbouring countries - the Republic of Moldova and Ukraine

situated at the confluence of three rivers, the Danube, the Siret and the Prut

in Bram Stoker's novel *Dracula*, Galati is the port at which Count Dracula disembarked on his way back to Transylvania

- established in **1948**;
- the most important state institution of higher education in south-east Romania and a science and technology pole;
- accredited by **ARACIS** (*Romanian Agency for Quality Assurance in Higher Education*)

14 faculties
92 Bachelor programmes
73 Master programmes

4 doctoral schools
19 doctoral domains

over 22 000 students
3 000 full-time international students

820 academics

38 research centres

400 partnership agreements signed with universities from more than 60 countries

3 student campuses
11 dorms

accommodation for
over 3,000 students

4 cafeterias
(with low prices)

1 brand new central library
(fully equipped and digitalized)

1 student chapel

2 gyms (including a physio-kinesiotherapy
and medical recovery center)
1 stadium

1 medical office

Physio-Kinesiotherapy and Medical Recovery Center

- involved in the research and development activities in the physiotherapy and medical recovery sector, at national and international level;
- initiates and consolidates the knowledge and practical skills of the students from the Faculty of Physical Education and Sports, as well as the implementation of modern methods of education in physiotherapy and medical recovery through the provision of services;
- implements innovative technologies, observations and therapeutic results developed within the Center.

“Sf. Gheorghe” University Research Station

- research and development center for sturgeons, aquatic habitats and biodiversity
- protection and restoration of sturgeon stocks
- international station for the conservation of sturgeon biodiversity and the research of migratory fish species from the Danube and the Black Sea

REXDAN - Integrated System for Complex Environmental Research and Monitoring in the Danube River Area

- covers a vast geographical area (2,000 km on the navigable part of the Danube from Sulina to Passau-Germany);
- mobile campus that will bring together young researchers from DJUG and other university centres;
- research related to: water, sediments, soil, air, biodiversity, bathymetry, hydromorphology, chemistry, biology, physics, etc.
- the infrastructure also includes a REXDAN Research Center with 9 laboratories

Faculties

- Faculty of Engineering
- Faculty of Naval Architecture
- Faculty of Food Science and Engineering
- Faculty of Automatics, Computer Sciences, Electrical Engineering and Electronics
- Faculty of Physical Education and Sports
- Faculty of Letters
- Faculty of Science and Environment
- Faculty of History, Philosophy and Theology
- Faculty of Engineering and Agronomy in Braila
- Faculty of Economics and Business Administration
- Faculty of Law and Administrative Sciences
  Faculty of Medicine and Pharmacy
- Faculty of Arts

International Campuses

The first and only Romanian university with branches in two other countries:

Cross-Border Faculty
(with locations in Cahul and Chisinau, Republic of Moldova)

Extension of the Faculty of Medicine and Pharmacy in Enna, Italy

Internationalization

- main strategic principle of our institution - to increase professional, social and intercultural skills of both students and staff and employability of the former
- the Erasmus+ Programme - the exchange of students and staff within mobility schemes and participation in other international projects
- expansion of foreign partner institution network, with a focus on quality, with even distribution of roles.

Research, development, innovation

- the university promotes the development of a competitive research and innovation environment.
- every year, the university carries out national and international projects whose cumulative value exceeds 35 million euros.

- **IMPROVEMENT OF ASPHALT MIXTURES WITH GRIT SANDBLASTING WASTE AND MICROPLASTICS BASED POLYPROPYLENE**

Inventors: Daniela Laura BURUIANA, Puiu Lucian GEORGESCU, Gabriel Bogdan CARP, Viorica GHISMAN, Catalin Cristian STANCIC

The invention relates to the technological eco-innovation of introducing polypropylene microplastics in the recipe of the asphalt mixture and of partially replacing the natural resources with the waste grit from the blasting process of the ship's hulls.

- **RECYCLING SURGICAL MASKS IN HOT ASPHALT MIXTURES**

Inventors: Daniela Laura BURUIANA, Puiu Lucian GEORGESCU, Gabriel Bogdan CARP, Viorica GHISMAN, Tatiana MARDARE

The invention relates to the technological innovation of introducing used surgical masks in the recipe of the hot asphalt mixture Base layer type AB 31.5 bringing enormous environmental benefits by reducing the disasters caused by the COVID-19 pandemic.

International Invention Innovation Competition in Canada
iCAN - TORONTO, CANADA
The 7th International Invention Innovation Competition in Canada iCAN 2022

UNIVERSITAS GALATIENSIS
"Dunarea de Jos" University of Galati, Romania
Domneasca Street, No 47, 800008, Galati, Romania
www.ugal.ro

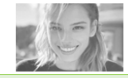
RECYCLING OF SURGICAL MASKS IN HOT ASPHALT MIXTURES

Daniela Laura BURUIANĂ, Professor at "Dunărea de Jos" University of Galati, Faculty of Engineering

Puiu Lucian GEORGESCU, Professor at "Dunărea de Jos" University of Galati, Faculty of Sciences and Environment

Gabriel Bogdan CARP, Associate professor at "Dunărea de Jos" University of Galati, Faculty of Engineering

Viorica GHISMAN, Assistant at "Dunărea de Jos" University of Galati, Faculty of Engineering



Tatiana MARDARE, Universita degli Studi di Milano
Urban Office Arhitecture, Milano, Italia

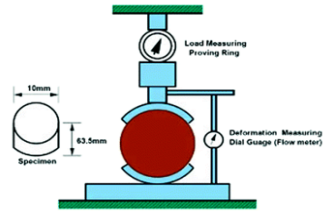
The invention relates to the technological innovation of introducing used surgical masks in the recipe of the hot asphalt mixture base layer type AB 31.5 bringing enormous environmental benefits by reducing the disasters caused by the COVID-19 pandemic. The hot asphalt mixture of the base layer type AB 31.5, according to the invention, consists, in mass percentages, of 40.8% natural aggregate chipboard with a size of more than 4.0 mm, 50% of crushing sand with a granulometry between 0.0 and 4.0 mm, 5% sorted limestone filler with a particle size of 0.063 and 0.100 mm, 3.9% road bitumen type 50/70 and 0.3% used surgical masks.

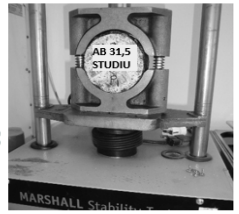
INTRODUCTION

Globally, the current environmental problem is the enormous amount of surgical masks used during the COVID-19 pandemic period through the measures imposed by the World Health Organization on the mandatory use of masks in public space.
According to the World Trade Organization (WTO), China has exported more than 220 billion medical and non-medical masks by 2020. Recent studies have estimated that 130 billion used masks are dumped every month, some are stored uncontrollably causing major environmental problems and the other part is being incinerated as a measure of immediate elimination of environmental and population toxicity risks (WTO Annual Report), 2021). The World Environment Organization warns that throwing masks into the marine environment as a result of the pandemic is a huge environmental problem, the lifespan of surgical mask waste is 450 years coupled with the conditions of the climate crisis affecting the planet, an estimated 1.56 billion surgical masks will reach the oceans (Bondaroff, 2020). The masks are composed of synthetic fabric based on polypropylene and / or polyethylene, polyurethane, polystyrene, polycarbonate, polyacrylonitrile (Akber, 2020). The mass of a surgical mask varies between 3-4 grams, which means that for 1 kg of masks there are 250-330 pieces. Disposal of masking waste in conjunction with reducing carbon dioxide emissions is a priority for each country through government policy strategies, involving road builders in environmental actions.

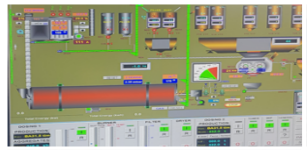
HOW TO PERFORM THE MARSHALL MIX STABILITY TEST

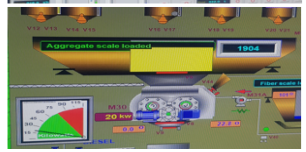
While there are quite a few steps that go into the Marshall test for asphalt, they're straight for ward and simple to perform with the right equipment at your disposal.
Step 1: Aggregate Selection
Step 2: Asphalt Binder Selection
Step 3: Sample Preparation
Step 4: Stability Testing
Step 5: Marshall Analysis

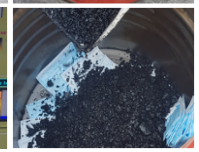




RESULTS AND DISCUSSION







No. crt.	MARSHALL Test characteristics	U.M.	Recipe I Masks=0,1%	Recipe II Masks=0,3%	Requirement SR 605/2016
1	Apparent density	kg/m³	2381	2387	**2390**
2	Water absorption	% vol	2,6	2,6	**2,5**
3	Stability (S), at 60°C	kN	9,16	9,7	**9,9**
4	Flow rate, at 60 °C	mm	2,85	2,9	**3,1**
5	Solid/Liquid report	kN/mm	2,21	3,3	**3,5**

The technical problem solved by the invention is the elimination of environmental pollution (oceans, seas, soil) caused by worn surgical masks by adding them to the base layer of the hot asphalt mixture type AB 31.5, and the elements in the composition of surgical masks (polymers) helps to improve the mechanical properties of the asphalt mixture. The new elements consist in solving the environmental problem by recycling the used surgical masks by introducing them in the recipe of the hot asphalt mixtures of the base layer type AB 31.5. Asphalt mixture recipe: 40.8% natural aggregate sieve with a size over 4.0 mm, 50% crushing sand with a particle size between 0.0 and 4.0 mm, 5% sorted limestone filler with a particle size of 0.063 and 0.100 mm, 3.9% road bitumen type 50/70 and 0.3% surgical masks. In the Laboratory of Analysis and Testing in Construction - Grade II from S.C. the Enterprise of Roads and Highways Constructions SRL has experienced a load of 2000 kg, the quantities have been added: 816 kg of natural aggregate sieve with a size over 4.0 mm, 1000 kg of crushing sand with a granulometry between 0.0 and 4, 0 mm, 100 kg limestone filler, 78 kg 50/70 type road bitumen and 6 kg surgical masks.

CONCLUSIONS

By applying the innovative recipe, the advantages are obtained:
- Reducing environmental pollution by removing worn-out surgical masks following the impact of the COVID-19 pandemic.
- The environmental cost-benefit analysis shows that the disposal of used mask waste has insignificant costs compared to the environmental benefits, and also reduces the costs of producing hot asphalt mixtures by adding a smaller amount of bitumen (from 4,2% decreases to 3.9%)
- Worn surgical masks introduced in the technological process of obtaining hot asphalt mixture at 160 °C are considered as additives, improving the mechanical characteristics and workability of the asphalt mixture.
- Reducing the viscosity of the asphalt binder (bitumen), saving energy we reduce the emission of carbon dioxide (CO_2).
- Increased physical properties as well as increased rheological properties of the binder due to polymer-based surgical masks used in the hot mixture.
- Recovery of used surgical masks in order to reduce the negative effect on the environment and the health of the population.

"Dunarea de Jos" University of Galati, 47 Domneasca Street, daniela.buruiana@ugal.ro

Innovative entrepreneurship for students

- "Dunarea de Jos" University of Galati implemented many projects aiming to develop **specific entrepreneurial skills** for students or other interested persons, in the field of **start-up creation**;
- the university also created the **Students Entrepreneurship Society (SAS – UGAL)**, an institutional structure that encourages and supports students to consider entrepreneurship as a carrier opportunity;
- 14 start-up companies created and funded (from €40,000 to €100,000 for each start-up) in different fields of activity that brought **65 newly created jobs**;

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International Cooperation, Foreign Students and University Extensions Office


international.relations@ugal.ro


(+40) 372 770 768

Erasmus Office


erasmus@ugal.ro


(+40) 756 063 672


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www.en.ugal.ro


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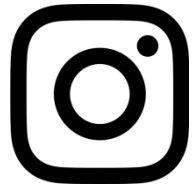
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