Post-graduated MOOC on «particle-laden flows: theory and engineering applications»

Project coordinator: DICA, Politecnico di Milano, Italy
Object of the project

Goal of the project, financed within the competitive T.I.M.E. Call of Projects 2018-2019, is the realization of a post-graduate distance-learning course entitled

**Particle-laden flows: theory and engineering applications**

The course is in the form of a **MOOC: Massive Online Open Course**

The course is arranged into:

- **Video lessons**
- **Case studies**

As a first step, the course will be accessible **for free** on the PoliMI-POK platform

www.pok.polimi.it
Actors involved in the project

- Messa Malavasi
- Matoušek
- Donghai
- Dalfré Filho
- Wang

**Partners and teachers**

**Financer**
- TIME association
  - www.time-association.org

**Media support**
- www.metid.polimi.it

**Platforms**
- www.pok.polimi.it
Arrangement of the video lessons

1. **Fundamentals of particle-laden flows**
   - Number of lessons: 5
   - Teacher: GV Messa

2. **Multi-scale modelling of particle-laden flows**
   - Number of lessons: 6
   - Teacher: GV Messa

3. **Transport of solids in pipeline systems**
   - Number of lessons: 4
   - Teachers: V Matoušek and GV Messa

4. **Solid particle erosion**
   - Number of lessons: 4
   - Teacher: GV Messa
Preparation of the video lessons...

1. storyboard preparation
2. a text document with the speech
3. a presentation with the related media

MOOC on «particle-laden flows: theory and engineering applications»
Preparation of the video lessons:

STE1 storyboarding preparation

- a text document with the speech
- a presentation with the related media

STE2 video shooting

< 1 hour/lesson

In the PoliMI-METID studios

≈ 1 full day/lesson
Preparation of the video lessons...

**STE 1** storyboard preparation
- a text document with the speech
- a presentation with the related media

**STE 2** video shooting
< 1 hour/lesson
in the PoliMI-METID studios

**STE 3** video processing
≈1 full day/lesson
by PoliMI-METID staff

MOOC on «particle-laden flows: theory and engineering applications»
...and the final result
New approach to case studies

Initial idea

Case studies provided by project partners not involved in the lessons

José Gilberto Dalfré Filho
University of Campinas (Brazil)

Stefano Malavasi
Politecnico di Milano (Italy)

Xu Donhai & Zhiguo Wang
Xi’an Jiaotong/Shiyou Universities (PRC)

New idea

Additional case studies provided by invited contributors from academia and industry

- Higher impact of the MOOC
- Greater visibility to T.I.M.E, partners, and contributors
- Possibility to establish new collaborations
### Again, about case studies

#### ACADEMIC CONTRIBUTORS

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Contribution Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magdalena Walczak</td>
<td>Pontificia Universidad Católica de Chile</td>
<td>Contribution already received</td>
</tr>
<tr>
<td>Francisco Souza</td>
<td>Federal University of Uberlândia (Brazil)</td>
<td>Contribution already received</td>
</tr>
<tr>
<td>Francois Avellan</td>
<td>EPFL (Switzerland)</td>
<td>Contribution already received</td>
</tr>
<tr>
<td>Thomas Senfter</td>
<td>University of Innsbruck (Austria)</td>
<td>Invited – under consideration</td>
</tr>
</tbody>
</table>

#### INDUSTRIAL CONTRIBUTORS

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>Contribution Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ENI S.p.A. (Italy)</td>
<td>Contribution already received</td>
</tr>
<tr>
<td></td>
<td>CHAM Ltd (UK)</td>
<td>Contribution already received</td>
</tr>
<tr>
<td></td>
<td>InterApp group (Switzerland)</td>
<td>Invited – under consideration</td>
</tr>
<tr>
<td></td>
<td>GIW Industries (USA)</td>
<td>Invited – under consideration</td>
</tr>
</tbody>
</table>
Steps undertaken so far...

02/2019

Our project was funded!

03/2019

The MOOC proposal form, which defines the arrangement of the lessons into weeks, was approved by the delegate authority of PoliMI

04/2019

GV Messa attends the 22nd International Conference on Wear of Materials, promotes the MOOC and obtains 2 case studies

ENI S.p.A. accepts to provide a case study.

GV Messa shoots the first video lesson

05/2019

Project partners Malavasi, Dalfrè Filho, Donghau & Wang and invited cotributor Francois Avellan provide 4 case studies

06/2019

GV Messa shoots the first video lesson
Steps undertaken so far...

07/2019
GV Messa shoots four video lessons

09/2019
GV Messa shoots three video lessons
GV Messa and V Matousek attend the 19th International Conference on Transport and Sedimentation of Solid Particles, promote the MOOC and invite Thomas Senfter (Univ. Innbruck) and GIW Industry (USA) to submit their case study.

10/2019
V Matousek comes to PoliMI and shoots three video lessons
CHAM Ltd provides a case study
...and planned developments

25/10/2019
GV Messa will shoot four video lessons

8/11/2019
GV Messa will shoot four video lessons

21/11/2019
The video lessons will be finalized

12/2019
A student survey and quizzes will be prepared

Spring 2020
A beta version of the MOOC will be integrated in a PhD course at PoliMI

Before 7/2020
A first version of the MOOC will be online on the PoliMI-POK portal

Before 7/2020
State-of-the-art review papers will be submitted for «open access» publication in scientific journals, and they will be provided as teaching material for the MOOC
Budget considerations

15.000 € Total funding requested to T.I.M.E.

≈ 2.500 € Participation of GV Messa to the 22nd International Conference on Wear of Materials

≈ 2.500 € Participation of GV Messa to the 19th International Conference on Transport and Sedimentation of Solid Particles

≈ 500 € Visit of Prof. Matousek to PoliMI

≈ 500 € Participation of GV Messa to the TIME GA

≈ 2-4000 € Technical support of PoliMI-METID for the realization of the MOOC

The remainder of the funding (≈5000/7000 €) will be used to support another participation to a conference (e.g. Int. Conf. Hydrotransport) to promote the course and collect case studies, and to cover the Open Access Fees of 2/3 state-of-the-art review papers to prove as teaching material of the course.
Thank you for your attention

GV Messa (PoliMI)  course coordinator

V Matousek (CVUT)

JG Dalfrè Filho (UNICAMP)

S Malavasi (PoliMI)

Z Wang (Xi’an Shiyou)