Low-cost interlocking solutions for small and middle-size freight yards with PRORIS-H

PRORIS-H interlocking system at Fényeslitke Intermodal Terminal

PROLAN

INTRODUCTION

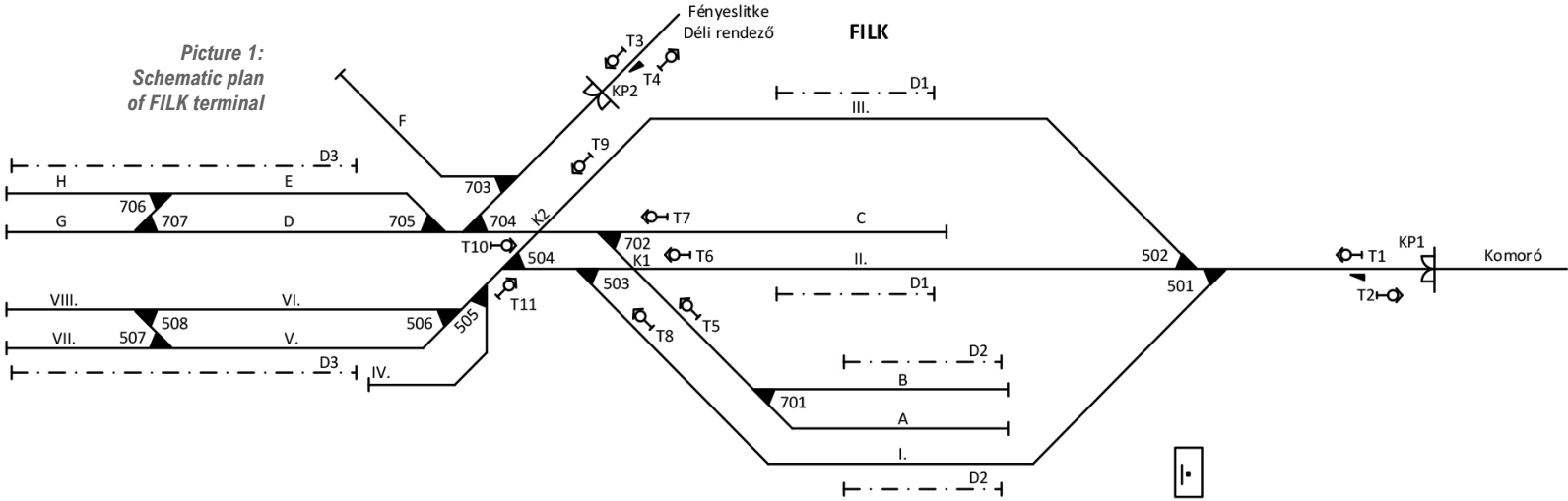
Functionality of a marshalling yard, on one hand, is simpler than it is expected from a „traditional" interlocking; but, on the other hand, task to be completed are much more complex: inter-related safety connections must be established between interlocking system and automated transfer machines (eg. cranes). The interlocking system has been built considering the following aspects, ie. the system can be developed forward in two parallel, but independent phases:

- inter-related connections between interlocking and other technology systems (eg. cranes),
- simple improvement possibility into a shunting-route interlocking system.

FILK terminal is an intermodal transfer station, from railway point of view a normal – broad gauges one. The transfer technology is executed with high-tech solutions either between normal and broad gauge freight waggons, or from road vehicles to rail ones and vica-versa, according to the XXI. century's requirements, the terminal is connected with a normal and a broad gauge track to the MÁV (state railways)-operated network. According to the valid traffic technology, all movements are shunting ones on terminal area (ie. no train routes / movements on FILK network).

SIGNALS

All shunting movements in FILK area are controlled with shunting signals (these signals have two optics (blue: shunting is forbidden; white: shunting is enabled beyond the signal; but these signals do not give speed instructions) according to the Signal Rules (F1) valid on Hungarian railway network). Position of shunting signals has been determined when the traffic technology was fixed. It was extremely important, shunting movements on normal and broad gauge network must be separated from each other with the aid of shunting signal's aspects; the two networks intersect in two rail-rail acute-angled crossings (K1 and K2 crossings on picture 1).



Picture 1: Schematic plan of FILK terminal

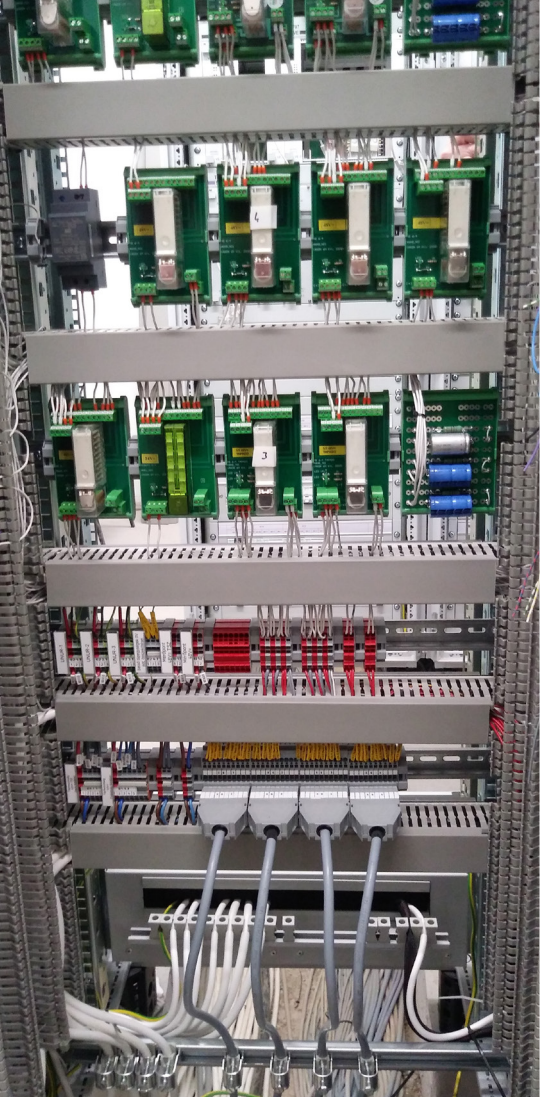
CONNECTION TO THE NEIGHBOURING STATIONS

Between FILK terminal and neighbouring stations (on normal gauge: Fényeslitke South Marshalling Yard; on broad gauge: Komoró Broad Marshalling Yard) the „head-on collision and overtaking prevention" function has been elaborated with fail-safe relay circuits, as a simple interface between PRORIS-H and Integra-Domino55 relay interlocking systems. These interdependencies respond to T2 and T4 shunting signals in case of movements from FILK terminal to MÁV stations; in case of movements from MÁV stations to FILK terminal new shunting signals have been erected on MÁV area. In order to avoid non-intended movements from FILK, two derailers have been installed at the T2, T4 shunting signals. Enabling / prohibiting the shunting movements from MÁV-network, T1 and T3 shunting signals give white or blue aspects. Both in entrance / exit routes to / from FILK terminal, „open" status of rail gates is checked as a dependency. Of course, the „free" status of „open line" sections are proven between MÁV and terminal areas.

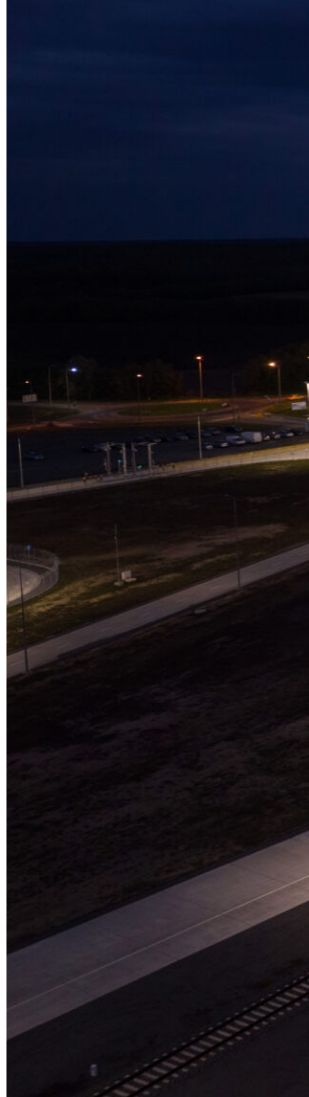
POINTS

In terminal area, normal-gauge points are numbered with 700, the broad-gauge ones are numbered with 500.

In order to avoid building a lot of superfluous „knowledge" into the point-logic of a marshalling yard, where this knowledge would be unnecessary, point module of PRORIS-H is organized to several printed boards (PCBs). The non-route (ie. individual, eg.: point setting, point checking) relevant functions of a point have been concentrated on three printed boards. Therefore a reduced functionality can be carried out on these 3 PCBs. (The normal point module comprises 7 PCBs; the other 4 cards are dedicated for route-relevant functionality, ie. route checking, locking and releasing, flank protection.) On „reduced" point module, there are a lot of point control contacts, and right / left end position checking contacts are available for individual dependencies. In case of lack of sufficient number of contacts, on free-wired PCBs the point control relays (magnetic latching relays) and point checking relays can be repeated. Some of the functions and dependencies, related to individual point-setting, are elaborated at ProSigma-B level (eg. individual locking of a point).



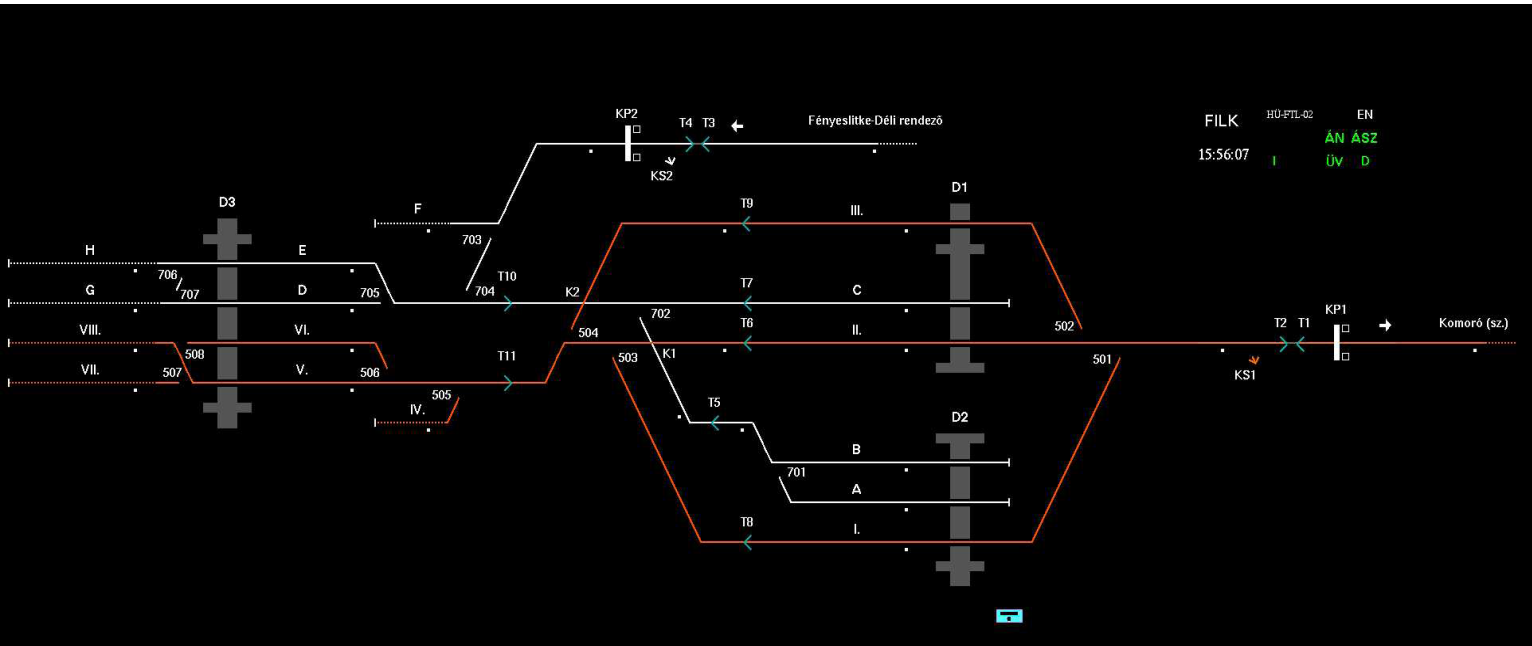

K2.SZ/T11
K1.SZ/T9
T6/T8
T11
T9
T6
T8
SZN
TJ
K1.N/702
702
701
VE



Picture 2:
Complete point module (7 cards); in red frame PCBs necessary for reduced point module

OTHER DEPENDENCIES AND FUNCTIONS

Because of transfer functionality of the terminal, inter-related dependency with automated loading equipment has been prepared. That means, shunting signals - enabling or prohibiting shunting movements in direction of crane tracks (indicated with dots and dashed line on the schematic plan) – can be set to proceed aspect, if no crane movements are enabled and vica versa: crane movements can be enabled, if all related shunting signals show stop aspect. Later, if it is required by the operator, more sophisticated dependencies can be carried out: crane movements shall depend on track occupation (ie. crane enabled or prohibited); of course, in this case train detection of tracks shall be sectioned.



Picture 3: Man-Machine interface of FILK terminal


kühz
EWG
EAST WEST GATE
INTERMODAL TERMINAL HUNGARY
3

Marshalling yards, where numerous shunting movements are carried out in points area, point (and maybe other objects) operation shall be possible locally by the shunting staff, from local posts. This is a so-called on-site MMI. This MMI has not been required in first phase, but, point operating modules have been prepared for this function. In case of such claim later, on-site operation can be added in flexible way.

At the end, a small, but interesting issue: this was the first order in Prolan railway automation story, where different gauges must be indicated on same MMI. Normal gauge has been visualized with white (as it ordinary), but broad gauge with brown colour is shown (Picture 3.).

Picture 4: View of FILK Terminal

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