Deliverable 2.6

D2.6: Specifications on portable excitation sources and structure selection

Impact Hammer for Building Testing

Deliverable information	
Work package	WP2 [Innovation]
Lead	BOUN
Authors	Erdal Safak
Reviewers	Ian Main
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Summary

This report presents the objectives, criteria, and design drawings of the Impact Hammer to be built and applied by BOUN-KOERI as part of its responsibilities in WP2.3 of the RISE Project.

1. Objectives and criteria for an Impact Hammer for building testing

The impact hammer will be used to identify the wave propagation characteristics of multi-storey buildings. The hammer will be used to give an impulsive force at the top, any mid-floor, or at ground level, and the waveforms and arrival times of the impulse will be measured by acceleration sensors in the building. This information will provide a better insight into the dynamic characteristics of the building than the modal properties.

Regarding the size and the power of the hammer, we use two key criteria for the design: it will be small enough to be transported to the roof via elevators, and it will be strong enough that the impact is detected near the ground floors, but small enough not to cause any damage to the building or nuisance to the occupiers. These criteria might change depending on the size of the building (e.g., number of floors) and the structural system (e.g., steel, RC, RC with shear walls, etc.), as well as the foundation and soil type. The mass, velocity, and momentum values given on the first figure below are selected for a typical multi-story building in Istanbul (e.g., 10-20 story RC building with shear walls). Based on our past experiences of such tests (e.g. by using a sledgehammer on the roof), we think that the selected dimensions are an optimal choice to satisfy all the criteria.

2. Design drawings of the impact hammer

The design drawings of the impact hammer are given below. It involves four springs, a lever to set the springs, and a release button. It can transfer the impulsive force to the floor by connecting the hammer to the floor, or to a wall or column by placing it against them.

The hammer is currently being manufactured and will be ready to use by the end of March 2020.

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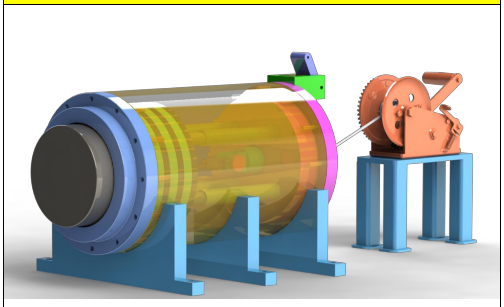
MEKANİK DARBE ÇEKİCİ TEKNİK ÖZELLİKLER

MEKANİK DARBE ÇEKİCİ TEKNİK ÖZELLİKLERİ



Momentum Capacity (kgxm/s)	100
Impact mass (kg)	80
Maximum contraction (mm)	54
Impact area (mm^2)	31400
Maximum Velocity (mm/s)	1250 mm/s
Number of springs	4
Maximum force need for setting the springs (N)	~2000 N = 200 kg
Maximum height (mm)	430
Maximum width (mm)	466
Maximum length (mm)	~1000

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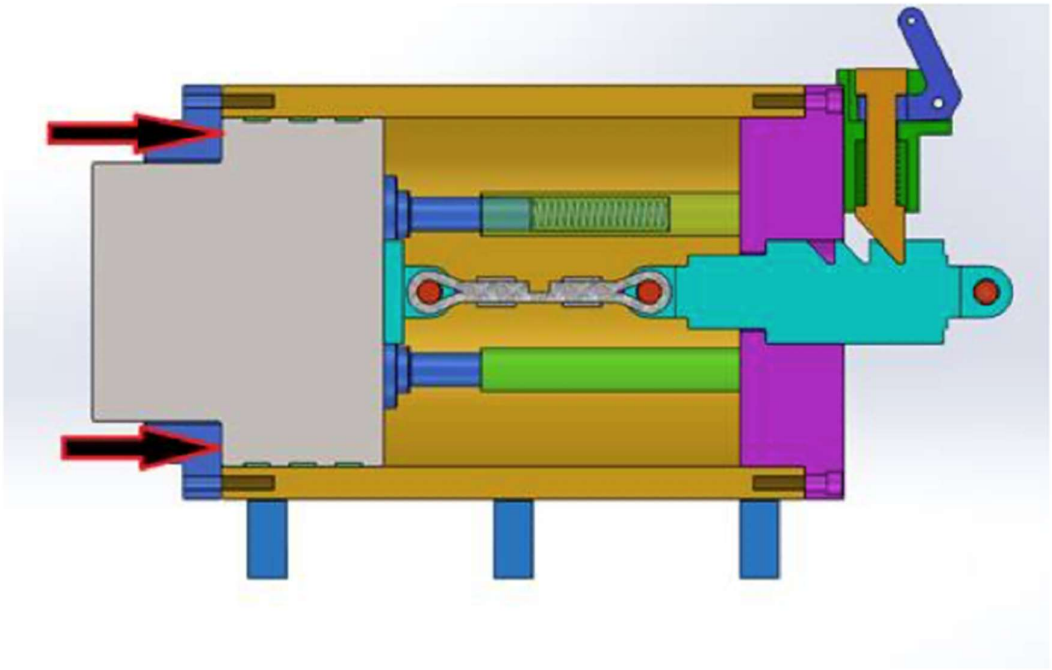

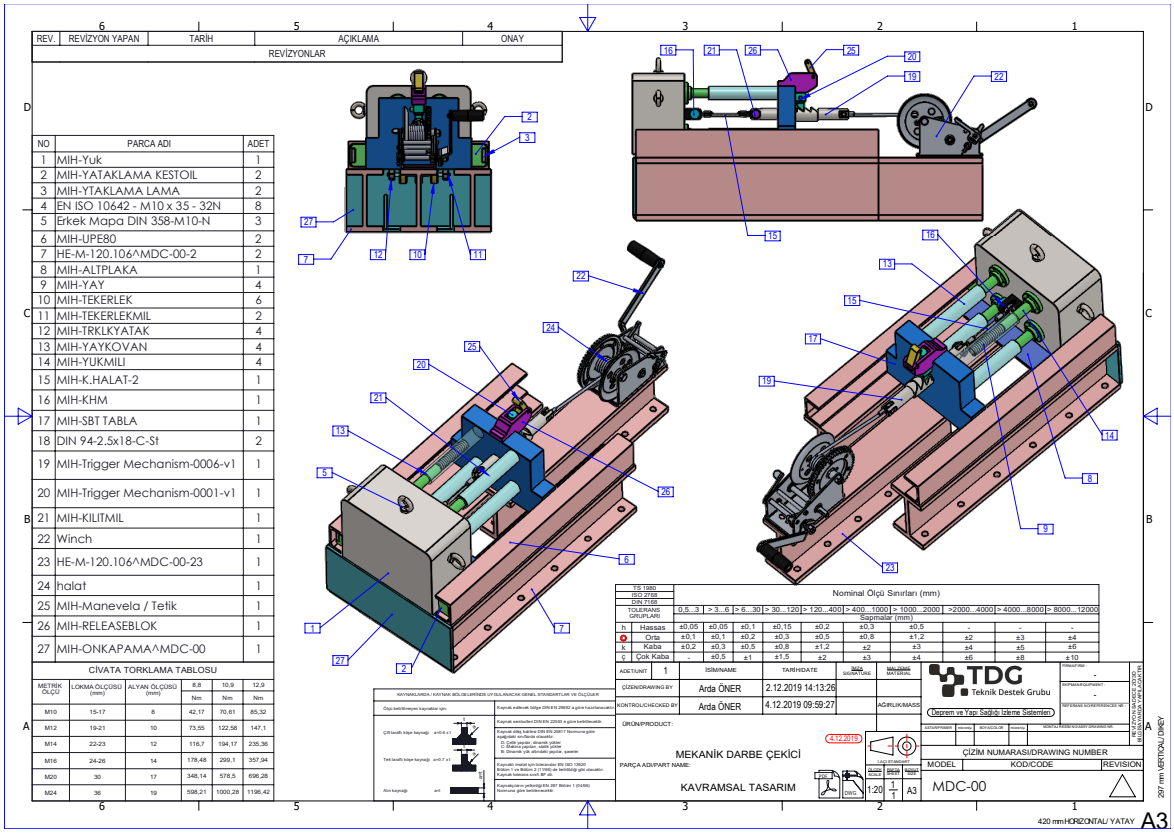
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3 MIH-YTAKLAMA LAMA 2
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5 Erkek Mapa DIN 358-M10-N 3
6 MIH-UPE80 2
7 HE-M-120.106^MDC-00-2 2
8 MIH-ALTPLAKA 1
9 MIH-YAY 4
10 MIH-TEKERLEK 6
11 MIH-TEKERLEKMIL 2
12 MIH-TRKLKYATAK 4
13 MIH-YAYKOVAN 4
14 MIH-YUKMILI 4
15 MIH-K.HALAT-2 1
16 MIH-KHM 1
17 MIH-SBT TABLA 1
18 DIN 94-2.5x18-C-St 2
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27 MIH-ONKAPAMA^MDC-00 1
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M10 15-17 8 42,17 70,61 85,32
M12 19-21 10 73,55 122,58 147,1
M14 22-23 12 116,7 194,17 235,36
M16 24-26 14 178,48 299,1 357,94
M20 30 17 348,14 578,5 696,28
M24 36 19 598,21 1000,28 1196,42
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Orta ±0,1 ±0,1 ±0,2 ±0,3 ±0,5 ±0,8 ±1,2 ±2 ±3 ±4
k Kaba ±0,2 ±0,3 ±0,5 ±0,8 ±1,2 ±2 ±3 ±4 ±5 ±6
ç Çok Kaba - ±0,5 ±1 ±1,5 ±2 ±3 ±4 ±6 ±8 ±10
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4.12.2019
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(Deprem ve Yapı Sağlığı İzleme Sistemleri)
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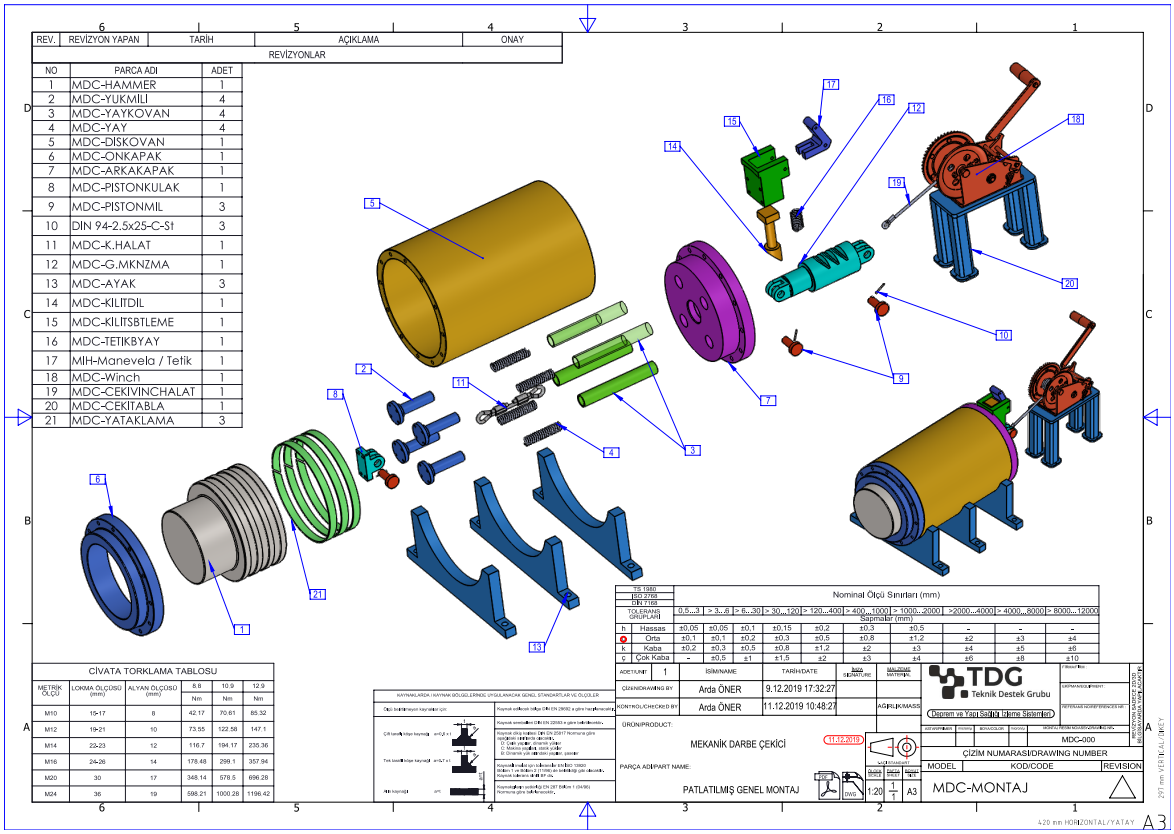
420 mm HORİZONTAL/ YATAY A3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3 MDC-YAYKOVAN 4
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5 MDC-DİSKOVAN 1
6 MDC-ONKAPAK 1
7 MDC-ARKAKAPAK 1
8 MDC-PISTONKULAK 1
9 MDC-PISTONMIL 3
10 DIN 94-2.5x25-C-St 3
11 MDC-K.HALAT 1
12 MDC-G.MKNZMA 1
13 MDC-AYAK 3
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16 MDC-TETIKBYAY 1
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20 MDC-CEKİTABLA 1
21 MDC-YATAKLAMA 3
CİVATA TORKLAMA TABLOSU
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Sapmalar (mm)
h Hassas ±0,05 ±0,05 ±0,1 ±0,15 ±0,2 ±0,3 ±0,5 - - -
Orta ±0,1 ±0,1 ±0,2 ±0,3 ±0,5 ±0,8 ±1,2 ±2 ±3 ±4
k Kaba ±0,2 ±0,3 ±0,5 ±0,8 ±1,2 ±2 ±3 ±4 ±5 ±6
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MDC-000
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297 mm VERTİKAL/ DİKEY
420 mm HORİZONTAL/YATAY A3

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