“An intelligent electronic seal system for cargo containers is a vital element of transport corridor security and logistics"

Valery Andryushin,
Deputy General Director of AO IPC Strazh
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STRAATEGIC PARTNERSHIP 1520: CENTRAL EUROPE
Russian railways dispatch about 3.5 million tons of cargoes daily, and the carrier is responsible for safety of each ton of the cargo accepted for transportation. At present, more than 55 thousand mechanical locking seal devices of various designs are used daily for safety control purposes.
The current sealing technologies and hardware are mostly capable to control access to the cargo and to inform about state of the cargo at destination points only.
Biglock main components

- Mobile Workstation
- Central Database Server
- Electronic Component
- Standard SPRUT 777 Sealing Device
- User Dashboard
- Telecommunication System
- ETRAN (Electronic Waybill)

STRATEGIC PARTNERSHIP 1520: CENTRAL EUROPE
ELECTRONIC SECURITY SEAL (ESS)

Electronic Security Seal

Mechanical component (MC)
1. Body
2. Ø4.7 mm steel wire

Electronic Component (EC)
1. Body
2. Cover
3. MK socket
4. Holes for passing the MC wire
5. The serial number of the Electronic Component (ID-EC)

STRATEGIC PARTNERSHIP 1520: CENTRAL EUROPE
USING “DAUGHTER” AND SENSORS (RAILWAY TRANSPORT)

1. EHSS (multipurpose) assembled
2. Sub-EHSS assembled
3. Smart tachograph for road vehicles
4. Smart tachograph for railway cars
5. Smart tachograph for ships
6. (filling level, temperature, humidity, volume, illumination intensity and other) monitoring sensors
7. SOS button, sleep detector, EHSS cable condition monitor (CM) installed on the van and other monitors

- Central DB server
- User’s personal account
- Situation centre
- Fast response service

Satellite
Communication systems
Cloud technologies
Central DB server
User’s personal account

Locomotive
Covered railcar
Container (tank-container)
Tank car

STRATEGIC PARTNERSHIP 1520: CENTRAL EUROPE
USING “DAUGHTER” AND SENSORS (ROAD TRANSPORT)

1. EHSS (multipurpose) assembled
2. Sub-EHSS assembled
3. Smart tachograph for road vehicles
4. Smart tachograph for railway cars
5. Smart tachograph for ships
6. (filling level, temperature, humidity, volume, illumination intensity and other) monitoring sensors
7. SOS button, sleep detector, EHSS cable condition monitor (CM) installed on the van and other monitors

Satellite Communication systems Cloud technologies Central DB server User’s personal account

Central DB server User’s personal account Situation centre Fast response service

GSM SATELLITE

Situation centre Fast response service

GSM SATELLITE

STRATEGIC PARTNERSHIP 1520: CENTRAL EUROPE
USING “DAUGHTER” AND SENSORS (SEA TRANSPORT)

Central DB server
User Dashboard
Situation centre
Fast response service

GSM
SATELLITE

Container ship

Central DB server
User Dashboard
Situation centre
Fast response service

GSM
SATELLITE

1 2 3 4 5 6

Container terminal
ESS USE TREND

NUMBER OF ESSS AFFIXED  NUMBER OF ROUTES

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018 (target)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>7</td>
<td>475</td>
<td>765</td>
<td>3800</td>
<td>4698</td>
</tr>
</tbody>
</table>
ESSs Affixed Since Start of Use

Number of ESSs affixed since start of use

- 2014
- 2015
- 2016
- 2017
- 2018 (target)

- 0
- 5000
- 10000
- 15000
- 20000
- 25000
- 30000
THE ROUTE OF CCTT “SECURITY TRAIN PROJECT” ALONG THE SILK WAY

STRATEGIC PARTNERSHIP 1520: CENTRAL EUROPE
MAIN OPERATIONS DURING CONTAINER TRANSPORTATION

- in transit
- Seal check in transit
- Seal check in transit
- Seal check in transit
- Seal check in transit

POLAND → BELARUS → RUSSIA → KAZAKHSTAN → CHINA

- Transshipment
- Customs
- Custody transfer from PKP SA (Polish State Railways) to BCH (Belarus Railways)

- Custody transfer from BCH to RZD (Russian Railways)

- Custody transfer from RZD to KZKh (Kazakhstan Railways)

- Transshipments
- Customs
- Other operations

- Consignor's warehouse
- Transshipment to road vehicles
- Railway cablegram. loading into railway cars

STRATEGIC PARTNERSHIP 1520: CENTRAL EUROPE
## Detailed calculation of Benefits of Implementation of Technology of “Secure Train” Container Transportation with Use of Electronic Seals, as demonstrated by the Silk Way Example

<table>
<thead>
<tr>
<th>No.</th>
<th>Route leg</th>
<th>L, km</th>
<th>Current technology parameters</th>
<th>ESS technology parameters</th>
<th>V, km/day</th>
<th>Delivery time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Additional time for transshipment and custom clearance (days)</td>
<td>Additional time for affixation of seals, including custom ones, and their check in transit (days)</td>
<td>V, km/day</td>
<td>Additional time for custom clearance (days)</td>
</tr>
<tr>
<td>1</td>
<td>Zhengzhou, CPR – Dostyk, KZKh</td>
<td>3,777</td>
<td>0.5</td>
<td>0.5</td>
<td>786.9</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>Dostyk, KZKh – Iletsk-1, KZKh</td>
<td>2,838</td>
<td>1</td>
<td>0.5</td>
<td>660.0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Iletsk-1, KZKh – Smolensk-Minsk-Marshalling</td>
<td>1,805</td>
<td>0</td>
<td>1</td>
<td>644.6</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Smolensk-Minsk-Marshalling – Brest, BCH</td>
<td>634</td>
<td>0.5</td>
<td>0.5</td>
<td>402.4</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Brest, BCH – Małaszewicze, PKP</td>
<td>18</td>
<td>1</td>
<td>0.5</td>
<td>11.8</td>
<td>0.5</td>
</tr>
<tr>
<td>6</td>
<td>Total route</td>
<td>9,122</td>
<td>3</td>
<td>3</td>
<td>608.1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Difference</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ESSs will make it possible:
- to shorten the time of cargo delivery by express container trains by 5 days or by 34%;
- to increase the delivery speed by 304.1 km/day or by 35%;
- to cut down the in-transit cargo protection costs (the cargo is protected by an ESS and the alarm signal is responded by a security response team);
- to cut down the cargo insurance costs through the ESS use by 5-7% approximately;
- to accelerate money capital turnover.
Calculation of Benefits of Implementation of Technology of “Secure Train” Container Transportation with Use of Electronic Seals, as demonstrated by the Silk Way Example

<table>
<thead>
<tr>
<th>Transportation route</th>
<th>L, km</th>
<th>Transportation parameters</th>
<th>ESS technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station of departure</td>
<td>Route leg</td>
<td>Current technology</td>
<td>ESS technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Delivery time (days) including</td>
<td>Delivery time (days) including</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Additional time for transshipment and custom clearance (days)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average speed V, km/day</td>
<td>Average speed V, km/day</td>
</tr>
<tr>
<td>Zhenzhou, CPR</td>
<td>Małaszewicze, PKP</td>
<td>9,122</td>
<td>15</td>
</tr>
<tr>
<td>Absolute difference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ESSs will make it possible:
- to shorten the time of cargo delivery by express container trains by 5 days or by 34%;
- to increase the delivery speed by 304.1 km/day or by 35%;
- to cut down the in-transit cargo protection costs (the cargo is protected by an ESS and the alarm signal is responded by a response team of a security organization);
- to cut down the cargo insurance costs through the ESS use by 5-7% approximately;
- to accelerate money capital turnover.
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THANK YOU FOR YOUR ATTENTION!