

2017-2022

Explosives Trace Detection (ETD): Technologies & Global Market



2 Volumes

**Explosives Trace Detection
(ETD): Technologies & Global
Market - 2017-2022 - Volume 1**

**Explosives Trace Detection
(ETD): Technologies & Global
Market - 2017-2022 - Volume 2**

2017-2022

Explosives Trace Detection (ETD): Technologies & Global Market

Volume 1



Explosives Trace Detection (ETD): Technologies & Global Market

2017-2022

December 2016

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 reports on present and emerging technologies and industry expertise, enabling global clients to gain time-critical insight into business opportunities. HSRC's clients include U.S. Congress, DHS, U.S. Army, U.S. Navy, NATO, DOD, DOT, GAO, and EU, among others; as well as HLS & PS government agencies in Japan, Korea, Taiwan, Israel, Canada, UK, Germany, Australia, Sweden, Finland, Singapore. With over 750 private sector clients (72% repeat customers), including major defense and security contractors, and Fortune 500 companies. HSRC earned the reputation as the industry's Gold Standard for HLS & PS market reports.

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



Table of Contents

1	Executive Summary	19
1.1	Major Findings	19
1.2	Major Conclusions	23
1.3	Global ETD Market Dynamics & Opportunities	26
1.4	Explosives Trace Detection Market – 2015-2022.....	27
MARKET ANALYSIS	31	
2	ETD Market: Drivers	31
3	ETD Market: Inhibitors	34
4	ETD Industry: Business Opportunities & Challenges	35
5	ETD Market: SWOT Analysis	36
5.1	Strengths	36
5.2	Weaknesses	37
5.3	Opportunities	37
5.4	Threats.....	38
6	ETD Market: Barriers to Entry, Supplier Power, Buyer Power & Barriers to Substitution	39
GLOBAL MARKET	40	
7	Global Explosives Trace Detection Market – 2015-2022	40
7.1	Global ETD Market by Region	40
7.1.1	Global Market – 2015-2022	40
7.1.2	Market Dynamics – 2015-2022.....	41
7.1.3	Market Breakdown – 2015-2022	42
7.2	Global ETD Market by Vertical Market.....	42
7.2.1	Global Market – 2015-2022	42
7.2.2	Global Market Breakdown – 2015-2022	44
7.3	Global ETD Market by Technology	45
7.4	Global ETD Market by Revenue Source	46
7.4.1	ETD Aftersales Market Trends	46
7.4.2	Contracted ETD Service Business	46
7.4.3	Time and Materials Service Revenues	47
7.4.4	ETD Spare Parts Revenues	47
7.4.5	ETD Consumables Revenues	47
7.4.6	Global Market – 2015-2022	47
7.4.7	Market Breakdown – 2015-2022	48
REGIONAL MARKETS	49	
8	North America ETD Market – 2015-2022	49
8.1	U.S. Explosives Trace Detection Market Background.....	49

8.1.1	The Transportation Security Administration (TSA)	49
8.1.2	U.S. Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	52
8.1.3	DHS ETD Related Programs and Funding	63
8.1.3.1	Screening Partnership Program.....	63
8.1.3.2	Screening Training and Other Programs	64
8.1.3.3	Passengers Checkpoint Support Program.....	64
8.1.3.4	Maintenance	65
8.1.3.5	U.S. Aviation Security Regulations	66
8.1.3.6	Air Cargo Security Program	67
8.1.3.7	Secure Flight Program.....	68
8.1.3.8	The U.S. Transportation Sector	69
8.1.3.9	Transportation Security.....	71
8.1.3.10	Managing and Coordinating Transportation Industry Security Responsibilities	71
8.1.4	U.S. ETD Market Overview	73
8.1.5	ETD Related TSA Programs	75
8.1.5.1	Passengers Checkpoint Support Program.....	75
8.1.5.2	TSA EDS and ETD Procurement and Installation Program.....	76
8.1.5.3	TSA Screening Technology Maintenance & Utilities Program.....	77
8.1.6	U.S. Air-Cargo Screening Regulations	77
8.1.7	TSA Certified Air-Cargo Screening Program (CCSP).....	78
8.1.7.1	Air-Cargo Screening Legislation	78
8.1.7.2	U.S. ETD Air Cargo Business Considerations	79
8.1.7.3	CCSP Benefits.....	80
8.1.7.4	TSA air Cargo Screening Requirements.....	80
8.1.7.5	TSA Air Cargo Screening	80
8.1.7.6	Air Cargo Screening Chain of Custody	80
8.1.7.7	Certified Cargo Screening Locations	81
8.1.7.8	Independent U.S. Cargo Screening Facility Screening Locations	81
8.1.7.9	Networked ETD Systems.....	82
8.1.7.10	U.S. Explosives Detection Related Regulations	82
8.2	Canada Explosives Trace Detection Market Background	83
8.2.1	Aviation Security Mandated Activities.....	85
8.2.2	Air Cargo Screening	86
8.2.3	Canada Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	88
8.3	North America ETD Market by Vertical Market	90
8.3.1	North America Market – 2015-2022	90
8.3.2	North America Market Breakdown – 2015-2022.....	91

8.4	North America ETD Market by Revenue Source	92
8.4.1	North America Market – 2015-2022	92
8.4.2	Market Breakdown – 2015-2022	92
9	Latin America ETD Market – 2015-2022	94
9.1	Market Background.....	94
9.2	Mexico Aviation Security.....	96
9.2.1	Mexico Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	96
9.3	Colombia Aviation Security	98
9.3.1	Colombia Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	98
9.4	Brazil Aviation Security Background	99
9.4.1	Overview	99
9.4.2	Brazil Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	100
9.5	Argentina Aviation Security	102
9.5.1	Argentina Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	102
9.6	Latin America ETD Market by Vertical Market	102
9.6.1	Latin America Market – 2015-2022	102
9.6.2	Latin America Market Breakdown – 2015-2022.....	104
9.7	Latin America ETD Market by Revenue Source	105
9.7.1	Latin America Market – 2015-2022	105
9.7.2	Market Breakdown – 2015-2022	106
10	Europe ETD Market – 2015-2022	107
10.1	Europe: Market Background	107
10.2	European ETD Market Background	129
10.2.1	Overview	129
10.2.2	EU ETD Related Regulation.....	131
10.2.3	Screening of Air Cargo Routed to the U.S.....	132
10.3	UK Explosives Trace Detection Market Background.....	133
10.3.1	U.K. Homeland Security & Public Safety	133
10.3.2	UK Homeland Security & Public Safety Agencies	136
10.3.3	UK ETD Market	136
10.3.4	United Kingdom Aviation Security Background	140
10.3.5	UK Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020.....	141
10.4	Germany ETD Market Background	142
10.4.1	Germany Homeland Security & Public Safety Agencies.....	144
10.4.2	Germany ETD Systems Market.....	145
10.4.3	Germany Aviation Security Background	146

10.4.4	German Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport – 2016 & 2020	147
10.5	Belgium ETD Market Background.....	148
10.5.1	Belgium Homeland Security & Public Safety Agencies	152
10.5.2	Belgium Airport Security Statistics.....	153
10.6	France Explosives Trace Detection Market Background	153
10.6.1	France Homeland Security & Public Safety.....	153
10.6.2	France Counter Terror & Public Safety Agencies	156
10.6.3	France ETD Systems Market	157
10.6.4	France Aviation Security.....	159
10.6.5	France Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	160
10.7	Spain ETD Market Background.....	162
10.7.1	Spain Homeland Security & Public Safety Agencies	162
10.7.2	Spain Explosives Trace Detection Market.....	163
10.7.3	Spain Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	164
10.8	Italy Explosives Trace Detection Market Background	165
10.8.1	Italy Homeland Security & Public Safety Agencies.....	165
10.8.2	Italy Explosives Trace Detection Market.....	166
10.8.3	Italy Aviation Security Background	167
10.8.4	Italy Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	167
10.9	Russia Aviation Security Background	168
10.9.1	Overview	168
10.9.2	Russia Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	169
10.10	Sweden Aviation Security	171
10.10.1	Sweden Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	171
10.11	Denmark Aviation Security.....	172
10.11.1	Denmark Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	172
10.12	Netherlands Aviation Security	173
10.12.1	Netherlands Aviation Passenger Security Screening Statistics	173

10.13 Austria Aviation Security	173
10.13.1 Austria Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	173
10.14 Czech Republic Aviation Security	174
10.14.1 Czech Republic Airport Statistics: Number of Screened Passengers & Screened Baggage - 2016 & 2020	174
10.15 Poland Aviation Security	174
10.15.1 Poland Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	174
10.16 Europe ETD Market by Vertical Market.....	175
10.16.1 Europe Market – 2015-2022.....	175
10.16.2 Europe Market Breakdown – 2015-2022	176
10.17 Europe ETD Market by Revenue Source.....	177
10.17.1 Europe Market – 2015-2022	177
10.17.2 Market Breakdown – 2015-2022	178
11 Middle East & Africa ETD Market – 2015-2022	179
11.1 Market Background.....	179
11.1.1 Overview	179
11.1.2 Screening of Air Cargo Routed from the Middle East to the U.S.	179
11.2 Turkey Aviation Security Background	180
11.2.1 Turkey Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	181
11.3 Israel Aviation Security Background	183
11.3.1 Israel Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	184
11.4 Saudi Arabia Aviation Security Background.....	184
11.4.1 Saudi Arabia Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	185
11.5 UAE Aviation Security Background.....	185
11.5.1 UAE Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	187
11.6 Qatar Aviation Security Background	187
11.6.1 Qatar Aviation Passenger Security Screening Statistics	188
11.7 Kuwait Aviation Security	188
11.7.1 Kuwait Airport Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	188

11.8	Iraq Aviation Security	188
11.8.1	Iraq Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	188
11.9	Nigeria Aviation Security Background.....	188
11.9.1	Nigeria Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	189
11.10	South Africa Aviation Security.....	190
11.10.1	South Africa Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	190
11.11	Middle East & Africa ETD Market by Vertical Market.....	191
11.11.1	Middle East & Africa Market – 2015-2022	191
11.11.2	Middle East & Africa Market Breakdown – 2015-2022	192
11.12	Middle East & Africa ETD Market by Revenue Source	193
11.12.1	Middle East & Africa Market – 2015-2022	193
11.12.2	Market Breakdown – 2015-2022	194
12	Asia-Pacific ETD Market – 2015-2022	195
12.1	APAC Market Background.....	195
12.2	China ETD Market Background	197
12.2.1	Overview	197
12.2.2	China Explosives and Narcotics & Contraband Screening Devices: Market Background.....	198
12.2.3	China Maritime Security	199
12.2.4	China's Container Security Initiative (CSI).....	201
12.2.5	China Mass Transportation Security	202
12.2.6	Land Transport Infrastructure in China.....	202
12.2.7	China Metro Transportation Security	203
12.2.8	China Railway Security.....	203
12.2.9	China Aviation Security Market	206
12.2.10	China Aviation Security Background	208
12.2.11	China Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	209
12.3	India Aviation Security Background	213
12.3.1	India Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	214
12.4	Azerbaijan Aviation Security	215
12.4.1	Azerbaijan Airport Statistics: Number of Screened Passengers & Screened Baggage - 2016 & 2020	215
12.5	Kazakhstan Aviation Security	216
12.5.1	Kazakhstan Airport Statistics: Number of Screened Passengers & Screened Baggage - 2016 & 2020	216

12.6	Pakistan Aviation Security	216
12.6.1	Pakistan Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	216
12.7	Taiwan Aviation Security.....	217
12.7.1	Taiwan Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	217
12.8	South Korea Aviation Security Background	217
12.8.1	South Korea Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	218
12.9	Japan Aviation Security Background	219
12.9.1	Japan Aviation Passenger Security Screening Statistics.....	219
12.10	Singapore Aviation Security	221
12.10.1	Singapore Statistics: Number of Screened Passengers & Screened Baggage - 2016 & 2020.....	221
12.11	Malaysia Aviation Security	222
12.11.1	Malaysia Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	222
12.12	Indonesia Aviation Security Background.....	222
12.12.1	Indonesia Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	224
12.13	Australia Aviation Security Background	225
12.13.1	Australia Airports Statistics: Number of Screened Passengers & Screened Baggage by Airport - 2016 & 2020	228
12.14	Asia-Pacific ETD Market by Vertical Market	229
12.14.1	Asia-Pacific Market – 2015-2022.....	229
12.14.2	Asia-Pacific Market Breakdown – 2015-2022	231
12.15	Asia-Pacific ETD Market by Revenue Source.....	232
12.15.1	Asia-Pacific Market – 2015-2022.....	232
12.15.2	Market Breakdown – 2015-2022	233
VERTICAL MARKETS		234
13	Transportation Security ETD Market	234
13.1	Global Transportation Security Market Background.....	234
13.1.1	Aviation Security ETD Screening	234
13.1.2	ETD Related Legislation and Regulations Schedule	235
13.1.3	Checked Luggage ETD Screening	237
13.1.3.1	Screening Process.....	237
13.1.4	ETD Based Screening	239

13.2	Global Transportation Security ETD Market – 2015-2022	241
13.2.1	Transportation Security Market – 2015-2022	241
13.2.2	Market Dynamics – 2015-2022.....	243
13.2.3	Market Breakdown – 2015-2022	243
14	Secured Facilities ETD Market	244
14.1	Global Secured Facilities ETD Market – 2015-2022	244
14.2	Market Dynamics – 2015-2022	246
14.3	Market Breakdown – 2015-2022	246
15	Defense ETD Market.....	247
15.1	Global Defense ETD Market – 2015-2022	247
15.2	Market Dynamics – 2015-2022	249
15.3	Market Breakdown – 2015-2022.....	249
16	1st Responders & Others ETD Market.....	250
16.1	Global 1st Responders & Others ETD Market – 2015-2022	250
16.2	Market Dynamics – 2015-2022	251
16.3	Market Breakdown – 2015-2022	252

List of Tables

Table 1 - Global Air Passengers & Cargo Traffic on International & Domestic Scheduled Flights - 2012–2016	23
Table 2 - Airport ETD Screening Market Opportunities by Region.....	27
Table 3 - Global ETD Market [\$M] by Region – 2015-2022	28
Table 4 - Global ETD Market [\$M] by Vertical Market – 2015-2022.....	29
Table 5 - Global ETD Market (Incl. Sales, Service, Consumables & Upgrade) [\$M] by Hand-Held, Desktop & Other ETD Technologies – 2015-2022	29
Table 6 - Global ETD Market [\$M] by Revenue Source – 2015-2022	30
Table 7 - ETD Screening Market: Business Opportunities	35
Table 8 - Global ETD Market [\$M] by Region – 2015-2022	40
Table 9 - Global ETD Market AGRs [%] by Region – 2015-2022	41
Table 10 - Global ETD Market [\$M] by Vertical Market – 2015-2022.....	43
Table 11 - Global ETD Market Share [%] by Vertical Market – 2015-2022	44
Table 12 - Global ETD Market (Incl. Sales, Service, Consumables & Upgrade) [\$M] by Hand-Held, Desktop & Other ETD Technologies – 2015-2022	45
Table 13 - Global ETD Market [\$M] by Revenue Source – 2015-2022	48
Table 14 - U.S. Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	52
Table 15 - TSA Program Progress Relative to EDS/ETD Deployment and Facility Modifications.....	65
Table 16 - Transportation Systems Industry, Divisions Statistics.....	70
Table 17 - U.S.A. Potential Sites Requiring ETD Screening	74
Table 18 - TSA Program Progress Relative to EDS/ETD Deployment and Facility Modifications.....	77
Table 19 - U.S. Explosives Detection Related Regulatory Schedule	82
Table 20 - Canadian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	88
Table 21 - North America ETD Market [\$M] by Vertical Market – 2015-2022	90
Table 22 - North America ETD Market Share [%] by Vertical Market – 2015-2022.....	91
Table 23 - North America ETD Market [\$M] by Revenue Source – 2015-2022.....	92
Table 24 - Mexican Airports: Number of Screened Passengers & Screened Baggage (Carry-on & Checked Baggage) [M] by Airport - 2016 & 2020	96
Table 25 - Colombian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020	98
Table 26 - Brazilian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	100
Table 27 - Argentina Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	102
Table 28 - Latin America ETD Market [\$M] by Vertical Market – 2015-2022	102

Table 29 - Latin America ETD Market Share [%] by Vertical Market – 2015-2022.....	104
Table 30 - Latin America ETD Market [\$M] by Revenue Source – 2015-2022.....	105
Table 31 - European Population, Muslim-Population, GDP, GDP/Capita & Defense-Budget by 17 Countries.....	113
Table 32 - European Police Forces, 1 st Responders, Airports & Air-Passengers Statistics by Country	118
Table 33 - EU ETD Regulatory Schedule	131
Table 34 - UK Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	141
Table 35 - German Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	147
Table 36 - Belgium Passenger Screening [M] by 5 Airports.....	153
Table 37 - French Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	160
Table 38 - Spanish Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	164
Table 39 - Italian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	167
Table 40 - Russian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	169
Table 41 - Swedish Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	171
Table 42 - Danish Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	172
Table 43 - Netherlands Passenger Screening [M] by 5 Airports	173
Table 44 - Austrian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	173
Table 45 - Czech Republic Airport: Passengers Screening, Carry-on & Checked Baggage Screening [M] - 2016 & 2020.....	174
Table 46 - Poland Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	174
Table 47 - Europe ETD Market [\$M] by Vertical Market – 2015-2022.....	175
Table 48 - Europe ETD Market Share [%] by Vertical Market – 2015-2022.....	176
Table 49 - Europe ETD Market [\$M] by Revenue Source – 2015-2022.....	177
Table 50 - Turkish Airports: Number of Screened Passengers & Screened Baggage (Carry-on & Checked Baggage) [M] by Airport - 2016 & 2020	181
Table 51 - Israeli Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	184
Table 52 - Saudi Arabian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020	185
Table 53 - UAE Airports: Number of Screened Passengers & Screened Baggage (Carry-on & Checked Baggage) [M] by Airport - 2016 & 2020	187

Table 54 - Doha Airport Passenger Screening [M] 2016 & 2022	188
Table 55 - Kuwait Airport: Number of Screened Passengers & Screened Baggage (Carry-on & Checked Baggage) [M] - 2016 & 2020.....	188
Table 56 - Iraqi Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	188
Table 57 - Nigerian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	189
Table 58 - South African Airports: Number of Screened Passengers & Screened Baggage (Carry-on & Checked Baggage) [M] by Airport - 2016 & 2020.....	190
Table 59 - Middle East & Africa ETD Market [\$M] by Vertical Market – 2015-2022.....	191
Table 60 - Middle East & Africa ETD Market Share [%] by Vertical Market – 2015-2022.....	192
Table 61 - Middle East & Africa ETD Market [\$M] by Revenue Source – 2015-2022.....	193
Table 62 - Investments in Developing Chinese Coastal Ports – 1991-2020	201
Table 63 - Metro Upgrade Projects in China Key Cities – 2012-2020.....	203
Table 64 - Number of New Airports – 2000-2020	206
Table 65 - Chinese Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	209
Table 66 - India Airports: Number of Screened Passengers & Screened Baggage (Carry-on & Checked Baggage) [M] by Airport - 2016 & 2020	214
Table 67 - Azerbaijan Airport: Passengers Screening, Carry-on & Checked Baggage Screening [M] - 2016 & 2020.....	215
Table 68 - Kazakhstan Airport: Passengers Screening, Carry-on & Checked Baggage Screening [M] - 2016 & 2020.....	216
Table 69 - Pakistan Airports: Number of Screened Passengers & Screened Baggage (Carry-on & Checked Baggage) [M] by Airport - 2016 & 2020	216
Table 70 - Taiwan Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	217
Table 71 - South Korean Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020	218
Table 72 - Japan Passenger Screening [M] by 50 Airports – 2015-2020.....	219
Table 73 - Singapore Airport: Number of Screened Passengers & Screened Baggage (Carry-on & Checked Baggage) [M] - 2016 & 2020	221
Table 74 - Malaysian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	222
Table 75 - Indonesian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020	224
Table 76 - Australian Airports: Passengers Screening, Carry-on & Checked Baggage Screening [M] by Airport - 2016 & 2020.....	228
Table 77 - Asia-Pacific ETD Market [\$M] by Vertical Market – 2015-2022	229

Table 78 - Asia-Pacific ETD Market Share [%] by Vertical Market – 2015-2022.....	231
Table 79 - Asia-Pacific ETD Market [\$M] by Revenue Source – 2015-2022.....	232
Table 80 - Global Aviation Industry, by Passenger Traffic RPK CAGR and Air Cargo RTK CAGR [%]-2010-2030.....	234
Table 81 - Aviation Security Explosives Screening: Regulatory Schedule	235
Table 82 - Global Transportation Security ETD Market [\$M] by Region – 2015-2022.....	241
Table 83 - Global Transportation Security ETD Market AGRs [%] by Region – 2015-2022.....	243
Table 84 - Global Secured Facilities ETD Market [\$M] by Region – 2015-2022.....	244
Table 85 - Global Secured Facilities ETD Market AGRs [%] by Region – 2015-2022.....	246
Table 86 - Global Defense ETD Market [\$M] by Region – 2015-2022	247
Table 87 - Global Defense ETD Market AGRs [%] by Region – 2015-2022	249
Table 88 - Global 1st Responders & Others ETD Market [\$M] by Region – 2015-2022.....	250
Table 89 - Global 1st Responders & Others ETD Market AGRs [%] by Region – 2015-2022	251

List of Figures

Figure 1 - Terror Attacks Utilizing Explosives	19
Figure 2 - A Multi-lane People Screening Site	21
Figure 3 - Boeing Aviation Passengers 2015-2034 CAGR [%] Forecast	25
Figure 4 - Global ETD Market [\$M] by Region – 2015-2022	28
Figure 5 - ETD Systems Market: Barriers to Entry, Supplier Power, Buyer Power and Barriers to Substitution	39
Figure 6 - Global ETD Market [\$M] by Region – 2015-2022	41
Figure 7 - Regional ETD Market Shares [%] – 2015-2022	42
Figure 8 - Global ETD Market [\$M] by Vertical Market – 2015-2022.....	43
Figure 9 - Global ETD Market Share [%] by Vertical Market – 2015-2022	44
Figure 10 - Global ETD Market (Incl. Sales, Service, Consumables & Upgrade) [\$M] by Hand-Held, Desktop & Other ETD Technologies – 2015-2022	46
Figure 11 - Global ETD Market [%] by Revenue Source – 2015-2022.....	48
Figure 12 - TSA Organizational Infrastructure	51
Figure 13 - Transportation Systems Sector Government Coordination Organization	70
Figure 14 - Transportation Systems Sector Risk Management Framework.....	71
Figure 15 - Transportation Systems Industry Management Approach	72
Figure 16 - The Transportation Industry – Government Partnership Model	72
Figure 17 - Canada Aviation Security Infrastructure	83
Figure 18 - Canada Aviation Security: Key Data.....	84
Figure 19 - Canada Airports, # of Screened Passengers - 2010-2014	84
Figure 20 - Canada Aviation Security Mandated Activities	86
Figure 21 - Canadian Air-Cargo Security Screening Process	88
Figure 22 - North America ETD Market [\$M] by Vertical Market – 2015-2022.....	90
Figure 23 - North America ETD Market Share [%] by Vertical Market – 2015-2022.....	91
Figure 24 - North America ETD Market [%] by Revenue Source – 2015-2022.....	93
Figure 25 - Latin America ETD Market [\$M] by Vertical Market – 2015-2022 ...	103
Figure 26 - Latin America ETD Market Share [%] by Vertical Market – 2015-2022.....	104
Figure 27 - Latin America ETD Market [%] by Revenue Source – 2015-2022.....	106
Figure 28 - Number of European ISIS-Da'esh Fighters by Country	109
Figure 29 - 2015 Migrant Applications to Europe by Country of Origin	114
Figure 30 - UK Homeland Security & Public Safety Agencies Organogram	136
Figure 31 - The UK Aviation Security Layers	137
Figure 32 - A UK Airport Security Process.....	138
Figure 33 - UK 2015 Passengers Share [%] by Airport.....	140
Figure 34 - Germany Homeland Security & Public Safety Agencies Organogram.....	144

Figure 35 - Belgium Counter Terror & Public Safety Agencies Organogram	152
Figure 36 - France Counter Terror & Public Safety Agencies Organogram	156
Figure 37 - France Aviation Security Layers	158
Figure 38 - Spain Homeland Security & Public Safety Agencies Organogram.....	162
Figure 39 - Italy Homeland Security & Public Safety Agencies Organogram....	165
Figure 40 - Europe ETD Market [\$M] by Vertical Market – 2015-2022	175
Figure 41 - Europe ETD Market Share [%] by Vertical Market – 2015-2022....	176
Figure 42 - Europe ETD Market [%] by Revenue Source – 2015-2022	178
Figure 43 - Middle East & Africa ETD Market [\$M] by Vertical Market – 2015-2022.....	191
Figure 44 - Middle East & Africa ETD Market Share [%] by Vertical Market – 2015-2022.....	192
Figure 45 - Middle East & Africa ETD Market [%] by Revenue Source – 2015-2022.....	194
Figure 46 - China Air Traffic Trend: By 2031 China Air Traffic will be 200% of the U.S.A. 2011 Traffic.....	207
Figure 47 - Passenger Movements at Changi Airport	221
Figure 48 - Asia-Pacific ETD Market [\$M] by Vertical Market – 2015-2022	230
Figure 49 - Asia-Pacific ETD Market Share [%] by Vertical Market – 2015- 2022.....	231
Figure 50 - Asia-Pacific ETD Market [%] by Revenue Source – 2015-2022	233
Figure 51 - Aviation Cargo & Passengers Growth Rate (CAGR): 2015-2030 ...	234
Figure 52 - Airport Security Screening Infrastructure	236
Figure 53 - Diagram of a Three-Level Checked Baggage Inspection	237
Figure 54 - Schematic Diagram of EDS & ETD Checked Luggage Flow Chart.....	238
Figure 55 - Standalone EDS and ETD Luggage Screening Configuration.....	239
Figure 56 - Stand-Alone Table Top ETD Systems Configuration for Small Airports	240
Figure 57 - Global Transportation Security ETD Market [\$M] by Region – 2015-2022.....	242
Figure 58 - Regional Transportation Security ETD Market Shares [%] – 2015-2022.....	243
Figure 59 - Global Secured Facilities ETD Market [\$M] by Region – 2015- 2022.....	245
Figure 60 - Regional Secured Facilities ETD Market Shares [%] – 2015- 2022.....	246
Figure 61 - Global Defense ETD Market [\$M] by Region – 2015-2022.....	248
Figure 62 - Regional Defense ETD Market Shares [%] – 2015-2022.....	249
Figure 63 - Global 1st Responders & Others ETD Market [\$M] by Region – 2015-2022.....	251
Figure 64 - Regional 1st Responders & Others ETD Market Shares [%] – 2015-2022.....	252

2017-2022

Explosives Trace Detection (ETD): Technologies & Global Market Volume 2



Explosives Trace Detection (ETD): Technologies & Global Market

2017-2022

December 2016

Volume 2

Table of Contents

NATIONAL MARKETS.....	15
1 United States Explosives Trace Detection (ETD) Market – 2015-2022	15
1.1 Market Background.....	15
1.2 United States Explosives Trace Detection (ETD) Market.....	15
1.2.1 United States Market by Revenue Source – 2015-2022	15
1.2.2 Market Dynamics – 2015-2022.....	16
1.2.3 Market Breakdown – 2015-2022	17
2 Saudi Arabia Explosives Trace Detection (ETD) Market – 2015-2022	18
2.1 Market Background.....	18
2.2 Saudi Arabia Explosives Trace Detection (ETD) Market.....	18
2.2.1 Saudi Arabia Market by Revenue Source – 2015-2022	18
2.2.2 Market Dynamics – 2015-2022.....	19
2.2.3 Market Breakdown – 2015-2022	20
3 China Explosives Trace Detection (ETD) Market – 2015-2022.....	21
3.1 Market Background.....	21
3.2 China Explosives Trace Detection (ETD) Market.....	21
3.2.1 China Market by Revenue Source – 2015-2022.....	21
3.2.2 Market Dynamics – 2015-2022.....	22
3.2.3 Market Breakdown – 2015-2022	23
4 India Explosives Trace Detection (ETD) Market – 2015-2022.....	24
4.1 Market Background.....	24
4.2 India Explosives Trace Detection (ETD) Market	24
4.2.1 India Market by Revenue Source – 2015-2022	24
4.2.2 Market Dynamics – 2015-2022.....	25
4.2.3 Market Breakdown – 2015-2022	26
5 Japan Explosives Trace Detection (ETD) Market – 2015-2022.....	27
5.1 Market Background.....	27
5.2 Japan Explosives Trace Detection (ETD) Market	27
5.2.1 Japan Market by Revenue Source – 2015-2022	27
5.2.2 Market Dynamics – 2015-2022.....	28
5.2.3 Market Breakdown – 2015-2022	29
VENDORS	30
6 Leading Explosives Trace Detectors Vendors.....	30
6.1 1st Detect.....	30
6.1.1 Company Profile & Contact Information	30
6.1.2 ETD Screening Products	31
6.1.3 Recent Events	32
6.2 American Innovations, Inc.....	33

6.2.1	Company Profile & Contact Information	33
6.2.2	ETD Screening Products.....	34
6.2.3	Recent Events	35
6.3	Autoclear US (Formerly Control Screening LLC)	36
6.3.1	Company Profile & Contact Information	36
6.3.2	ETD Screening Products	37
6.4	Biosensor Applications AB	41
6.4.1	Company Profile & Contact Information	41
6.4.2	ETD Screening Products	42
6.5	Bruker Corporation.....	43
6.5.1	Company Profile & Contact Information	43
6.5.2	ETD Screening Products	44
6.6	Recent Events.....	44
6.7	DetectaChem, LLC	45
6.7.1	Company Profile & Contact Information	45
6.7.2	ETD Screening Products	45
6.8	Electronic Sensor Technology	46
6.8.1	Company Profile & Contact Information	46
6.8.2	ETD Screening Products	47
6.9	FLIR Systems, Inc.....	48
6.9.1	Company Profile & Contact Information	48
6.9.2	ETD Screening Products	49
6.10	Hitachi, Ltd	52
6.10.1	Company Profile & Contact Information	52
6.10.2	ETD Screening Products	53
6.11	Implant Sciences.....	54
6.11.1	Company Profile & Contact Information	54
6.11.2	ETD Screening Products	55
6.11.3	Recent Events	55
6.12	Ion Applications, Inc.....	56
6.12.1	Company Profile & Contact Information	56
6.12.2	ETD Screening Products	56
6.13	Ketech Defence	57
6.13.1	Company Profile & Contact Information	57
6.13.2	ETD Screening Products	57
6.14	Mistral Security, Inc.....	58
6.14.1	Company Profile & Contact Information	58
6.14.2	ETD Screening Products	59
6.15	Morpho Detection Inc.....	59
6.15.1	Company Profile & Contact Information	59
6.15.2	ETD Screening Products	60
6.16	MS Tech	61
6.16.1	Company Profile & Contact Information	61
6.17	NUCTECH Co. Ltd.....	62
6.17.1	Company Profile & Contact Information	62
6.17.2	ETD Screening Products	62

6.18	Red X Defense.....	63
6.18.1	Company Profile & Contact Information	63
6.18.2	ETD Screening Products	63
6.19	SCANNA MSC Ltd.....	64
6.19.1	Company Profile & Contact Information	64
6.19.2	ETD Screening Products	65
6.20	Scintrex Trace.....	65
6.20.1	Company Profile & Contact Information	65
6.20.2	ETD Screening Products	65
6.21	Sibel Ltd.....	66
6.21.1	Company Profile & Contact Information	66
6.21.2	ETD Screening Products	66
6.22	Smiths Detection.....	67
6.22.1	Company Profile & Contact Information	67
6.22.2	ETD Screening Products	68
6.22.3	Recent Events	77
6.23	Syagen Technology	79
6.23.1	Company Profile & Contact Information	79
6.23.2	ETD Screening Products	79
6.24	Thermo Fisher Scientific Inc.	80
6.24.1	Company Profile & Contact Information	80
6.24.2	ETD Screening Products	81
6.25	Westminster International Ltd.	82
6.25.1	Company Profile & Contact Information	82
6.25.2	ETD Screening Products	82
APPENDICES.....		84
7	Appendix A: Current Explosives and Narcotics Detection Technologies	84
7.1	Explosive Materials Classification	84
7.2	Canine Explosives and Narcotics Screening	87
7.3	Explosives and Narcotics Detection Technologies.....	89
7.3.1	Explosives and Narcotics Trace Detection (ETD).....	89
7.3.2	Bulk Explosives and Narcotics Detection	90
7.3.3	Current Explosives & Narcotics Detection Technologies Map	90
7.3.4	ETD vs. Bulk Explosives & Narcotics Detection: Pros & Cons	92
7.4	ETD and Other Explosive Detection Systems: Prices	92
7.5	Emerging People Screening Technologies	93
7.6	ETD Principles of Operation	94
7.7	ETD Core Technologies.....	95
7.7.1	Overview	95
7.7.2	Ion Mobility Spectroscopy (IMS)	97
7.7.3	ChemiLuminescence (Thermal Energy Analyzers)	98

7.7.4	Electron Capture Detectors (ECD)	99
7.7.5	Surface Acoustic Wave (SAW) Detectors.....	100
7.7.6	Nanotechnology-enabled Technologies for Explosives and Narcotics Detection	101
8	Appendix B: Pipeline ETD Technologies.....	103
8.1	Introduction	103
8.2	Techno-Tactical Requirements	104
8.3	ETD of the Future: Performance & Operational Goals	105
8.4	Advanced Sample Collection	105
8.5	Dual Sensor ETD Technology	106
8.6	Integrated Explosives, Chemical Warfare and Narcotics Trace Detectors	106
8.7	Drivers for Superior ETD Technologies	107
8.8	Nanotechnology ETDs: Challenges	108
8.9	Receptor-based ETD	108
8.10	Molecularly Imprinted Polymers Based ETD.....	108
8.11	Nano-mechanical Sensor Based ETD	109
8.12	Electronic Nose Based ETD	109
8.13	Silica Micro-cantilever Based ETD.....	109
8.14	Surface Enhanced Raman Scattering Based ETD.....	110
8.15	Hybrid Nano-sensor Based ETD.....	110
8.16	Protein Coated Carbon Nanotubes, Nano Based ETD	110
8.17	Piezo-resistive Polymer Cantilever Nano Based ETD.....	111
8.18	Inkjet Based Wireless Sensor ETD Technology	111
8.19	Amino-silane Coated Nanowires Arrays Based ETD	111
8.20	Free-surface Microfluidic Control of Surface-Enhanced Raman Spectroscopy Based ETD	112
8.20.1	Introduction.....	112
8.20.2	Trace Chemical Vapor Detection Cartridge	113
8.20.3	Free Surface MicroFluidic Chip	114
8.20.4	Continuous Preconcentrator.....	114
8.20.5	Raman Chemical Specific Signatures	115
8.21	Molecularly Imprinted Polymers Explosives and Narcotics Detection Kit	115
8.22	Quantum Sniffer™ Portable ETD.....	116
8.23	Cantilever Nano Mechanical Sensors	117
8.24	Sensor Array and Neural Network Based ETD	119
8.25	Temperature-Stepped Desorption Based ETD	119
8.26	Trace Detection of Nitrogen-Based Explosives with UV-PLF.....	120
8.27	Non-Contact Explosives and Narcotics Harvesting ETD.....	120
8.27.1	Non-Contact Harvesting	120
8.27.2	ETD Transport.....	121
8.27.3	ETD Analysis	121
8.27.4	ETD Reporting.....	121
8.28	Check Point Explosives and Narcotics Detection System.....	121

8.29	Trace Detection of Small Molecules by Pulsed-Ultraviolet Laser Raman Spectroscopy.....	122
8.30	Sensing Trace Amounts of Nitro-Aromatic Explosives and Narcotics Using Nanowire-Nanocluster Hybrids	122
8.31	Detection of Explosives and Narcotics at Trace Levels by Laser-Induced Breakdown Spectroscopy (LIBS)	122
8.32	Universal Explosive Detection System.....	123
8.33	MEMS-Based Explosive Particle Detection and Remote Particle Stimulation	123
8.34	Laser Vaporization of Trace Explosives and Narcotics for Enhanced Non-Contact Detection.....	123
8.35	Atmospheric Flow Tube Mass Spectrometry Technology (AFT-MS)	124
8.36	Advanced Materials and Sensor Platforms	125
8.37	Basic Research.....	125
9	Appendix C: Pipeline ETD Systems by Configuration and Application	127
9.1	Standoff Explosives Trace Detection	127
9.2	ETD Based Document Scanner	127
9.3	Boarding Gate Explosives Scanners.....	128
9.4	Vehicle Screening ETD Systems	129
10	Appendix D: ETD Business Opportunities	131
10.1	Improved Detection Quality.....	131
10.2	Enable Multiple-threat Detection	131
10.3	Reduce Transaction Cost	131
10.4	Increase Automation	132
10.5	Reduce Throughput Delays	132
10.6	Ease of Integration.....	132
10.7	Medium Capacity, Multi-Threat Screening Systems	132
10.8	Upgraded Bio-Chem, Narcotics & Explosives Multi-Threat Trace Detection Screening	132
10.9	“Power” Multi-Threat ETD Vapor-trace Collector	132
10.10	Fused Technology Screening Systems with RFID and Risk Assessment Infrastructure	133
10.11	Third Party Service	133
11	Appendix E: ETD Products: Prices, Technologies, Detection Capabilities & Vendors Comparison.....	134
11.1	Desktop ETD Products: Vendors, Prices, Technologies, Detection & Capabilities Comparison.....	134
11.2	Colorimetric ETD Products by Vendors, Prices, Technologies & Detection	135
11.3	Hand-Held ETD by: Products, Vendors, Prices, Technologies, Detection & Capabilities Comparison	135
11.4	ETD Document Scanners: Products, Prices, Technologies & Explosives	136

11.5 People Screening ETD Portals: Products, Vendors Price Comparison	136
12 Appendix F: ETD Products Prices and Procurement Contracts.....	137
12.1 American Innovations, Inc.....	137
12.1.1 Contractor Information.....	137
12.1.2 ETD Screening Products	137
12.2 Anchortex Corporation	138
12.2.1 Contractor Information.....	138
12.2.2 ETD Screening Products	138
12.3 Control Screening LLC.....	141
12.3.1 Contractor Information.....	141
12.3.2 ETD Screening Products	141
12.3.3 Control Screening LLC – U.S. Government Contract	142
12.4 Federal Resources Supply Co.	146
12.4.1 Contractor Information.....	146
12.4.2 ETD Screening Products	146
12.4.3 Federal Resources Supply Co. - U.S. Government Contract.....	147
12.5 ICx Technologies, Inc. (FLIR)	154
12.5.1 Contractor Information.....	154
12.5.2 ETD Screening Products	154
12.5.3 FLIR – U.S. Government Contract	155
12.6 Implant Sciences Corp.....	160
12.6.1 Contractor Information.....	160
12.6.2 ETD Screening Products	160
12.6.3 Implant Sciences – U.S. Government Contract	162
12.7 Laurus Systems Inc.	166
12.7.1 Contractor Information.....	166
12.7.2 ETD Screening Products	166
12.7.3 Laurus Systems Inc – U.S. Government Contract.....	169
12.8 Morpho Detection.....	173
12.8.1 Contractor Information.....	173
12.8.2 ETD Screening Products	174
12.8.3 Morpho Detection – U.S. Government Contract	180
12.9 Security 20/20 Inc.	190
12.9.1 Contractor Information.....	190
12.9.2 Security 20/20 Inc ETD Screening Products	191
12.9.3 Contract.....	202
12.10 Security Detection.....	205
12.11 Smiths Detection.....	205
12.11.1 Contractor Information.....	205
12.11.2 ETD Screening Products	205
12.11.3 Smiths Detection – U.S. Government Contract	210
12.12 Treasure Electronics, Inc.	216
12.12.1 Contractor Information.....	216

12.12.2	ETD Screening Products	217
12.12.3	Treasure Electronics – U.S. Government Contract	218
12.13	Veteran Corps Of America	221
12.13.1	Contractor Information.....	221
12.13.2	ETD Screening Products	221
12.13.3	Veteran Corps of America Contract.....	222
12.14	Winvale Group	230
12.14.1	Contractor Information.....	230
12.14.2	ETD Screening Products	230
12.14.3	Winvale Group - U.S. Government Contract	231
13	Appendix G: Checked Luggage EDS & ETD Screening Configurations	236
14	Appendix H: TSA Air Cargo Facility Regulations	243
15	Appendix I: TSA Checked Luggage Systems	247
16	Appendix J: The DOJ ETD Evaluation Protocol for 1st Responders.....	249
16.1	Introduction	249
16.2	The Basics of Instrument Operation.....	249
16.3	Protocol for Characterizing a Trace Explosives Detector.....	252
16.3.1	Probability of Detection - P(d).....	253
16.3.2	Detection Limit (DL).....	253
16.3.3	False-Negative Rate.....	255
16.3.4	False-Positive Test.....	255
16.3.5	Nuisance-Alarm Rate	255
16.3.6	Interference Tests	256
16.3.7	Throughput Rate	257
16.3.8	Sampling Time	258
16.3.9	Analysis Time	258
16.3.10	Total Processing Time.....	259
17	Appendix K: TSA Air Cargo Screening Technology List (ACSTL)	260
17.1	Document Purpose	260
17.2	Document Format.....	260
17.3	Certified Air Cargo Screening Product Manufacturers Contact Information.....	261
17.4	Certified 2D X-ray Devices	262
17.5	Certified ETD Devices.....	264
17.6	Certified Tomographic Explosive Detection Systems (EDS)	265
17.7	Certified Carbon Dioxide (CO ₂) Monitors	265
17.8	Certified Non-EDS 2D X-ray Devices	266
17.9	Certified Electronic Metal Detection (EMD) Devices.....	266

18	Appendix L: List of Authorized Air-Cargo on Scheduled Passenger Flights Screening Facilities	267
19	Appendix M: The Narcotics Trafficking “Industry”	289
19.1	Illegal Narcotics Trade	289
19.2	Narcotics Trafficking via West Africa.....	290
19.3	Narcotics Trafficking Route in Asia	290
19.4	Narcotics Trafficking in the United States	291
19.5	Narcotics Trafficking in Mexico	292
19.6	Narcotics Industry in Colombia	294
20	Appendix N: Improvised and Military Explosives.....	295
20.1	Background.....	295
20.2	Explosives Categories	295
20.2.1	Chemical Explosives	295
20.2.2	Explosives Train	297
20.2.3	Low Explosives.....	297
20.2.4	Nitrocellulose	298
20.2.5	High Explosives	299
20.2.6	Primary High Explosives.....	300
20.3	Secondary High Explosives	302
20.3.1	PETN.....	302
20.3.2	RDX.....	303
20.3.3	Main Charges	303
20.4	Improvised Explosives	306
20.4.1	Introduction.....	306
20.4.2	Hexamethylene Triperoxide Diamine (HMTD)	307
20.4.3	Triacetone Triperoxide (TATP)	307
21	Appendix O: Air Cargo ETD Screening	309
21.1	Air Cargo Explosives Screening: Background	309
22	Appendix P: IATA, Boeing & ICAO Air Travel and Air Cargo Forecast to 2034	310
23	Appendix Q: IATA Airport Screening Checkpoints Recommended.....	313
24	Appendix R: Glossary & Abbreviations.....	318
25	Report Research Methodology.....	339
25.1	Report Structure.....	339
25.2	Assumptions	339
25.3	Research Methodology	339
25.4	For Whom is This Report?	340
25.5	Research Methods.....	341
26	Disclaimer & Copyright.....	342

List of Tables

<u>Table 1 - United States Explosives Trace Detection (ETD) Market [\$M] by Revenue Source – 2015-2022</u>	15
<u>Table 2 - United States Explosives Trace Detection (ETD) Market AGRs [%] by Revenue Source – 2015-2022</u>	16
<u>Table 3 - Saudi Arabia Explosives Trace Detection (ETD) Market [\$M] by Revenue Source – 2015-2022</u>	18
<u>Table 4 - Saudi Arabia Explosives Trace Detection (ETD) Market AGRs [%] by Revenue Source – 2015-2022</u>	19
<u>Table 5 - China Explosives Trace Detection (ETD) Market [\$M] by Revenue Source – 2015-2022</u>	21
<u>Table 6 - China Explosives Trace Detection (ETD) Market AGRs [%] by Revenue Source – 2015-2022</u>	22
<u>Table 7 - India Explosives Trace Detection (ETD) Market [\$M] by Revenue Source – 2015-2022</u>	24
<u>Table 8 - India Explosives Trace Detection (ETD) Market AGRs [%] by Revenue Source – 2015-2022</u>	25
<u>Table 9 - Japan Explosives Trace Detection (ETD) Market [\$M] by Revenue Source – 2015-2022</u>	27
<u>Table 10 - Japan Explosives Trace Detection (ETD) Market AGRs [%] by Revenue Source – 2015-2022</u>	28
<u>Table 11 - Autoclear ETD Products</u>	38
<u>Table 12 - Number and Costs of TSA Canine Teams by Type of Team</u>	88
<u>Table 13 - ETD vs. Bulk Explosives and Narcotics Detection Technologies</u>	92
<u>Table 14 - Checkpoint Technology Average U.S. Government Price per System</u>	92
<u>Table 15 - Emerging Technologies: Description</u>	93
<u>Table 16 - ETD Core Technologies by Current Use and TSA Approval</u>	95
<u>Table 17 - ETD Nanotechnology Techniques</u>	102
<u>Table 18 - Quantum Sniffer: Features & Benefits</u>	117
<u>Table 19 - Desktop ETD Products by: Vendors, Prices, Technologies, Detection & Capabilities Comparison</u>	134
<u>Table 20 - Colorimetric ETD Products by: Vendors, Prices, Explosives Detection and Technologies</u>	135
<u>Table 21 - Hand-Held ETD: Products, Vendors, Prices, Technologies and Detection</u>	135
<u>Table 22 - ETD Document Scanners: Products, Prices, Technologies & Capabilities Comparison</u>	136
<u>Table 23 - People Screening ETD Portals: Products, Vendors Price Comparison</u>	136
<u>Table 24 - Potential ETD Machines-Equipment Assumptions</u>	242
<u>Table 25 - ETD Geometrical & Power Consumption Specification Characteristics</u>	248
<u>Table 26 - Manufacturer Points of Contact</u>	261
<u>Table 27 - Certified 2D X-ray Devices</u>	262

<u>Table 28 - Certified ETD Devices</u>	264
<u>Table 29 - Certified Tomographic Explosive Detection Systems (EDS)</u>	265
<u>Table 30 - Certified Carbon Dioxide (CO₂) Monitors</u>	265
<u>Table 31 - Certified Non-EDS 2D X-ray Devices</u>	266
<u>Table 32 - Certified Electronic Metal Detection (EMD) Devices</u>	266
<u>Table 33 - List of Authorized Air-Cargo on Scheduled Passenger Flights Screening Facilities</u>	267

List of Figures

Figure 1 - United States Explosives Trace Detection (ETD) Market Breakdown [%] by Revenue Source – 2015-2022	17
Figure 2 - Saudi Arabia Explosives Trace Detection (ETD) Market Breakdown [%] by Revenue Source – 2015-2022	20
Figure 3 - China Explosives Trace Detection (ETD) Market Breakdown [%] by Revenue Source – 2015-2022	23
Figure 4 - India Explosives Trace Detection (ETD) Market Breakdown [%] by Revenue Source – 2015-2022	26
Figure 5 - Japan Explosives Trace Detection (ETD) Market Breakdown [%] by Revenue Source – 2015-2022	29
Figure 6 - Ex-Detect Model XD-2 Kit.....	57
Figure 7 - Explosive Materials Classification.....	85
Figure 8 - The Most Commonly Used Explosives Classification	86
Figure 9 - Canine Team Air Cargo Explosives and Narcotics Screening	87
Figure 10 - Explosives Detection Technologies: Bulk vs. Trace Detection	91
Figure 11 - ETD: Principle of Operation	94
Figure 12 - ETD Operational Workflow	95
Figure 13 - The Airborne Concentration of Military & IED Explosives	96
Figure 14 - Typical Sensitivity of Various ETD Technologies.....	96
Figure 15 - Free-surface Microfluidic Control of Surface-enhanced Raman Spectroscopy Based ETD.....	112
Figure 16 - Surface Enhanced Raman Spectroscopy System	113
Figure 17 - Microfluidic Control Surface-Enhanced Raman Spectroscopy Based ETD Process	114
Figure 18 - Falcon First Responder Kit	116
Figure 19 - Cantilever (a) Without Detection. (b) With Detection of Molecules at its Surface.....	118
Figure 20 - Schematic of Basic Sensor Design.....	118
Figure 21 - Schematic Diagram of an ETD Based on a Sensor Array and Neural Network	119
Figure 22 - Non-Contact ETD Explosives and Narcotics Harvesting, Transport, Analysis and Reporting Process.....	120
Figure 23 - AFT-MS Technology	125
Figure 24 - Smiths Detection IONSCAN Document Scanner.....	127
Figure 25 - Boarding Gate with Build-in ETD Screening Technology.....	129
Figure 26 - ETD Based Vehicle Screening System.....	130
Figure 27 - The ETD Performance Criteria	131
Figure 28 - Checked Luggage ETD-EDS Screening Configuration - 1	236
Figure 29 - Checked Luggage ETD-EDS Screening Configuration - 2	237
Figure 30 - Schematic Visualization of a Mini in-Line System.....	238
Figure 31 - Checked Luggage ETD-EDS Screening Configuration - 3 Mini In-Line System with Light Integration	239
Figure 32 - Checked Luggage ETD-EDS Screening Configuration - Stand-Alone EDS	240

Figure 33 - Stand-Alone Checked Luggage ETD System.....	241
Figure 34 - International Narcotics Routes.....	289
Figure 35 - Explosives Classification Tree	296
Figure 36 - Explosive Train	297
Figure 37 - Black Powder.....	298
Figure 38 - Smokeless Powder	298
Figure 39 - Nitrocellulose	299
Figure 40 - Flash Powder.....	299
Figure 41 - High Explosives Tree.....	300
Figure 42 - Lead Azide	301
Figure 43 - Lead Styphnate	301
Figure 44 - Mercury Fulminate Salt.....	301
Figure 45 - Diazodinitrophenol (DDNP)	302
Figure 46 - Pentaerythrite Tetranitrate (PETN)	303
Figure 47 - Cyclotrimethylenetrinitramine (RDX).....	303
Figure 48 - Dynamite (EGDN).....	303
Figure 49 - Plastic Bottles Containing Unidentified Binary Explosives.....	304
Figure 50 - Water Gel in a Glass Bubble Sensitizer.....	304
Figure 51 - Tubes of Emulsion Explosives	305
Figure 52 - Yellow TNT Solids	305
Figure 53 - Ammonium Nitrate and Fuel Oil (ANFO)	305
Figure 54 - Dinitrotoluene (DNT)	306
Figure 55 - High Melting Point Explosive (HMX)	306
Figure 56 - Hexamethylene Triperoxide Diamine (HMTD)	307
Figure 57 - TATP (Crude and Dry) and Preparation Ingredients.....	308
Figure 58 - Flow of Cargo from Shipper to Air Carrier.....	309
Figure 59 - World Passenger Traffic vs. GDP	310
Figure 60 - Passenger Traffic: 1974-2034	311
Figure 61 - RPK Traffic by Airline Domicile [Billions].....	311
Figure 62 - Single Queue Serving Multiple X-ray Security Checkpoints	315
Figure 63 - A Single Queue Serving Multiple Screening Positions	315
Figure 64 - Two Single Lanes Serving Multiple Screening Positions	316
Figure 65 - Separated Lines in Single Queue Serving Multiple Screening Positions	316
Figure 66 - Checkpoint Staff Allocation.....	317