2021-2027

X-Ray Security Screening

(Aviation, Maritime, Land Transportation, Defense, Postal, Perimeter, Building, Baggage, Cargo, People, Container & Vehicle)

Market

with COVID-19 Vaccines Impact Analysis

Source:
Smiths Detection

Source: Nuctech

Homeland Security Research Corp.

X-Ray Security Screening
(Aviation, Maritime, Land Transportation, Defense, Postal, Perimeter, Building, Baggage, Cargo, People, Container & Vehicle)
Market
with COVID-19 Vaccines Impact Analysis

2021-2027

Volume 1

Homeland Security Research Corp. (HSRC) is an international market and technology research firm specializing in the Homeland Security (HLS) & Public Safety (PS) Industry. HSRC provides premium market off-the-shelf and custom reports on present and emerging technologies and industry expertise, enabling global clients to gain time-critical insight into business opportunities. HSRC's clients include the EU, NATO, U.S. Congress, DHS, U.S. Army, U.S. Navy, DOD, DOT, and US Congress GAO among others; as well as Counter Terror & PS government agencies in Japan, Korea, Taiwan, Israel, Canada, UK, Germany, Australia, Sweden, Finland, Singapore. With over 950 private sector clients (72% repeat customers), including major defense and security vendors, and Fortune 2000 companies, HSRC earned the reputation as the industry's Gold Standard for Homeland Security & Public Safety market reports.

Washington D.C. 20004, 601 Pennsylvania Ave., NW Suite 900,
Tel: 202-455-0966, info@hsrc.biz, www.homelandsecurityresearch.com

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table of Contents

1 Executive Summary 18
1.1 Major Findings 18
1.2 COVID-19 Pandemic and Vaccines Impact 23
1.3 Major Conclusions 24
1.4 Market Dynamics & Opportunities 26
1.5 Global X-ray Screening Systems Market – 2020-2027 27
1.6 Markets Organogram 31

2 Post Coronavirus Pandemic Global Security Concerns 32

3 Global Risks 2020: A Regional Perceptive 34

4 Global Geopolitical Scenario: 2026 Outlook 37

5 Global Terror Threats 39

6 COVID-19 Pandemic & Vaccines Impact on the X-Ray Security Screening Systems Market 44

7 X-ray Screening Systems: Market Drivers 45

8 X-ray Screening Systems: Market Inhibitors 47

9 X-ray Security Industry: Business Opportunities & Challenges 48

10 X-ray Screening Systems Industry: SWOT Analysis 49
10.1 Strengths 49
10.2 Weaknesses 50
10.3 Opportunities 50
10.4 Threats 51

11 Barriers to Entry, Supplier Power, Buyer Power & Barriers to Substitution 52

12 Global X-ray Screening Systems Market – 2020-2027 53
12.1 Global X-ray Screening Systems Market by Region 53
12.1.1 Global Market – 2020-2027 53
12.1.2 Market Breakdown – 2020-2027 54
12.2 Global X-ray Screening Systems Market by Six Vertical Markets 55
12.2.1 Global Market – 2020-2027 55
12.2.2 Global Market Breakdown – 2020-2027 56
12.3 Global X-ray Screening Systems Market by Six Technologies 58
12.3.1 Global Market – 2020-2027 58
12.3.2 Market Breakdown – 2020-2027 59
12.4 Global X-ray Screening Systems Market by Revenue Source 61
12.4.1 Global Market – 2020-2027 61

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

12.4.2 Market Breakdown – 2020-2027 61
12.5 Global X-ray Screening Systems Market by Country 62

REGIONAL MARKETS 65

13 North America X-ray Screening Systems Market – 2020-2027 65
13.1 North America COVID-19 Assessment 65
13.1.1 North America Market – 2020-2027 65
13.1.2 North America Market Breakdown – 2020-2027 67
13.2 North America X-ray Screening Systems Market by Technology 68
13.2.1 North America Market – 2020-2027 68
13.2.2 Market Breakdown – 2020-2027 70
13.3 North America X-ray Screening Systems Market by Revenue Source 71
13.3.1 North America Market – 2020-2027 71
13.3.2 Market Breakdown – 2020-2027 72

14 Latin America X-ray Screening Systems Market – 2020-2027 73
14.1 LATAM COVID-19 Assessment 73
14.2 Latin America X-ray Screening Systems Market by Six Vertical Markets 73
14.2.1 Latin America Market – 2020-2027 73
14.2.2 Latin America Market Breakdown – 2020-2027 75
14.3 Latin America X-ray Screening Systems Market by Technology 76
14.3.1 Latin America Market – 2020-2027 76
14.3.2 Market Breakdown – 2020-2027 78
14.4 Latin America X-ray Screening Systems Market by Revenue Source 79
14.4.1 Latin America Market – 2020-2027 79
14.4.2 Market Breakdown – 2020-2027 80

15 Europe X-ray Screening Systems Market – 2020-2027 81
15.1 Europe X-ray Screening Systems Market by Six Vertical Markets 81
15.2 Europe COVID-19 Assessment 81
15.2.1 Europe Market – 2020-2027 81
15.2.2 Europe Market Breakdown – 2020-2027 83
15.3 Europe X-ray Screening Systems Market by TechEulogy 84
15.3.1 Europe Market – 2020-2027 84
15.3.2 Market Breakdown – 2020-2027 86
15.4 Europe X-ray Screening Systems Market by Revenue Source 87
15.4.1 Europe Market – 2020-2027 87
15.4.2 Market Breakdown – 2020-2027 88

16 Middle East & Africa X-ray Screening Systems Market – 2020-2027 89

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

16.1 Middle East & Africa COVID-19 Assessment 89
16.2 Middle East & Africa X-ray Screening Systems Market by Six Vertical Markets 89
16.2.1 Middle East & Africa Market – 2020-2027 89
16.2.2 Middle East & Africa Market Breakdown – 2020-2027 91
16.3 Middle East & Africa X-ray Screening Systems Market by Technology 92
16.3.1 Middle East & Africa Market – 2020-2027 92
16.3.2 Market Breakdown – 2020-2027 94
16.4 Middle East & Africa X-ray Screening Systems Market by Revenue Source 95
16.4.1 Middle East & Africa Market – 2020-2027 95
16.4.2 Market Breakdown – 2020-2027 96

17 Asia-Pacific X-ray Screening Systems Market – 2020-2027 97
17.1 APAC COVID-19 Assessment 97
17.2 Asia-Pacific X-ray Screening Systems Market by Six Vertical Markets 97
17.2.1 Asia-Pacific Market – 2020-2027 97
17.2.2 Asia-Pacific Market Breakdown – 2020-2027 99
17.3 Asia-Pacific X-ray Screening Systems Market by Technology 100
17.3.1 Asia-Pacific Market – 2020-2027 100
17.3.2 Market Breakdown – 2020-2027 102
17.4 Asia-Pacific X-ray Screening Systems Market by Revenue Source 103
17.4.1 Asia-Pacific Market – 2020-2027 103
17.4.2 Market Breakdown – 2020-2027 104

VERTICAL MARKETS 105

18 Aviation X-ray Baggage, Cargo & People, Screening Systems: Market – 2020-2027 105
18.1 X-ray Aviation Security Market Background 105
18.2 COVID-19 Impact on Aviation Security Market 114
18.3 Airports Passengers & Baggage Screening Statistics by 42 Countries – 2017 & 2027 117
18.4 Aviation X-ray Screening Systems: Market Drivers 118
18.5 Aviation X-ray Screening Systems: Market Inhibitors 119
18.6 Global Aviation X-ray Security Screening Market – 2020-2027 120
18.6.1 Aviation Market Size – 2020-2027 120
18.6.2 Market Breakdown – 2020-2027 121

19 Land Transportation X-ray Screening Systems: Global Market -2020-2027 123
19.1 Land Transportation X-ray Screening Market Background 123
19.2 Land Transportation X-ray Screening: Market Drivers 124

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

19.3 Land Transportation X-ray Screening: Market Inhibitors 124
19.4 Global Land Transportation X-ray Security Screening Market – 2020-2027 126
19.4.1 Land Transportation Market Size – 2020-2027 126
19.4.2 Market Breakdown – 2020-2027 127

20 Maritime X-ray Baggage, Cargo, People, Container & Vehicle Screening Systems: Market – 2020-2027 129
20.1 Maritime X-ray Screening Systems: Market Background 129
20.2 Maritime X-ray Screening Systems: Market Drivers 130
20.3 Maritime X-ray Screening Systems: Market Inhibitors 131
20.4 Global Maritime X-ray Security Screening Market – 2020-2027 132
20.4.1 Maritime Market Size – 2020-2027 132
20.4.2 Market Breakdown – 2020-2027 133

21 Secured Perimeters & Buildings X-ray Screening Systems: Market – 2020-2027 135
21.1 Secured Perimeters & Buildings X-ray Screening Systems: Market Background 135
21.2 Secured Perimeters & Buildings X-ray Screening Systems: Market Drivers 136
21.3 Secured Perimeters & Buildings X-ray Screening Systems: Market Inhibitors 137
21.4 Global Secured Perimeters & Buildings X-ray Security Screening Market – 2020-2027 139
21.4.1 Secured Perimeters & Buildings Market Size – 2020-2027 139
21.4.2 Market Breakdown – 2020-2027 140

22 X-ray Screening Systems: Market – 2020-2027 142
22.1 Postal Services X-ray Screening Market Background 142
22.2 Postal Services X-ray Screening Systems: Market Drivers 144
22.3 Postal Services X-ray Screening Systems: Market Inhibitors 145
22.4 Global Postal Services X-ray Security Screening Market – 2020-2027 145
22.4.1 Postal Services Market Size – 2020-2027 145
22.4.2 Market Breakdown – 2020-2027 146

23 Defense X-ray Baggage, Cargo, People, Container & Vehicle Screening Systems: Market – 2020-2027 148
23.1 Defense Related X-ray Screening Systems: Market Background 148
23.2 Defense Related X-ray Baggage, Cargo, People, Container & Vehicle Screening Systems: Market Drivers 148
23.3 Defense Related X-ray Baggage, Cargo, People, Container & Vehicle Screening Systems: Market Inhibitors 149

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

23.4 Global Defense X-ray Security Screening Market – 2020-2027 150
23.4.1 Defense Market Size – 2020-2027 150
23.4.2 Market Breakdown – 2020-2027 151

TECHNOLOGY MARKETS 153

24 Container-Vehicle X-ray Screening Systems Market – 2020-2027 153
24.1 Container-Vehicle X-ray Screening Systems: Market Background 153
24.2 Container-Vehicle X-ray Systems: Applications 155
24.3 Container-Vehicle X-ray Systems: Market Drivers 156
24.4 Container-Vehicle X-ray Systems: Market Inhibitors 157
24.5 Global Container-Vehicle X-ray Security Screening Market – 2020-2027 158
24.5.1 Container-Vehicle Screening Systems Market Size – 2020-2027 158
24.5.2 Market Breakdown – 2020-2027 159

25 1st Responders X-ray Systems Market – 2020-2027 161
25.1 1st Responders X-ray Systems Market Background 161
25.2 1st Responders X-ray Systems: Market Drivers 162
25.3 1st Responders X-ray Systems: Market Inhibitors 162
25.4 1st responders X-ray Systems: Applications 163
25.5 Global 1st Responders X-Ray Screening Market – 2020-2027 163
25.5.1 1st Responders X-Ray Systems Market Size – 2020-2027 163
25.5.2 Market Breakdown – 2020-2027 164

26 Small Aperture X-ray Screening Market – 2016 -2021 166
26.1 Small Aperture X-ray Definition 166
26.2 Small Aperture X-ray Screening Market Background 166
26.3 Small Aperture X-ray Screening Systems: Market Drivers 166
26.4 Small Aperture X-ray Screening Systems: Market Inhibitors 167
26.5 Small Aperture X-ray Systems: Applications 167
26.6 Global Small Aperture X-Ray Screening Market – 2020-2027 168
26.6.1 Small Aperture X-Ray Systems Market Size – 2020-2027 168
26.6.2 Market Breakdown – 2020-2027 170

27 Medium Aperture X-ray Screening Market – 2020-2027 171
27.1 Medium Aperture X-ray Product Line Definition 171
27.2 Medium Aperture X-ray Screening Market Background 171
27.3 Medium Aperture X-ray Screening: Market Drivers 172
27.4 Medium Aperture X-ray Screening: Market Inhibitors 172
27.5 Medium Aperture X-ray Systems: Applications 173

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

27.6 Global Medium Aperture X-Ray Systems X-ray Security Screening Market – 2020-2027 173
27.6.1 Medium Aperture X-Ray Systems Market Size – 2020-2027 173
27.6.2 Market Breakdown – 2020-2027 174

28 Cargo X-ray Screening Systems Market – 2020-2027 176
28.1 Cargo Screening X-ray Product Definition 176
28.2 Global Cargo Screening X-ray Market Background 176
28.3 Market Drivers 178
28.4 Market Inhibitors 179
28.5 Cargo X-ray Systems: Applications 179
28.6 Global Large Aperture X-Ray Systems Screening Market – 2020-2027 179
28.6.1 Large Aperture X-Ray Systems Market Size – 2020-2027 179
28.6.2 Market Breakdown – 2020-2027 180

29 Whole Body X-ray Scanners (AIT) and Other Systems Security X-ray Screening Market – 2020-2027 182
29.1 Global Whole Body X-ray Scanners (AIT) Market Background 182
29.1.1 The Whole-Body X-ray Scanners (AIT) Technology 182
29.1.2 Problems and Concerns with Use of Body Scanners 183
29.1.3 Privacy Concerns 183
29.1.4 Automated Target Recognition (ATR) Technology 183
29.1.5 Health Concerns 183
29.1.6 The EU Legal Framework for X-ray Body Scanners 184
29.1.7 People Screening Throughput and Delays 184
29.1.8 Scanner Effectiveness 184
29.2 Market Drivers 185
29.3 Market Inhibitors 186
29.4 Global Whole Body X-ray Scanners and Other Systems X-ray Screening Market – 2020-2027 186
29.4.1 Whole Body X-ray Scanners and Other Systems X-ray Screening Market Size – 2020-2027 186
29.4.2 Market Breakdown – 2020-2027 187

MARKET BY REVENUE SOURCE 189

30 X-ray Security Screening System Sales 189
30.1 Global System Sales X-ray Security Screening Market – 2020-2027 189
30.1.1 System Sales Market Size – 2020-2027 189
30.1.2 Market Breakdown – 2020-2027 189

31 X-ray Security Screening Aftersale Revenues 190
31.1 Global Aftersale Revenues X-ray Security Screening Market – 2020-2027 190

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

31.1.1 Aftersale Revenues Market Size – 2020-2027 190
31.1.2 Market Breakdown – 2020-2027 190

32 X-ray Security Screening Planning & Consulting Services 191
32.1 Global Planning & Consulting Services X-ray Security Screening Market – 2020-2027..... 191
32.1.1 Planning & Consulting Services Market Size – 2020-2027 191
32.1.2 Market Breakdown – 2020-2027 191

33 X-ray Security Screening Training Services 193
33.1 Global Training Services X-ray Security Screening Market – 2020-2027..... 193
33.1.1 Training Services Market Size – 2020-2027..... 193
33.1.2 Market Breakdown – 2020-2027 193

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

List of Tables

Table 1 - Airport X-ray Screening Market Opportunities by Region 27
Table 2 - Global X-ray Screening Systems Market [$M] by Region – 2020-2027 28
Table 3 - Global X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 28
Table 4 - Global X-ray Screening Systems Market [$M] by Technology – 2020-2027 29
Table 5 - Global X-ray Screening Systems Market [$M] by Revenue Source – 2020-2027 29
Table 6 - National X-ray Screening Systems Markets [$M] – 2020-2027 30
Table 7 - Global Geopolitical Scenario 2026 Outlook 38
Table 8 - X-ray Screening Market: Business Opportunities 48
Table 9 – Global X-ray Security Screening Market [$M] by Region – 2020-2027 53
Table 10 – Regional X-ray Security Screening Market Shares [%] – 2020-2027 54
Table 11 - Global X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 55
Table 12 - Global X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 57
Table 13 - Global X-ray Screening Systems Market [$M] by Technology – 2020-2027 58
Table 14 - Global X-ray Screening Systems Market Share [%] by Technology – 2020-2027 60
Table 15 - Global X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 61
Table 16 - X-ray Screening Systems Markets [$M] by 30 countries – 2020-2027 63
Table 17 - North America X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 66
Table 18 - North America X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 67
Table 19 - North America X-ray Screening Systems Market [$M] by Technology – 2020-2027 69
Table 20 - North America X-ray Screening Systems Market Share [%] by Technology – 2020-2027 70
Table 21 - North America X-ray Screening Systems Market [$M] by Revenue Source – 2020-2027 72
Table 22 - Latin America X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 74
Table 23 - Latin America X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 75
Table 24 - Latin America X-ray Screening Systems Market [$M] by Technology – 2020-2027 77

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table 25 - Latin America X-ray Screening Systems Market Share [%] by Technology – 2020-2027 78
Table 26 - Latin America X-ray Screening Systems Market [$M] by Revenue Source – 2020-2027 80
Table 27 - Europe X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 82
Table 28 - Europe X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 83
Table 29 - Europe X-ray Screening Systems Market [$M] by Technology – 2020-2027 85
Table 30 - Europe X-ray Screening Systems Market Share [%] by Technology – 2020-2027 86
Table 31 - Europe X-ray Screening Systems Market [$M] by Revenue Source – 2020-2027 88
Table 32 - Middle East & Africa X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 90
Table 33 - Middle East & Africa X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 91
Table 34 - Middle East & Africa X-ray Screening Systems Market [$M] by Technology – 2020-2027 93
Table 35 - Middle East & Africa X-ray Screening Systems Market Share [%] by Technology – 2020-2027 94
Table 36 - Middle East & Africa X-ray Screening Systems Market [$M] by Revenue Source – 2020-2027 96
Table 37 - Asia-Pacific X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 98
Table 38 - Asia-Pacific X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 99
Table 39 - Asia-Pacific X-ray Screening Systems Market [$M] by Technology – 2020-2027 101
Table 40 - Asia-Pacific X-ray Screening Systems Market Share [%] by Technology – 2020-2027 102
Table 41 - Asia-Pacific X-ray Screening Systems Market [$M] by Revenue Source – 2020-2027 104
Table 42 - COVID-19 Impact on Civil Aviation: ICAO Estimates 114
Table 43 - Airports Passenger-Screening Traffic [M Passengers], Carry-on & Checked Baggage-Screening [Million] by 42 Countries – 2017 & 2027 117
Table 44 – Global Aviation X-ray Security Screening Market [$M] by Region – 2020-2027 120
Table 45 – Regional Aviation X-ray Security Screening Market Shares [%] – 2020-2027 121
Table 46 – Global Land Transportation X-ray Security Screening Market [$M] by Region – 2020-2027 126
Table 47 – Regional Land Transportation X-ray Security Screening Market Shares [%] – 2020-2027 127

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table 48 – Global Maritime X-ray Security Screening Market [$M] by Region – 2020-2027 132
Table 49 – Regional Maritime X-ray Security Screening Market Shares [%] – 2020-2027 133
Table 50 – Global Secured Perimeters & Buildings X-ray Security Screening Market [$M] by Region – 2020-2027 139
Table 51 – Regional Secured Perimeters & Buildings X-ray Security Screening Market Shares [%] – 2020-2027 140
Table 52 – Global Postal Services X-ray Security Screening Market [$M] by Region – 2020-2027 146
Table 53 – Regional Postal Services X-ray Security Screening Market Shares [%] – 2020-2027 147
Table 54 – Global Defense X-ray Security Screening Market [$M] by Region – 2020-2027 150
Table 55 – Regional Defense X-ray Security Screening Market Shares [%] – 2020-2027 151
Table 56 – Global Container-Vehicle Screening Systems X-ray Security Screening Market [$M] by Region – 2020-2027 159
Table 57 – Regional Container-Vehicle Screening Systems X-ray Security Screening Market Shares [%] – 2020-2027 160
Table 58 – Global 1st Responders X-Ray Systems X-ray Security Screening Market [$M] by Region – 2020-2027 163
Table 59 – Regional 1st Responders X-Ray Systems X-ray Security Screening Market Shares [%] – 2020-2027 164
Table 60 – Global Small Aperture X-Ray Systems X-ray Security Screening Market [$M] by Region – 2020-2027 168
Table 61 – Regional Small Aperture X-Ray Systems X-ray Security Screening Market Shares [%] – 2020-2027 170
Table 62 – Global Medium Aperture X-Ray Systems X-ray Security Screening Market [$M] by Region – 2020-2027 174
Table 63 – Regional Medium Aperture X-Ray Systems X-ray Security Screening Market Shares [%] – 2020-2027 175
Table 64 – Global Large Aperture X-Ray Systems X-ray Security Screening Market [$M] by Region – 2020-2027 180
Table 65 – Regional Large Aperture X-Ray Systems X-ray Security Screening Market Shares [%] – 2020-2027 181
Table 66 – Whole Body X-ray Scanners and Other Systems X-ray Screening Market [$M] by Region – 2020-2027 186
Table 67 – Regional Whole Body X-ray Scanners and Other Systems X-ray Screening Market Shares [%] – 2020-2027 187
Table 68 – Global System Sales X-ray Security Screening Market [$M] by Region – 2021-2027 189
Table 69 – Regional System Sales X-ray Security Screening Market Shares [%] – 2020-2027 189
Table 70 – Global Aftersale Revenues X-ray Security Screening Market [$M] by Region – 2021-2027 190

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table 71 – Regional Aftersale Revenues X-ray Security Screening Market Shares [%] – 2020-2027 190
Table 72 – Global Planning & Consulting Services X-ray Security Screening Market [$M] by Region – 2021-2027..... 191
Table 73 – Regional Planning & Consulting Services X-ray Security Screening Market Shares [%] – 2020-2027 192
Table 74 – Global Training Services X-ray Security Screening Market [$M] by Region – 2021-2027..... 193
Table 75 – Regional Training Services X-ray Security Screening Market Shares [%] – 2020-2027 193

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

List of Figures

Figure 1 - Boeing Global Passenger Traffic Forecast 19
Figure 2 - World Cargo Traffic Forecast by Region..... 20
Figure 3 - Airport Multi-Layered Security Infrastructure 21
Figure 4 - Types of Airport Attacks by Weapons Used [%] 22
Figure 5 - X-ray Screening Systems Markets Organogram 31
Figure 6 - Global Risks Landscape 2020 34
Figure 7 - Top Global Risks by Impact and Likelihood..... 35
Figure 8 - The Global Risks Interconnections Map 2020 35
Figure 9 - The Global Risks-Trends Interconnections Map 2019..... 36
Figure 10 - Global Risks 2002: A Regional Perceptive – Most Likely Global Risk..... 37
Figure 11 - Global Map of Terrorism Threats..... 41
Figure 12 - X-ray Security Systems Market: Barriers to Entry, Supplier Power, Buyer Power and Barriers to Substitution 52
Figure 13 – Global X-ray Security Screening Market [$M] by Region – 2020-2027..... 54
Figure 14 - Global X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 56
Figure 15 - Global X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 57
Figure 16 - Global X-ray Screening Systems Market [$M] by Technology – 2020-2027..... 59
Figure 17 - Global X-ray Screening Systems Market Share [%] by Technology – 2020-2027 60
Figure 18 - Global X-ray Security Screening Market [%] by Revenue Source – 2027 62
Figure 19 - Global X-ray Screening Systems Market [%] by Country – 2020-2027..... 64
Figure 20 - North America X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 66
Figure 21 - North America X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 68
Figure 22 - North America X-ray Screening Systems Market [$M] by Technology – 2020-2027 69
Figure 23 - North America X-ray Screening Systems Market Share [%] by Technology – 2020-2027 71
Figure 24 - North America X-ray Screening Systems Market [%] by Revenue Source – 2027 72
Figure 25 - Latin America X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 74
Figure 26 - Latin America X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 76
Figure 27 - Latin America X-ray Screening Systems Market [$M] by Technology – 2020-2027 77

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Figure 28 - Latin America X-ray Screening Systems Market Share [%] by Technology – 2020-2027 79
Figure 29 - Latin America X-ray Screening Systems Market [%] by Revenue Source – 2027 80
Figure 30 - Europe X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 82
Figure 31 - Europe X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 84
Figure 32 - Europe X-ray Screening Systems Market [$M] by Technology– 2020-2027 85
Figure 33 - Europe X-ray Screening Systems Market Share [%] by Technology – 2020-2027 87
Figure 34 - Europe X-ray Screening Systems Market [%] by Revenue Source – 2027 88
Figure 35 - Middle East & Africa X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 90
Figure 36 - Middle East & Africa X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 92
Figure 37 - Middle East & Africa X-ray Screening Systems Market [$M] by Technology – 2020-2027 93
Figure 38 - Middle East & Africa X-ray Screening Systems Market Share [%] by Technology – 2020-2027 95
Figure 39 - Middle East & Africa X-ray Screening Systems Market [%] by Revenue Source – 2027 96
Figure 40 - Asia-Pacific X-ray Screening Systems Market [$M] by Six Vertical Markets – 2020-2027 98
Figure 41 - Asia-Pacific X-ray Screening Systems Market Share [%] by Six Vertical Markets – 2020-2027 100
Figure 42 - Asia-Pacific X-ray Screening Systems Market [$M] by Technology – 2020-2027 101
Figure 43 - Asia-Pacific X-ray Screening Systems Market Share [%] by Technology – 2020-2027 103
Figure 44 - Asia-Pacific X-ray Screening Systems Market [%] by Revenue Source – 2027 104
Figure 45 - Boeing Global Passenger Traffic Forecast 106
Figure 46 - World Cargo Traffic Forecast by Region 107
Figure 47 - Global Aviation Passengers Traffic Growth [%] by Region & Destination, 2011-2031 109
Figure 48 - Airport Security Screening: Cabin Baggage, Checked Baggage & Passengers X-ray Systems 110
Figure 49 - Types of Airport Attacks by Weapons Used [%] 111
Figure 50 – When Will Air Travel Return To Pre COVID-Level? 112
Figure 51 - Airport Multi-Layered Security Infrastructure 112
Figure 52 – ICAO Forecast: Comparison of Passenger Numbers and Seat Capacity 115

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Figure 53 – Global Aviation X-ray Security Screening Market [$M] by Region – 2020-2027 121
Figure 54 – Regional Aviation X-ray Security Screening Market Shares [%] – 2020-2027 122
Figure 55 – Global Land Transportation X-ray Security Screening Market [$M] by Region – 2020-2027 127
Figure 56 – Regional Land Transportation X-ray Security Screening Market Shares [%] – 2020-2027 128
Figure 57 - Container-Shipping Costs [K$ per 40-Foot Container] – 2020, 2021 130
Figure 58 – Global Maritime X-ray Security Screening Market [$M] by Region – 2020-2027 133
Figure 59 – Regional Maritime X-ray Security Screening Market Shares [%] – 2020-2027 134
Figure 60 - Perimeters & Buildings Security Systems, Layers of Security 136
Figure 61 – Global Secured Perimeters & Buildings X-ray Security Screening Market [$M] by Region – 2020-2027 140
Figure 62 – Regional Secured Perimeters & Buildings X-ray Security Screening Market Shares [%] – 2020-2027 141
Figure 63 – Global Postal Services X-ray Security Screening Market [$M] by Region – 2020-2027 146
Figure 64 – Regional Postal Services X-ray Security Screening Market Shares [%] – 2020-2027 147
Figure 65 - Military Trailer - Mobile Backscatter X-Ray System 148
Figure 66 – Global Defense X-ray Security Screening Market [$M] by Region – 2020-2027 151
Figure 67 – Regional Defense X-ray Security Screening Market Shares [%] – 2020-2027 152
Figure 68 - Integrated RFID - X-ray Container Scanning System 155
Figure 69 - Typical Container Inspection Process Via X-Ray Scanning 155
Figure 70 – Global Container-Vehicle Screening Systems X-ray Security Screening Market [$M] by Region – 2020-2027 159
Figure 71 – Regional Container-Vehicle Screening Systems X-ray Security Screening Market Shares [%] – 2020-2027 160
Figure 72 – Global 1st Responders X-Ray Systems X-ray Security Screening Market [$M] by Region – 2020-2027 164
Figure 73 – Regional 1st Responders X-Ray Systems X-ray Security Screening Market Shares [%] – 2020-2027 165
Figure 74 – Global Small Aperture X-Ray Systems X-ray Security Screening Market [$M] by Region – 2020-2027 169
Figure 75 – Regional Small Aperture X-Ray Systems X-ray Security Screening Market Shares [%] – 2020-2027 170
Figure 76 – Global Medium Aperture X-Ray Systems X-ray Security Screening Market [$M] by Region – 2020-2027 174
Figure 77 – Regional Medium Aperture X-Ray Systems X-ray Security Screening Market Shares [%] – 2020-2027 175

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Figure 78 - Cargo Screening Modalities & Methods: X-Ray vs. Other 176
Figure 79 - Multi-Level Cargo Screening 177
Figure 80 - Factors and Constraints for Air Cargo Growth 178
Figure 81 – Global Large Aperture X-Ray Systems X-ray Security Screening Market [$M] by Region – 2020-2027..... 180
Figure 82 – Regional Large Aperture X-Ray Systems X-ray Security Screening Market Shares [%] – 2020-2027 181
Figure 83 - X-ray Backscatter Images of a Female (Left) and Male (Right) with Privacy Algorithm Applied..... 182
Figure 84 – Global Whole Body X-ray Scanners and Other Systems X-ray Screening Market [$M] by Region – 2020-2027..... 187
Figure 85 – Regional Whole Body X-ray Scanners and Other Systems X-ray Screening Market Shares [%] – 2020-2027 188

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

X-Ray Security Screening
(Aviation, Maritime, Land Transportation, Defense, Postal, Perimeter, Building, Baggage, Cargo, People, Container & Vehicle)
Market
with COVID-19 Vaccines Impact Analysis

2021-2027

Volume 2

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table of Contents

NATIONAL MARKETS **12**

North America **12**

1 U.S. X-ray Security Screening Market – 2020-2027 ..... **12**
1.1 U.S. X-ray Security Screening Market 12
1.1.1 U.S. Market by Revenue Source – 2020-2027 12
1.1.2 Market Dynamics – 2020-2027 13
1.1.3 Market Breakdown – 2020-2027 13

2 Canada X-ray Security Screening Market – 2020-2027 ..... **15**
2.1 Canada X-ray Security Screening Market 15
2.1.1 Canada Market by Revenue Source – 2020-2027 15
2.1.2 Market Dynamics – 2020-2027 15
2.1.3 Market Breakdown – 2020-2027 16

Europe **17**

3 UK X-ray Security Screening Market – 2020-2027 ..... **17**
3.1 UK X-ray Security Screening Market 17
3.1.1 UK Market by Revenue Source – 2020-2027 17
3.1.2 Market Dynamics – 2020-2027 17
3.1.3 Market Breakdown – 2020-2027 18

4 France X-ray Security Screening Market – 2020-2027 ..... **19**
4.1 France X-ray Security Screening Market 19
4.1.1 France Market by Revenue Source – 2020-2027 19
4.1.2 Market Dynamics – 2020-2027 19
4.1.3 Market Breakdown – 2020-2027 20

5 Scandinavia (Finland, Sweden, Norway, Denmark) X-ray Security Screening Market – 2020-2027 ..... **21**
5.1 Scandinavia (Finland, Sweden, Norway, Denmark) X-ray Security Screening Market 21
5.1.1 Scandinavia (Finland, Sweden, Norway, Denmark) Market by Revenue Source – 2020-2027 21
5.1.2 Market Dynamics – 2020-2027 21
5.1.3 Market Breakdown – 2020-2027 22

6 Germany X-ray Security Screening Market – 2020-2027 ..... **23**
6.1 Germany X-ray Security Screening Market 23
6.1.1 Germany Market by Revenue Source – 2020-2027 23
6.1.2 Market Dynamics – 2020-2027 23
6.1.3 Market Breakdown – 2020-2027 24

7 Italy X-ray Security Screening Market – 2020-2027 ..... **25**
7.1 Italy X-ray Security Screening Market 25
7.1.1 Italy Market by Revenue Source – 2020-2027 25
7.1.2 Market Dynamics – 2020-2027 25

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

7.1.3 Market Breakdown – 2020-2027 26

8 Spain X-ray Security Screening Market – 2020-2027 27
8.1 Spain X-ray Security Screening Market 27
8.1.1 Spain Market by Revenue Source – 2020-2027 27
8.1.2 Market Dynamics – 2020-2027 27
8.1.3 Market Breakdown – 2020-2027 28

9 Russia X-ray Security Screening Market – 2020-2027 29
9.1 Russia X-ray Security Screening Market 29
9.1.1 Russia Market by Revenue Source – 2020-2027 29
9.1.2 Market Dynamics – 2020-2027 29
9.1.3 Market Breakdown – 2020-2027 30

10 Rest of Europe X-ray Security Screening Market – 2020-2027 31
10.1 Rest of Europe X-ray Security Screening Market 31
10.1.1 Rest of Europe Market by Revenue Source – 2020-2027 31
10.1.2 Market Dynamics – 2020-2027 31
10.1.3 Market Breakdown – 2020-2027 32

Middle East & Africa 33

11 Turkey X-ray Security Screening Market – 2020-2027 33
11.1 Turkey X-ray Security Screening Market 33
11.1.1 Turkey Market by Revenue Source – 2020-2027 33
11.1.2 Market Dynamics – 2020-2027 33
11.1.3 Market Breakdown – 2020-2027 34

12 Saudi Arabia X-ray Security Screening Market – 2020-2027 35
12.1 Saudi Arabia X-ray Security Screening Market 35
12.1.1 Saudi Arabia Market by Revenue Source – 2020-2027 35
12.1.2 Market Dynamics – 2020-2027 35
12.1.3 Market Breakdown – 2020-2027 36

13 GCC (w/o Saudi Arabia) X-ray Security Screening Market – 2020-2027 37
13.1 GCC (w/o Saudi Arabia) X-ray Security Screening Market 37
13.1.1 GCC (w/o Saudi Arabia) Market by Revenue Source – 2020-2027 37
13.1.2 Market Dynamics – 2020-2027 37
13.1.3 Market Breakdown – 2020-2027 38

14 Nigeria X-ray Security Screening Market – 2020-2027 39
14.1 Nigeria X-ray Security Screening Market 39
14.1.1 Nigeria Market by Revenue Source – 2020-2027 39
14.1.2 Market Dynamics – 2020-2027 39
14.1.3 Market Breakdown – 2020-2027 40

15 South Africa X-ray Security Screening Market – 2020-2027 41
15.1 South Africa X-ray Security Screening Market 41

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

15.1.1 South Africa Market by Revenue Source – 2020-2027 41
15.1.2 Market Dynamics – 2020-2027 41
15.1.3 Market Breakdown – 2020-2027 42

16 Rest of MEA X-ray Security Screening Market – 2020-2027 43
16.1 Rest of MEA X-ray Security Screening Market 43
16.1.1 Rest of MEA Market by Revenue Source – 2020-2027 43
16.1.2 Market Dynamics – 2020-2027 43
16.1.3 Market Breakdown – 2020-2027 44

Asia-Pacific 45

17 India X-ray Security Screening Market – 2020-2027 45
17.1 India X-ray Security Screening Market 45
17.1.1 India Market by Revenue Source – 2020-2027 45
17.1.2 Market Dynamics – 2020-2027 45
17.1.3 Market Breakdown – 2020-2027 46

18 China X-ray Security Screening Market – 2020-2027 47
18.1 China X-ray Security Screening Market 47
18.1.1 China Market by Revenue Source – 2020-2027 47
18.1.2 Market Dynamics – 2020-2027 47
18.1.3 Market Breakdown – 2020-2027 48

19 South Korea X-ray Security Screening Market – 2020-2027 49
19.1 South Korea X-ray Security Screening Market 49
19.1.1 South Korea Market by Revenue Source – 2020-2027 49
19.1.2 Market Dynamics – 2020-2027 49
19.1.3 Market Breakdown – 2020-2027 50

20 Japan X-ray Security Screening Market – 2020-2027 51
20.1 Japan X-ray Security Screening Market 51
20.1.1 Japan Market by Revenue Source – 2020-2027 51
20.1.2 Market Dynamics – 2020-2027 52
20.1.3 Market Breakdown – 2020-2027 52

21 Malaysia X-ray Security Screening Market – 2020-2027 54
21.1 Malaysia X-ray Security Screening Market 54
21.1.1 Malaysia Market by Revenue Source – 2020-2027 54
21.1.2 Market Dynamics – 2020-2027 54
21.1.3 Market Breakdown – 2020-2027 55

22 Indonesia X-ray Security Screening Market – 2020-2027 56
22.1 Indonesia X-ray Security Screening Market 56
22.1.1 Indonesia Market by Revenue Source – 2020-2027 56
22.1.2 Market Dynamics – 2020-2027 56
22.1.3 Market Breakdown – 2020-2027 57

23 Australia X-ray Security Screening Market – 2020-2027 58
23.1 Australia X-ray Security Screening Market 58
23.1.1 Australia Market by Revenue Source – 2020-2027 58

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

23.1.2 Market Dynamics – 2020-2027 58
23.1.3 Market Breakdown – 2020-2027 59

24 Rest of Asia Pacific X-ray Security Screening Market – 2020-2027 60
24.1 Rest of Asia Pacific X-ray Security Screening Market 60
24.1.1 Rest of Asia Pacific Market by Revenue Source – 2020-2027 60
24.1.2 Market Dynamics – 2020-2027 60
24.1.3 Market Breakdown – 2020-2027 61

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

List of Tables

Table 1 - U.S. X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 12
Table 2 – U.S. X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 13
Table 3 - Canada X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 15
Table 4 – Canada X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 16
Table 5 - UK X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 17
Table 6 – UK X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 18
Table 7 - France X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 19
Table 8 – France X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 20
Table 9 - Scandinavia (Finland, Sweden, Norway, Denmark) X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 21
Table 10 – Scandinavia (Finland, Sweden, Norway, Denmark) X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 22
Table 11 - Germany X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 23
Table 12 – Germany X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 24
Table 13 - Italy X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 25
Table 14 – Italy X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 26
Table 15 - Spain X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 27
Table 16 – Spain X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 28
Table 17 - Russia X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 29
Table 18 – Russia X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 30
Table 19 - Rest of Europe X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 31
Table 20 – Rest of Europe X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 32
Table 21 - Turkey X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 33

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table 22 – Turkey X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 34
Table 23 - Saudi Arabia X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 35
Table 24 – Saudi Arabia X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 36
Table 25 - GCC (w/o Saudi Arabia) X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 37
Table 26 – GCC (w/o Saudi Arabia) X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 38
Table 27 - Nigeria X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 39
Table 28 – Nigeria X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 40
Table 29 - South Africa X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 41
Table 30 – South Africa X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 42
Table 31 - Rest of MEA X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 43
Table 32 – Rest of MEA X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 44
Table 33 - India X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 45
Table 34 – India X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 46
Table 35 - China X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 47
Table 36 – China X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 48
Table 37 - South Korea X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 49
Table 38 – South Korea X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 50
Table 39 - Japan X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 51
Table 40 – Japan X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 52
Table 41 - Malaysia X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 54
Table 42 – Malaysia X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 55
Table 43 - Indonesia X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 56
Table 44 – Indonesia X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 57

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table 45 - Australia X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 58
Table 46 – Australia X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 59
Table 47 - Rest of Asia Pacific X-ray Security Screening Market [$M] by Revenue Source – 2020-2027 60
Table 48 – Rest of Asia Pacific X-ray Security Screening Market AGRs [%] by Revenue Source – 2020-2027 61

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

List of Figures

Figure 1 - U.S. X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 14
Figure 2 - Canada X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 16
Figure 3 - UK X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 18
Figure 4 - France X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 20
Figure 5 - Scandinavia (Finland, Sweden, Norway, Denmark) X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 22
Figure 6 - Germany X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 24
Figure 7 - Italy X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 26
Figure 8 - Spain X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 28
Figure 9 - Russia X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 30
Figure 10 - Rest of Europe X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 32
Figure 11 - Turkey X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 34
Figure 12 - Saudi Arabia X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 36
Figure 13 - GCC (w/o Saudi Arabia) X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 38
Figure 14 - Nigeria X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 40
Figure 15 - South Africa X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 42
Figure 16 - Rest of MEA X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 44
Figure 17 - India X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 46
Figure 18 - China X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 48
Figure 19 - South Korea X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 50
Figure 20 - Japan X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 53
Figure 21 - Malaysia X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 55

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Figure 22 - Indonesia X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 57
Figure 23 - Australia X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 59
Figure 24 - Rest of Asia Pacific X-ray Security Screening Market Breakdown [%] by Revenue Source – 2020-2027 61

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

X-Ray Security Screening

(Aviation, Maritime, Land Transportation, Defense, Postal, Perimeter, Building, Baggage, Cargo, People, Container & Vehicle)

Market

with COVID-19 Vaccines Impact Analysis

2021-2027

Volume 3

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table of Contents

PIPELINE TECHNOLOGIES & INDUSTRY 11

1 Pipeline X-ray Screening Technologies & Methods 11
1.1 Fused X-ray and Trace Detection Screening 11
1.2 Explosive Detection Systems For Cabin Baggage Screening (EDSCB) 11
1.3 Drugs Detection Using X-ray Diffraction Technology 11
14 Coded Cone-Beam X-Ray Diffraction 12
1.5 Single Photon Counting Based Dual-energy X-ray Screening Technology 13
1.6 Multi-Energy X-Ray Scanner 13
1.7 Multiple Beam Based X-ray Diffraction Explosives Detection Technology 15
1.8 Small Angle Scattering with an X-ray Grating Interferometer Improvised Explosives Detection 17
1.9 Fused X-ray and RFID Screening 19
1.10 Multi-Threat Multi-Modal Screening 19
1.11 AI-powered X-ray Screening Technology 20
1.12 Energy-Dispersive X-Ray Diffraction (EDXRD) 21
1.13 Deep Learning 22

2 Key Vendors 23
2.1 3DX-RAY 23
2.1.1 Company Profile 23
2.1.2 X-ray Security Screening Products 24
2.1.2.1 Portable Systems 24
2.1.2.2 Mail Screening 24
2.1.2.3 Conveyor Systems 25
2.1.2.4 Vehicle Screening 25
2.1.3 Recent Events 26
2.2 Adani 28
2.2.1 Company Profile 28
2.2.2 X-ray Security Screening Products 29
2.2.2.1 People X-ray Screening 29
2.2.2.2 Parcel, Baggage and Small Cargo X-ray Inspection 29
2.2.2.3 Preventive Detection and Antiterrorist Systems 29
2.2.2.4 Cargo and Vehicle X-ray Inspection 29
2.2.3 Recent Events 29
2.3 Analysed Images 32
2.3.1 Company Profile 32
2.3.2 X-ray Security Screening Products 32
2.4 Astrophysics Inc. 33
2.4.1 Company Profile 33
2.4.2 X-ray Security Screening Products 34
2.4.2.1 Mail & Small Parcel 34

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

2.4.2.2 Checkpoint 34
2.4.2.3 Hold Baggage 34
2.4.2.4 Cargo 34
2.4.2.5 Mobile Screening 35
2.4.2.6 Vehicle & Freight 35
2.4.2.7 Enhanced Imaging™ (EI) Software 35
2.4.2.8 2021 TSA Dual-View Mandate Compliant Products 36
2.4.3 Astrophysics X-ray Products Prices 37
2.4.4 Recent Events 38
2.5 Autoclear 41
2.5.1 Company Profile 41
2.5.2 X-ray Security Screening Products 41
2.5.2.1 Direct Transmission X-ray Screening Systems 42
2.5.2.2 Backscatter X-ray Screening Systems 42
2.5.3 Autoclear X-ray Products Prices 42
2.6 Eurologix Security Ltd 58
2.6.1 Company Profile 58
2.6.2 X-ray Security Screening Products 58
2.6.3 Recent Events 59
2.7 FISCAN 61
2.7.1 Company Profile 61
2.7.2 X-ray Security Screening Products 61
2.8 Gilardoni SpA 62
2.8.1 Company Profile 62
2.8.2 X-ray Security Screening Products 62
2.8.2.1 Single and Multi-View Screening Systems for Liquid Threats and Solid Explosives Detection 62
2.8.2.2 Mail and Parcels 63
2.8.2.3 Bulky Baggage Screening 63
2.8.2.4 Air-Cargo Screening 64
2.8.2.5 Optional Alarm and Training Software 64
2.8.2.6 Characteristics of Models 65
2.8.3 Recent Events 65
2.9 Inward Detection 67
2.9.1 Company Profile 67
2.9.2 X-ray Security Screening Products 68
2.9.2.1 Baggage and Parcel 68
2.9.2.2 People screening 68
2.9.2.3 Cargo inspection 68
2.9.3 Inward Detection X-ray Products Prices 68
2.9.4 Recent Events 69
2.10 Leidos (L3 Products) 70
2.10.1 Company Profile 70
2.10.2 X-ray Security Screening Products 70
2.10.2.1 Large X-ray 70
2.10.2.2 Medium X-ray 71

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

2.10.2.3 Small X-ray 71
2.10.3 X-ray Security Screening Products by Certification 71
2.10.3.1 TSA Air Cargo Qualified 71
2.10.3.2 TSA Checkpoint Qualified 71
2.10.3.3 EU Checkpoint Certified Products 72
2.10.3.4 DfT Certified Products 72
2.10.3.5 DfT Air Cargo Certified Products 72
2.10.3.6 Transport Canada Certified Products 72
2.10.4 L3 Air Cargo Screening Systems and Features 73
2.10.5 L-3 Security & Detection Systems X-ray Products Prices 74
2.10.6 Recent Events 80
2.11 Leidos, Inc 81
2.11.1 Company Profile 81
2.11.2 X-ray Security Screening Products 81
2.11.3 Leidos X-ray Products Prices 82
2.11.4 Recent Events 84
2.12 LIXI, Inc 87
2.12.1 Company Profile 87
2.12.2 X-ray Security Screening Products 87
2.13 MINXRAY, Inc. 89
2.13.1 Company Profile 89
2.13.2 X-ray Security Screening Products 89
2.14 Nuctech Co. Ltd 90
2.14.1 Company Profile 90
2.14.2 X-ray Security Screening Products 91
2.14.2.1 Air Cargo Screening System 91
2.14.2.2 Fast-Scan Container/Vehicle Screening System 92
2.14.2.3 Cargo/Vehicle Screening System 92
2.14.2.4 Container/Vehicle Screening - Dual-View Fixed Systems 93
2.14.2.5 Railway Cargo/Vehicle Screening - RF Series 94
2.14.2.6 Relocatable Container/Vehicle Screening - MB Series System 94
2.14.2.7 Mobile Container/Vehicle Screening - MT Series System 95
2.14.2.8 High Energy Portal Container Truck and Passenger Vehicle Inspection 96
2.14.2.9 Body Scan 96
2.14.2.10 Mail and Carry-On Baggage – CX Series 96
2.14.2.11 Luggage & Cargo Systems – CX Series 97
2.14.2.12 Large & Pallet Cargo Screening Systems 99
2.14.2.13 Mobile-Check – MX Series 99
2.14.2.14 Fixed Container & Vehicle Screening 100
2.14.2.15 Handheld Backscatter 100
2.14.3 Recent Events 100

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

2.15 Optosecurity 102
2.16 OSI Systems 103
2.16.1 Company Profile 103
2.16.2 Security Division Products 104
2.16.3 COVID-19 Impact 105
2.16.4 Recent Events 105
2.17 Polimek Electronics 107
2.17.1 Company Profile 107
2.17.2 X-ray Security Screening Products 107
2.18 Rapiscan Systems 109
2.18.1 Company Profile 109
2.18.2 X-ray Security Screening Products 110
2.18.2.1 Checkpoint X-ray Screening Products 110
2.18.2.2 Carry On Baggage Scanners 110
2.18.2.3 Customs Screening Products 111
2.18.2.4 Mail and Small Parcel Screening Products 111
2.18.2.5 Large Parcel and Small Cargo Screening Products 111
2.18.2.6 Pallet and Cargo Screening Products 112
2.18.2.7 Air Cargo & Vehicle Screening Products 112
2.18.3 Rapiscan X-ray Products Prices 112
2.18.4 Recent Events 118
2.19 S2 Global, Inc. 119
2.19.1 Company Profile 119
2.19.2 Security Screening Products 119
2.20 Scanna MSC Ltd. 121
2.20.1 Company Profile 121
2.20.2 X-ray Security Screening Products 122
2.20.2.1 Portable X-Ray Systems for Security and Defense 122
2.20.2.2 Mail Screening Equipment 122
2.20.2.3 Cabinet X-Ray 124
2.20.2.4 Conveyor X-Ray Systems 124
2.20.3 Scanna X-ray Products Prices 125
2.20.4 Recent Events 126
2.21 Smiths Detection 127
2.21.1 Company Profile 127
2.21.2 X-ray Security Screening Products 128
2.21.2.1 Checkpoint Baggage 128
2.21.2.2 Mail, Parcel & Freight 130
2.21.2.3 Air Cargo Screening 133
2.21.2.4 Mobile Screening Solution 135
2.21.2.5 Light Vehicle Inspection 135
2.21.2.6 X-ray Diffraction (XRD) XDi Detection System 136
2.21.3 Smiths Detection X-ray Products Prices 137
2.21.4 2020 Trends 137
2.21.5 Fighting COVID-19 138
2.21.6 Recent Events 138

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

2.22 Todd Research Ltd. 140
2.22.1 Company Profile 140
2.22.2 X-ray Security Screening Products 141
2.22.2.1 Cabinet X-ray Scanners 141
2.22.2.2 Conveyor X-ray Scanners 141
2.22.2.3 Security Vehicles 142
2.22.3 Recent Events 143
2.23 Vanderlande 144
2.23.1 Company Profile 144
2.23.2 X-ray Security Screening Products 145
2.23.2.1 SCANNOJET Automated Screening Lane 145
2.23.2.2 eVelocity Integrated Security Screening Software Suite 145
2.23.3 Recent Events 146
2.24 VisiConsult 147
2.24.1 Company Profile 147
2.24.2 X-ray Security Screening Products 147
2.24.3 Recent Events 148
2.25 Vidisco Ltd. 149
2.25.1 Company Profile 149
2.25.2 X-ray Security Screening Products 150
2.25.3 Recent Events 152
2.26 VOTI Detection 154
2.26.1 Company Profile 154
2.26.2 3D Perspective™ Technology 155
2.26.3 X-ray Security Screening Products 156
2.26.4 COVID-19: Impact & Response 157
2.26.5 Recent Events 158
2.27 Westminster International 160
2.27.1 Company Profile 160
2.27.2 X-ray Security Screening Products 161
2.27.2.1 WG Car, Bus, Truck & Container X-Ray Scanning Portal 161
2.27.2.2 WG IS6242 7 View Dual Energy X-Ray Baggage Scanner 161
2.27.2.3 WG 40 Large Cabinet X-Ray Scanner 162
2.27.2.4 WG Rugged Slim Panel X-Ray Systems 162
2.27.2.5 WG H Container X-Ray Scanning Portal 163
2.27.2.6 WG Relocatable - Entire Truck & Cargo X-Ray Scanning System 163
2.27.2.7 WG Mobile Entire Truck & Cargo X-Ray Scanning System 164
2.27.2.8 WG IS7858DVS Dual View X-Ray Baggage and Parcel Scanner 164
2.27.2.9 WG IS1818 (320kV) Pallet and Cargo X-Ray Scanner 165
2.27.2.10 WG IS X-Ray Scanner Management System (AMS) 165

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

2.27.2.11 WG IS1517 Pallet and Cargo X-Ray Scanner (320kV) 166
2.27.2.12 WG MVCTC X-Ray Pallet and Cargo Scanner 166
2.27.2.13 WG IS6545N X-Ray Baggage and Parcel Scanner 167
2.27.2.14 WG Container & Cargo X-Ray Scanning Portal 167
2.27.2.15 WG Automatic (X-Ray Scanner) Tray Return System 168
2.27.2.16 WG Industrial X-Ray NDT Solutions 168
2.27.2.17 WG IS1517 Pallet and Cargo X-Ray Scanner (200kV) 169
2.27.2.18 WG CP Body Scanner X-Ray Shielding Cabin 169
2.27.2.19 WG Entire Truck and Cargo X-Ray Scanning Portal 170
2.27.2.20 WG IS6545DVS Dual View Baggage & Parcel X-Ray Scanner 170
2.27.2.21 WG IS6040N Small Baggage and Parcel X-Ray Scanner 171
2.27.2.22 WG IS100XD DV Dual View Low Conveyor X-Ray Large Baggage and Parcel Scanner 171
2.27.2.23 WG IS5335SD Low Conveyor Mail and Small Parcel X-Ray Scanner 172
2.27.2.24 WG IS7858VI Baggage and Parcel X-Ray Scanner 172
2.27.2.25 WG IS6545DV Dual View X-Ray Baggage and Parcel Scanner 173
2.27.2.26 WG IS6545VI Baggage and Parcel X-Ray Scanner 173
2.27.2.27 WG X225 X-Ray Post & Small Parcel Scanner 174
2.27.2.28 WG X15 Post & Small X-Ray Scanner 174
2.27.2.29 WG IS100XDV Dual View X-Ray Large Baggage and Parcel Scanner 175
2.27.2.30 WG IS Mobile Heavy Duty X-Ray Van 175
2.27.2.31 WG IS1818DV Dual View (320kV) Pallet & Cargo X-Ray Scanner 176
2.27.2.32 WG IS X-Ray Mobile Screening - Mini Van 176
2.27.2.33 WG IS6040M Mobile Small Baggage and Parcel X-Ray Scanner 177
2.27.2.34 WG IS7555R Ruggedized Baggage and Parcel X-Ray Scanner 177
2.27.2.35 WG IS1517DV Dual View 320kV Pallet and Cargo X-Ray Scanner 178
2.27.3 Recent Events 179
2.28 X-Ray Center Ltd. 180
2.28.1 Company Profile 180
2.28.2 X-ray Security Screening Products 180
2.28.3 Recent Events 181

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

List of Tables

Table 1 - Pros and Cons of Multi-modal Technology 20
Table 2 - Astrophysics X-ray Products Prices 37
Table 3 – Autoclear X-ray Products Prices 42
Table 4 – Inward Detection X-ray Products Prices 69
Table 5 - L-3 X-ray Air Cargo Screening Products 73
Table 6 – L-3 Security & Detection Systems X-ray Products Prices 74
Table 7 – Leidos X-ray Products Prices 82
Table 8 - OSI Security and Inspection Products 104
Table 9 – Rapiscan X-ray Products Prices 113
Table 10 – Scanna X-ray Products Prices 125
Table 11 – Smiths Detection X-ray Products Prices 137

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

List of Figures

Figure 1 - Multi-Energy X-Ray Scanner Characteristics.....14
Figure 2 - Next generation X-ray Diffraction Explosives Detection Technology Developed by Morpho Detection 16
Figure 3 - Next Generation X-ray Diffraction Explosives Detection Technology Setup.....17
Figure 4 - Talbot-Lau Grating Interferometer with an X-ray Source 18
Figure 5 - 2D Plot of the Ratio RV T = s/μ as a function of RT P = μ/δ for PETN and Benign Materials.....18
Figure 6 - Fused Multi Threat (Explosives & Nuclear) Screening System.....19
Figure 7 - 3D View and Photograph of Spiral EDXRD System 22
Figure 8 - XDi X-ray Diffraction System with a Traditional Imaging System.....136

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

X-Ray Security Screening

(Aviation, Maritime, Land Transportation, Defense, Postal, Perimeter, Building, Baggage, Cargo, People, Container & Vehicle)

Market

with COVID-19 Vaccines Impact Analysis

2021-2027

Volume 4

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table of Contents

APPENDIX A: NATIONAL MARKETS BACKGROUND 18

North America 18

1 U.S. Homeland Security & Public Safety Market 18

1.1 U.S. Homeland Security & Public Safety Market Background 18
1.1.1 Facts & Figures 2020 18
1.1.2 U.S. Public Safety & Homeland Security: Introduction 18
1.1.3 Terror in the U.S. 22
1.2 U.S. Federal Homeland Security Related Organizations 22
1.2.1 Department of Homeland Security (DHS) 24
1.2.2 Department of Homeland Security: Agencies and Units 25
1.2.3 DHS – Transportation Security Administration (TSA) 27
1.2.4 DHS – U.S. Customs & Border Protection (CBP) 29
1.2.5 DHS – Federal Emergency Management Agency (FEMA) 29
1.2.6 DHS – U.S. Immigration & Customs Enforcement (ICE) 30
1.2.7 DHS – U.S. Coast Guard (USCG) 30
1.2.8 U.S. Secret Service (USSS) 31
1.2.9 DHS – Science & Technology Directorate (S&T) 31
1.2.10 DHS – Domestic Nuclear Detection Office (DNDO) 32
1.2.11 DHS – U.S. Citizenship & Immigration Services (USCIS) 33
1.2.12 DHS – National Protection and Programs Directorate (NPPD) 34
1.2.13 Department of Defense (DOD) 35
1.2.14 Department of Justice (DOJ) 35
1.2.15 Federal Bureau of Investigation (FBI) 37
1.2.16 Department of State (DOS) 38
1.2.17 National Aeronautic & Space Administration (NASA) 39
1.2.18 Department of Transportation (DOT) 40
1.2.19 Department of Commerce (DOC) 40
1.3 U.S. Police Forces 41
1.4 U.S. Airports Security Statistics 42
1.4.1 Air Passengers Checkpoint CCTV Support Program 49
1.4.2 CCTV Assisted Secure Flight Program 49
1.5 U.S. Land Border Security 50
1.5.1 Introduction 50
1.5.2 U.S. Land Border Security Components 52
1.5.3 Southwest Border 52
1.5.4 Northern Border 53
1.5.5 Trusted Traveler, Expedited Clearance and Other Partnerships 54
1.6 U.S. Critical Infrastructure Security 54

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

1.6.1 Scope 54
1.6.2 Major Findings 55
1.6.3 Critical Infrastructure Security Tactics 57
1.6.4 Critical Infrastructure Vulnerabilities 58
1.6.5 Planning of Infrastructure Security 59
1.6.6 Critical Infrastructure Strategy Outlook 59
1.6.7 Information Sharing with the Private Sector 60
1.6.8 Food and Agro-Terror Market Outlook 61
1.6.9 CIP Terror Mitigation Outlook 63
1.7 U.S. Maritime Security 65
1.7.1 Scope 65
1.7.2 Major Findings & Conclusions 66
1.7.3 Maritime Security Infrastructure 68
1.7.4 Port Critical Infrastructure Operations 69
1.7.5 The Container Security Initiative (CSI) 70
1.8 U.S. Land Transportation Security 71
1.8.1 Scope 71
1.8.2 Land Transportation Security: Background 72
1.8.3 Mass Transit Security 73
1.9 U.S. Energy Sector Security 74
1.9.1 Scope 74
1.9.2 U.S. Energy Sector Security: Background 74
1.10 U.S. Public Events Security 76
1.10.1 Scope 76
1.10.2 U.S. Natural & Manmade Disaster Mitigation 76

2 Canada Homeland Security & Public Safety Market 79
2.1 Canada Homeland Security & Public Safety Market Background 79
2.1.1 Facts & Figures 2020 79
2.1.2 Canada Geopolitical Overview 79
2.1.3 Crime in Canada 80
2.1.4 Terror in Canada 80
2.1.5 Canada's Counter Terror & Law Enforcement Legislation 81
2.1.6 Canada's Homeland Security & Public Safety Agencies 82
2.1.7 Canada's Police Forces 83
2.1.8 Canada's Security Intelligence Services 83
2.1.9 Canada's Defense Forces 84
2.1.10 Canada: Airport Security Statistics 84
2.1.11 Canada Border Security 85

Europe 87

3 UK Homeland Security & Public Safety Market 87
3.1 UK Homeland Security & Public Safety Market Background 87
3.1.1 Facts & Figures 2020 87
3.1.2 UK Geopolitical Overview 87

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

3.1.3 The Brexit Effects 88
3.1.4 UK Homeland Security & Public Safety: Market Background 89
3.1.5 UK National Security Risk Assessment 2018 92
3.1.6 Crime in the UK 93
3.1.7 Terror in the UK 93
3.1.8 UK Counter Terror & Law Enforcement Legislation 99
3.1.9 UK Homeland Security & Public Safety Agencies 104
3.1.10 UK Police Forces 104
3.1.11 UK Intelligence Services 107
3.1.12 UK Defense Forces 112
3.1.13 UK: Safe City Projects 112
3.1.14 UK: Airport Security Statistics 116
3.1.15 UK Border Security 117

4 Germany Homeland Security & Public Safety Market 128
4.1 Germany Homeland Security & Public Safety Market Background 128
4.1.1 Facts & Figures 2020 128
4.1.2 Germany Geopolitical Overview 128
4.1.3 Germany: Economy, Immigration & Terror 129
4.1.4 Germany Homeland Security & Public Safety Industry: Background 135
4.1.5 Crime in Germany 136
4.1.6 Terror in Germany 136
4.1.7 Germany's Counter Terror Legislation & Law Enforcement 137
4.1.8 Germany's Terror Challenge & Counter Terror Strategy 139
4.1.9 Germany's Homeland Security & Public Safety Agencies 148
4.1.10 Germany's Police Forces 148
4.1.11 Germany's Intelligence Services 152
4.1.12 Germany's Defense Forces 154
4.1.13 Germany's Safe City 154
4.1.14 Germany: Airport Security Statistics 159
4.1.15 Germany Border Security 160

5 France Homeland Security & Public Safety Market 168
5.1 France Homeland Security & Public Safety Market Background 168
5.1.1 Facts & Figures 2020 168
5.1.2 France Geopolitical Overview 168
5.1.3 France Homeland Security & Public Safety Industry 169
5.1.4 Crime in France 169
5.1.5 Terror in France 170
5.1.6 France's Terror Threats & Counter Terror Strategy 175
5.1.7 French Anti-Terror Legislation 179

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

5.1.8 France's Homeland Security & Public Safety Agencies 184
5.1.9 France's Police Forces 184
5.1.10 France's Intelligence Services 189
5.1.11 France's Defense Forces 192
5.1.12 France: Safe City Projects 193
5.1.13 France: Airport Security Statistics 194
5.1.14 France Border Security 195

6 Spain Homeland Security & Public Safety Market 206
6.1 Spain Homeland Security & Public Safety Market Background 206
6.1.1 Facts & Figures 2020 206
6.1.2 Spain Geopolitical Overview 206
6.1.3 Spain Homeland Security & Public Safety Industry 207
6.1.4 Crime in Spain 209
6.1.5 Terror in Spain 209
6.1.6 Spain's Counter Terror Legislation & Law Enforcement 210
6.1.7 Spain's Homeland Security & Public Safety Agencies 211
6.1.8 Spain's Police Forces 211
6.1.9 Spain's Intelligence Services 214
6.1.10 Spain's Defense Forces 216
6.1.11 Spain: Safe City Projects 216
6.1.12 Spain: Airport Security Statistics 220

7 Italy Homeland Security & Public Safety Market 222
7.1 Italy Homeland Security & Public Safety Market Background 222
7.1.1 Facts & Figures 2020 222
7.1.2 Italy Geopolitical Overview 222
7.1.3 Italy Homeland Security & Public Safety Industry 223
7.1.4 Crime in Italy 225
7.1.5 Terror in Italy 226
7.1.6 Italy's Counter Terror Legislation & Law Enforcement 226
7.1.7 Italy's Homeland Security & Public Safety Agencies 227
7.1.8 Italy's Police Forces 228
7.1.9 Italy's Intelligence Services 230
7.1.10 Italy's Defense Forces 232
7.1.11 Italy: Safe City Projects 232
7.1.12 Italy: Airport Security Statistics 234
7.1.13 Italy Border Security 235

8 Russia Homeland Security & Public Safety Market 238
8.1 Russia Homeland Security & Public Safety Market Background 238
8.1.1 Facts & Figures 2020 238
8.1.2 Russia Geopolitical Overview 238
8.1.3 Russia Homeland Security & Public Safety Industry 239
8.1.4 Crime in Russia 240

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

8.1.5 Russia's Counter Terror Legislation & Law Enforcement 241
8.1.6 Russia's Homeland Security & Public Safety Agencies..... 242
8.1.7 Russia's Police Forces 243
8.1.8 Russia's Intelligence Services 243
8.1.9 Russia's Defense Forces..... 244
8.1.10 Russia: Airport Security Statistics..... 245
8.1.11 Russia Border Security..... 247

9 Sweden Homeland Security & Public Safety Market 248
9.1 Sweden Homeland Security & Public Safety Market Background..... 248
9.1.1 Facts & Figures 2020 248
9.1.2 Sweden Geopolitical Overview..... 248
9.1.3 Sweden Homeland Security & Public Safety Industry 248
9.1.4 Crime in Sweden 249
9.1.5 Terror in Sweden..... 249
9.1.6 Sweden's Counter Terror Legislation & Law Enforcement 250
9.1.7 Sweden's Homeland Security & Public Safety Agencies..... 251
9.1.8 Sweden's Police Forces 251
9.1.9 Sweden's Defense Forces..... 252
9.1.10 Sweden's Intelligence Services 252
9.1.11 Sweden: Safe City Projects 252
9.1.12 Sweden: Airport Security Statistics..... 253

10 Denmark Homeland Security & Public Safety Market 254
10.1 Denmark Homeland Security & Public Safety Market Background..... 254
10.1.1 Facts & Figures 2020 254
10.1.2 Denmark Geopolitical Overview 254
10.1.3 Denmark Homeland Security & Public Safety Industry..... 254
10.1.4 Crime in Denmark 255
10.1.5 Terror in Denmark 256
10.1.6 Denmark's Counter Terror Legislation & Law Enforcement 256
10.1.7 Denmark's Police Forces..... 257
10.1.8 Denmark's Intelligence Services 258
10.1.9 Denmark's Defense Forces 258
10.1.10 Denmark: Airport Security Statistics 259

Middle East & Africa 260

11 Turkey Public Safety & Homeland Security Market 260
11.1 Turkey Public Safety & Homeland Security Market Background..... 260
11.1.1 Facts & Figures 2020 260
11.1.2 Turkey Homeland Security & Public Safety Market 260
11.1.3 Turkey COVID-19 Pandemic 262

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

11.1.4 Crime in Turkey 263
11.1.5 Terror in Turkey 263
11.1.6 Turkey's Counter Terror Legislation & Law Enforcement 263
11.1.7 Turkey's Homeland Security & Public Safety Agencies 264
11.1.8 Turkey's Police Forces 265
11.1.9 Turkey's Intelligence Services 267
11.1.10 Turkey's Defense Forces 268
11.1.11 Turkey: Airport Security Statistics 268
11.1.12 Turkey Border Security 270

12 Saudi Arabia Public Safety & Homeland Security Market 271
12.1 Saudi Arabia Public Safety & Homeland Security Market Background 271
12.1.1 Facts & Figures 2020 271
12.1.2 Saudi Arabia Homeland Security & Public Safety Market 271
12.1.3 Saudi Arabia COVID-19 Pandemic 271
12.1.4 Crime in Saudi Arabia 272
12.1.5 Saudi Arabia's Counter Terror Legislation & Law Enforcement 272
12.1.6 Saudi Arabia's Homeland Security & Public Safety Agencies 273
12.1.7 Saudi Arabia's Police Forces 278
12.1.8 Saudi Arabia's Intelligence Services 279
12.1.9 Saudi Arabia's Defense Forces 280
12.1.10 Saudi Arabia's Safe City Projects 281
12.1.11 Saudi Arabia: Airport Security Statistics 286
12.1.12 Saudi Arabia Border Security 286

13 UAE Public Safety & Homeland Security Market 287
13.1 UAE Public Safety & Homeland Security Market Background 287
13.1.1 Facts & Figures 2020 287
13.1.2 UAE Homeland Security & Public Safety Market 287
13.1.3 UAE COVID-19 Pandemic 292
13.1.4 Crime in the UAE 292
13.1.5 Terror in the UAE 293
13.1.6 UAE's Counter Terror Legislation & Law Enforcement 293
13.1.7 UAE's Homeland Security & Public Safety Agencies 295
13.1.8 UAE's Police Forces 296
13.1.9 UAE's Intelligence Services 298
13.1.10 UAE's Defense Forces 298
13.1.11 UAE's Safe City Projects 299
13.1.12 UAE: Airport Security Statistics 301
13.1.13 UAE Border Security 301

14 Qatar Public Safety & Homeland Security Market 302

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

14.1 Qatar Public Safety & Homeland Security Market Background 302
14.1.1 Facts & Figures 2020 302
14.1.2 Qatar Homeland Security & Public Safety Market 302
14.1.3 Qatar COVID-19 Pandemic 304
14.1.4 Crime in Qatar 304
14.1.5 Terror in Qatar 306
14.1.6 Qatar's Counter Terror Legislation & Law Enforcement 307
14.1.7 Qatar's Police Forces 308
14.1.8 Qatar's Intelligence Services 309
14.1.9 Qatar's Defense Forces 309
14.1.10 Qatar's Safe City Projects 310
14.1.11 Qatar: Airport Security Statistics 311
14.1.12 Qatar Border Security 311

15 Nigeria Public Safety & Homeland Security Market 313
15.1 Nigeria Public Safety & Homeland Security Market Background 313
15.1.1 Facts & Figures 2020 313
15.1.2 Nigeria Homeland Security & Public Safety Market 313
15.1.3 COVID-19 pandemic in Nigeria 314
15.1.4 Crime 315
15.1.5 Terror in Nigeria 316
15.1.6 Nigeria's Counter Terror Legislation & Law Enforcement 316
15.1.7 Nigeria's Homeland Security & Public Safety Agencies 318
15.1.8 Nigeria's Police Forces 318
15.1.9 Nigeria's Defense Forces 322
15.1.10 Nigeria: Airport Security Statistics 322
15.1.11 Nigeria Border Security 323

16 South Africa Public Safety & Homeland Security Market 325
16.1 South Africa Public Safety & Homeland Security Market Background 325
16.1.1 Facts & Figures 2020 325
16.1.2 COVID-19 pandemic in South Africa 325
16.1.3 Crime in South Africa 326
16.1.4 Crime in South Africa 327
16.1.5 Terror in South Africa 328
16.1.6 South Africa's Counter Terror Legislation & Law Enforcement 329
16.1.7 South Africa's Homeland Security & Public Safety Agencies 329
16.1.8 South Africa's Police Forces 331
16.1.9 South Africa's Intelligence Services 331
16.1.10 South Africa's Defense Forces 332
16.1.11 South Africa: Airport Security Statistics 334

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

16.1.12 South Africa Border Security 334

Asia Pacific 335

17 India Public Safety & Homeland Security Market 335

17.1 India Public Safety & Homeland Security Market Background 335
17.1.1 Facts & Figures 2020 335
17.1.2 India Homeland Security & Public Safety Market 335
17.1.3 COVID-19 pandemic in India 337
17.1.4 Crime in India 338
17.1.5 Terror in India 340
17.1.6 India's Counter Terror Legislation & Law Enforcement 340
17.1.7 India's Homeland Security & Public Safety Agencies 341
17.1.8 India's Police Forces 342
17.1.9 India's Defense Market 343
17.1.10 India's Intelligence Services 346
17.1.11 India's Defense Forces 347
17.1.12 India's Safe City Projects 348
17.1.13 India: Airport Security Statistics 350
17.1.14 India Border Security 351

18 China Public Safety & Homeland Security Market 354

18.1 China Public Safety & Homeland Security Market Background 354
18.1.1 Facts & Figures 2020 354
18.1.2 China Geopolitical Overview 355
18.1.3 China Economy 356
18.1.4 China: Security Threat Assessment 359
18.1.5 China's Security Industry 360
18.1.6 China Homeland Security & Public Safety Market 363
18.1.7 Crime in China 364
18.1.8 Terror in China 366
18.1.9 China's Counter Terror Legislation & Law Enforcement 366
18.1.10 China's Homeland Security & Public Safety Agencies 368
18.2 National Security Commission of the Communist Party of China (CNSC) 369
18.3 The 610 Office 369
18.3.1 China's Police Forces 372
18.3.2 China's Intelligence Services 372
18.3.3 China's Ministry of Public Security 373
18.3.4 China's Public Security Bureau 374
18.3.5 China's Ministry of State Security 374
18.3.6 China's Defense Forces 375
18.3.7 Natural Disasters in China 380
18.3.8 China's Safe City Projects 380
18.3.9 China: Airport Security Statistics 384
18.3.10 China Border Security 391

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

19 South Korea Public Safety & Homeland Security Market 392
19.1 South Korea Public Safety & Homeland Security Market Background..... 392
19.1.1 Facts & Figures 2020 392
19.1.2 South Korea Homeland Security & Public Safety Market 392
19.1.3 Crime in South Korea 393
19.1.4 Terror in South Korea 394
19.1.5 South Korea's Homeland Security & Public Safety Agencies..... 395
19.1.6 South Korea's Police Forces 396
19.1.7 South Korea's Intelligence Services 396
19.1.8 South Korea's Defense Forces..... 397
19.1.9 South Korea's Safe City Projects 397
19.1.10 South Korea: Airport Security Statistics..... 399
19.1.11 South Korea Border Security..... 399

20 Japan Public Safety & Homeland Security Market 400
20.1 Japan Public Safety & Homeland Security Market Background..... 400
20.1.1 Facts & Figures 2020 400
20.1.2 Japan Homeland Security & Public Safety Market 400
20.1.3 Crime in Japan 401
20.1.4 Terror in Japan 401
20.1.5 Japan's Homeland Security & Public Safety Agencies..... 402
20.1.6 Japan's Police Forces 403
20.1.7 Japan's Intelligence Services 403
20.1.8 Japan's Defense Forces..... 404
20.1.9 Japan's Safe City Projects..... 405
20.1.10 Natural Disasters in Japan 405
20.1.11 Japan: Airport Security Statistics..... 408
20.1.12 Japan Border Security..... 409

21 Australia Public Safety & Homeland Security Market 411
21.1 Australia Public Safety & Homeland Security Market Background..... 411
21.1.1 Facts & Figures 2020 411
21.1.2 Crime in Australia 411
21.1.3 Terror in Australia..... 412
21.1.4 Australia's Counter Terror Legislation & Law Enforcement 413
21.1.5 Australia's Homeland Security & Public Safety Agencies..... 414
21.1.6 Australia's Police Forces 416
21.1.7 Australia's Intelligence Services 416
21.1.8 Australia's Defense Forces..... 418
21.1.9 Australia's Safe City Projects 419
21.1.10 Natural Disasters..... 421

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

21.2 Airports in Australia 422
21.2.1 Australia Border Security 422

22 Malaysia Public Safety & Homeland Security Market 424
22.1 Malaysia Public Safety & Homeland Security Market Background 424
22.1.1 Facts & Figures 2020 424
22.1.2 Malaysia Homeland Security & Public Safety Market 424
22.1.3 Crime in Malaysia 424
22.1.4 Terror in Malaysia 426
22.1.5 Malaysia's Counter Terror Legislation & Law Enforcement 426
22.1.6 Malaysia's Homeland Security & Public Safety Agencies 427
22.1.7 Malaysia's Police Forces 428
22.1.8 Malaysia's Intelligence Services 428
22.1.9 Malaysia's Defense Forces 429
22.1.10 Malaysia: Airport Security Statistics 432
22.1.11 Malaysia Border Security 432

23 Indonesia Public Safety & Homeland Security Market 434
23.1 Indonesia Public Safety & Homeland Security Market Background 434
23.1.1 Facts & Figures 2020 434
23.1.2 Indonesia Geopolitical Overview 434
23.1.3 Indonesia Homeland Security & Public Safety Market 435
23.1.4 Crime in Indonesia 436
23.1.5 Terror & Civil Unrest in Indonesia 437
23.1.6 Indonesia's Counter Terror Legislation & Law Enforcement 437
23.1.7 Indonesia's Homeland Security & Public Safety Agencies 440
23.1.8 Indonesia's Police Forces 441
23.1.9 Indonesia's Intelligence Services 441
23.1.10 Indonesia's Defense Forces 442
23.1.11 Indonesia's Safe City Projects 443
23.1.12 Natural Disasters in Indonesia 444
23.1.13 Indonesia: Airport Security Statistics 445
23.1.14 Indonesia Border Security 446

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

List of Tables

Table 1 - Major Airports in the U.S.: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 42
Table 2 - U.S. Land Border Security Components 52
Table 3 - Major Airports in Canada: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 84
Table 4 - Major Airports in the UK: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 116
Table 5 - Migrant Stock in the UK by Country of Origin (2017) 122
Table 6 - Major Airports in Germany: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017-2025 159
Table 7 - Major Airports in France: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 194
Table 8 - Migrant Population in France by Country of Origin 201
Table 9 - Spain Crime Statistics – 2015-2016 209
Table 10 - Major Airports in Spain: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 220
Table 11 - Major Airports in Italy: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 234
Table 12 - Major Airports in Russia: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 245
Table 13 - Major Airports in Sweden: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 253
Table 14 - Major Airports in Denmark: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 259
Table 15 - Major Airports in Turkey: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 268
Table 16 - Major Airports in Saudi Arabia: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 286
Table 17 - Major Airports in UAE: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 301
Table 18 - Major Airport in Qatar: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 311
Table 19 - Nigeria Police Departments & Responsibilities 319
Table 20 - Major Airports in Nigeria: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 322
Table 21 - Major Airports in South Africa: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 334
Table 22 - Major Airports in India: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 350
Table 23 - China's Cities by 2025 381
Table 24 - China 200 Largest Safe City Projects 383
Table 25 - Major Airports in China: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 385

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table 26 - Major Airports in South Korea: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025 399
Table 27 - Major Airports in Japan: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025..... 408
Table 28 - Major Airports in Australia: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025..... 422
Table 29 - Major Airports in Malaysia: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025..... 432
Table 30 - Indonesia Natural Disaster Statistics – 1980-2010 445
Table 31 - Major Airports in Indonesia: Passenger-Screening, Carry-on & Checked Baggage-Screening [M] by Airport – 2017 & 2025..... 445

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

List of Figures

Figure 1 - U.S. Federal Homeland Security Organogram 23
Figure 2 - Department of Homeland Security –Organizational Structure 25
Figure 3 - Border Security, Layers of Security 51
Figure 4 - Hierarchy of Critical Infrastructures..... 64
Figure 5 - Critical Infrastructure Investment Priorities Scheme 64
Figure 6 - A National Critical Infrastructure Security Infrastructure: Example: The U.S.A. 65
Figure 7 - Maritime Security – Mixed Mode Approach 66
Figure 8 - Maritime Supply Chain vs. Security Legislation 67
Figure 9 - Partners Involved in Port Operations 70
Figure 10 - A Natural Disaster Activities Cycle..... 77
Figure 11 - 2000-2010 Number of Natural Disasters USA vs. Other Countries 78
Figure 12- Canada Homeland Security & Public Safety Agencies Organogram..... 82
Figure 13 - Europe Major Terror Attacks-2001 to March 2017..... 95
Figure 14 - Percentage of UK Muslim Population Vs. Other EU Countries..... 97
Figure 15 - UK Homeland Security & Public Safety Agencies Organogram 104
Figure 16 - Change in the number of police officers (FTE) from 31 March 2008 to 2018, compared with the previous 12 months, England and Wales..... 107
Figure 17 - UK Borders Map 117
Figure 18 - Long-term International Migration into and out of the UK (all Citizenships) March 2018 119
Figure 19 - Immigration Trends by Main Reason, December 2008 to March 2018..... 119
Figure 20 - Long-term International Migration into and out of the UK, 2008-2017..... 121
Figure 21 - An Automatic Border Control (ABC) Gate..... 124
Figure 22 - 2009-2017 Refugee Applications to Germany vs. Rest of Europe by Month 133
Figure 23 - 2016-17 Asylum Applications to Germany vs. Rest of EU by Country of Origin (% of Total) 133
Figure 24 - Main Routes of Migration to EU Borders (2017) 134
Figure 25 - Asylum-Seeker Decisions: Germany vs. Rest of Europe (1st Quarter 2018) 135
Figure 26 - European Terror Attacks Timeline, 2001- 2017 140
Figure 27- Percentage of Muslim Population in Germany vs. Other EU Countries, 2016 143
Figure 28 - The Balkan Migration Route to Germany..... 146
Figure 29 - Germany Homeland Security & Public Safety Agencies Organogram..... 148
Figure 30 - Stuttgart Safe City Steering Committee 156
Figure 31 - Safe City ICT Flow..... 157

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Figure 32 - Main Migrant Routes to Germany 160
Figure 33 - Asylum applications Germany vs. Other EU Countries 2014-2017 161
Figure 34 - Automated Passport Control at Frankfurt Airport 167
Figure 35 -The November 13, 2015 Paris Terror Attacks Timeline 172
Figure 36 -The November 13, 2015 Paris Terror Attacks Locations 173
Figure 37 - European Terror Attacks Timeline, 2001- 2017 173
Figure 38 - Percentage of France Muslim Population vs. Other EU Countries 177
Figure 39 - France Counter Terror & Public Safety Agencies Organogram 184
Figure 40 - French Police Organization 185
Figure 41 - France's Borders 198
Figure 42 -The Channel Tunnel Fence Construction 199
Figure 43 - The French Side of the Channel Tunnel Migrants Camp Border-Perimeter Security Fence 200
Figure 44 - Spain's Counter-Terror, Immigration Enforcement & Public Safety Market 208
Figure 45 - Spain Homeland Security & Public Safety Agencies Organogram 211
Figure 46 - Madrid PoC Location, Montera St and CISEM 217
Figure 47 - Madrid PoC Architecture 218
Figure 48 - Crime Syndicates in Italy – Total Annual Revenues 225
Figure 49 - Italy Homeland Security & Public Safety Agencies Organogram 227
Figure 50 - Italy's Intelligence Agencies Organizational Chart 230
Figure 51 - Italy's Deployment of Forces Abroad 232
Figure 52 - Italy's Safe City Project Architecture 233
Figure 53 - Italy's Safe City Project Main Module 234
Figure 54 - Turkey Homeland Security & Public Safety Agencies Organogram 264
Figure 55 - Ministry of Interior New Organizational Chart (Jan. 2018) 266
Figure 56 - Three Tiers of Saudi Security Infrastructure 274
Figure 57 - The Saudi Government Security Organogram 276
Figure 58 - Video Cameras Surveillance in Mecca 282
Figure 59 - Mecca Safe City Command & Control Hub 283
Figure 60 - Map of the Saudi Arabian Cities 284
Figure 61 - UAE Homeland Security & Public Safety Agencies Organogram 295
Figure 62 - Dubai Police Organization Chart 297
Figure 63 - UAE Cities and Towns 300
Figure 64 - South African Government Security Organogram 330
Figure 65 - India Homeland Security & Public Safety Agencies Organogram 341
Figure 66 - Smart Solutions Indicated in the Smart Cities Mission Guidelines 349
Figure 67 - Arc of India's Border Security 352
Figure 68 - GDP at PPP, Military Spending & R&D at PPP vs. 1997-2017: PRC vs. the USA & Europe 354

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Figure 69 - China's Homeland Security & Public Safety Agencies Organogram 368
Figure 70 - The 610 Office Infrastructure 370
Figure 71 - South Korea Homeland Security & Public Safety Agencies Organogram 395
Figure 72 - Japan Security & Public Safety Agencies Organogram 402
Figure 73 - Australia Homeland Security & Public Safety Agencies Organogram 415
Figure 74 - Malaysia's Homeland Security & Public Safety Agencies Organogram 427
Figure 75 - Indonesia Homeland Security & Public Safety Agencies 440

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

X-Ray Security Screening
(Aviation, Maritime, Land Transportation, Defense, Postal, Perimeter, Building, Baggage, Cargo, People, Container & Vehicle)
Market
with COVID-19 Vaccines Impact Analysis

2021-2027

Volume 5

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Table of Contents

APPENDICES **17**

1 Appendix B: Current Technologies **17**
1.1 Explosive Materials Classification 17
1.2 Security Screening Technologies 18
1.2.1 Major Technologies 18
1.2.2 2D X-ray, EDS and ETD Technologies - Pros and Cons 20
1.2.3 Bulk Screening Technologies: Price Comparison 20
1.3 X-ray Screening Technologies: Background 21
1.3.1 X-ray Systems – Characteristics 21
1.3.2 X-ray Screening Systems - Principles of Operation 22
1.3.3 Innocuous Materials Interference 24
1.3.4 Threat Image Projection (TIP) 25
1.3.5 Automated Target Detection 25
1.4 X-ray Security Systems by Technology 26
1.4.1 Overview 26
1.4.2 Conventional 2D X-ray 27
1.4.3 Dual Energy X-ray 28
1.4.4 Variable View X-ray 31
1.4.5 Quasi 3-D Dual View Dual-Energy X-ray Imaging 32
1.4.6 The Advanced Technology (AT) X-ray Systems 33
1.4.7 Backscatter Screening X-ray 35
1.4.8 X-ray Backscatter People Screening AIT 36
1.4.9 Backscatter AIT Sample System 38
1.4.10 Coherent Scatter 2D X-ray 39
1.5 Cast and Artificial Limbs X-ray Backscatter Screening Technologies 40
1.6 X-ray Technologies: Performance Comparison 41
1.7 X-ray Product Certification 42
1.8 X-ray Products: National Standards 42

2 Appendix C: Business & Technological Opportunities & Challenges **44**
2.1 Introduction 44
2.2 Tele-Interpretation 45
2.3 Medium Capacity Multi-Threat Screening Systems 47
2.4 Upgraded Multi Threat Screening System 47
2.5 Third Party Service Business 47

3 Appendix D: The X-ray Security Screening Industry **48**
3.1 The Globalization of the X-ray Screening Systems Business 48
3.2 Classification of the Industry Business and Industrial Activities 48
3.3 Forces that Shape the X-ray Security Screening systems Industry & Markets 49
3.4 X-ray Vendor – Client Relationship 51

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

4 Appendix E: X-ray Security Systems Industry: Business Models & Strategies 54
4.1 Variable Funding Conditions 54
4.2 X-ray Products: Market Tiers 54
4.3 Inroads into the Market 54
4.4 Entry Strategies toward the X-ray Security Screening Systems Market 55
4.5 Price Competition 56

5 Appendix F: Cargo Facility Regulations 58
5.1 Introduction to Cargo Security 58
5.2 Airport - Cargo Processing Facilities 58
5.3 Operational Considerations 58
5.4 Access Control Considerations 59
5.5 Information and Requirement Resources 60

6 Appendix G: Air Cargo Approved X-ray Screening Systems (ACSTL) 62
6.1 Certified Air Cargo Screening Product Manufacturers Contact Information 63
6.2 Qualified Technology 64
6.3 Grandfathered Non-CT X-ray Technology 67

7 Appendix H: EU Screening Equipment Certification & Standards 70
7.1 EU Certification of Aviation Security Screening Equipment 70
7.2 ECAC/EU Performance Standard Equipment Evaluation 70
7.3 EU Hold Baggage Screening Standards 71

8 Appendix I: IATA Airport Screening Checkpoints Recommended 73

9 Appendix J: Israel Ben Gurion Airport Security Procedures 78

10 Appendix K: Improvised Explosives & Military Explosives 79
10.1 Background 79
10.2 Explosives Categories 79
10.2.1 Chemical Explosives 79
10.2.2 Explosives Train 81
10.2.3 Low Explosives 81
10.2.4 Nitrocellulose 83
10.2.5 High Explosives 83
10.2.6 Primary High Explosives 84
10.3 Secondary High Explosives 86
10.3.1 PETN 86
10.3.2 RDX 87
10.3.3 Main Charges 87
10.4 Improvised Explosives 91
10.4.1 Introduction 91

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

10.4.2 Hexamethylene Triperoxide Diamine (HMTD) 92
10.4.3 Triacetone Triperoxide (TATP) 92

11 Appendix L: Contracts & Government Prices 93
11.1 Astrophysics, Inc. 93
11.2 Event Metal Detectors, LLC 99
11.3 Leidos 104
11.4 Smiths Detection 112
11.5 Treasure Electronics, Inc. 116

12 Appendix M: Glossary & Abbreviations 122

13 Report Research Methodology 143
13.1 For Whom is This Report? 143
13.2 Report Structure 143
13.3 Assumptions 143
13.4 Methodology 144

14 Disclaimer & Copyright 146

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

List of Tables

Table 1 - EDS, ETD and 2D X-ray Technologies - Pros and Cons 12
Table 2 - Price Comparison of Bulk Explosives Screening Technologies 12
Table 3 - Explosives, Drugs, and Common X-ray "Interruption" Materials 16
Table 4 - Backscatter People Screening Portals – Advantages & Disadvantages 29
Table 5 - Comparison of X-ray Detection Technologies..... 33
Table 6 - X-ray Standards for Bulk Explosives Detection..... 35
Table 7 - Manufacturer Points of Contact 55
Table 8 - Qualified X-ray Products 56
Table 9 - Grandfathered Non-CT X-ray Technology 59
Table 10 - Equipment Evaluated As Meeting An ECAC/EU Performance Standard. 63

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

List of Figures

Figure 1 - Explosive Materials Classification 9
Figure 2 - Major Explosives Detection Technologies: Bulk vs. Trace 11
Figure 3 - X-ray Conveyor-Based Screening Systems – Principles of Operation 14
Figure 4 - AIT X-ray People Screening Instruction Billboard 18
Figure 5 - Conventional X-ray 19
Figure 6 - Dual Energy X-ray 21
Figure 7 - Material Differentiation by Dual Energy X-ray 22
Figure 8 - Dual Energy Z Map 22
Figure 9 - Variable View X-ray Option 23
Figure 10 - Multi-View Dual Energy X-ray Screening 24
Figure 11 - Convectional 2D Image (Left) vs. Quasi 3D Image (Right) 24
Figure 12 - The Rapiscan - Dual View Advanced Technology X-ray System 26
Figure 13 - Smiths Detection HI-SCAN 6040aX 27
Figure 14 - Backscatter Cargo Screening X-ray 28
Figure 15 - Dose Comparison: Environmental Radiation vs. Backscatter AIT Scan 30
Figure 16 - Coherent X-ray Scheme 31
Figure 17 - Cast and Artificial Limbs Screening System 32
Figure 18 - A Prosthetic Limbs Backscatter Image Showing a Gun Hidden Underneath a Cast 33
Figure 19 - TSA RDT&E Strategic Vision 36
Figure 20 - The 2D X-ray Performance Criteria 37
Figure 21 - Remote Cargo Tele-Screening 38
Figure 22 - Government Industry X-ray Security Screening Life Cycle 43
Figure 23 - Government – Private Sector Techno-Tactical Technology Assessment Process 44
Figure 24 - X-ray Security Screening Industry - Government Relationship 45
Figure 25 - Typical ECAC Standard Processes 64
Figure 26 - Single Queue Serving Multiple X-ray Security Checkpoints 67
Figure 27 - A Single Queue Serving Multiple Screening Positions 67
Figure 28 - Two Single Lanes Serving Multiple Screening Positions 68
Figure 29 - Separated Lines in Single Queue Serving Multiple Screening Positions 68
Figure 30 - Checkpoint Staff Allocation 69
Figure 31 - Explosives Classification Tree 72
Figure 32 - Explosive Train 73
Figure 33 - Black Powder 74
Figure 34 - Smokeless Powder 74
Figure 35 - Nitrocellulose 75
Figure 36 - Flash Powder 75
Figure 37 - High Explosives Tree 76
Figure 38 - Lead Azide 77
Figure 39 - Lead Styphnate 77

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|

Figure 40 - Mercury Fulminate Salt....77
Figure 41 - Diazodinitrophenol (DDNP) 78
Figure 42 - Pentaerythrite Tetranitrate (PETN) 79
Figure 43 - Cyclotrimethylenetrinitramine (RDX)....79
Figure 44 - Dynamite (EGDN)....80
Figure 45 - Plastic Bottles Containing Unidentified Binary Explosives. 80
Figure 46 - Water Gel in a Glass Bubble Sensitizer....81
Figure 47 - Tubes of Emulsion Explosives. 81
Figure 48 - Yellow TNT Solids 82
Figure 49 - Ammonium Nitrate and Fuel Oil (ANFO) 82
Figure 50 - Dinitrotoluene (DNT)....82
Figure 51 - High Melting Point Explosive (HMX) 83
Figure 52 - Hexamethylene Triperoxide Diamine (HMTD) 84
Figure 53 -TATP (Crude and Dry) and Preparation Ingredients....84

Copyright © 2021 HSRC. All rights reserved | Copy #210210-1|