

FRONTLINE PERSPECTIVE

# IRANIAN TECHNOLOGY TRANSFERS TO YEMEN

‘Kamikaze’ drones used by Houthi forces to attack Coalition missile defence systems

March 2017

## CONTEXT

Since the start of the conflict in Yemen, Ansar Allah ‘Houthi’ forces, and those aligned with former President Ali Abdullah Saleh, have deployed increasingly sophisticated weaponry against their adversaries. This materiel includes unmanned aerial vehicles (UAVs), which Houthi and Saleh-aligned forces have used to target Saudi-led Coalition missile defence systems in what are locally referred to as ‘kamikaze’ drone attacks.

In October 2016 and February 2017, Conflict Armament Research (CAR) documented seven UAVs, and one UAV engine, in the possession

of United Arab Emirates (UAE) Presidential Guard forces. The Presidential Guard reportedly intercepted six of the UAVs in Yemen’s Marib Governorate (hereinafter the Marib seizure). These aircraft allegedly entered the country overland from Oman. The Presidential Guard also recovered a crash-landed UAV near Aden International Airport, and retrieved a damaged UAV engine following an attack by Houthi and Saleh-aligned forces in Marib Governorate (hereinafter the Marib attack).<sup>1</sup>

On 26 February 2017, Houthi forces displayed four UAVs, which they claimed to have designed and



## THE USE OF THESE UAVS ILLUSTRATES THE HOUTHIS AND SALEH-ALIGNED FORCES' ABILITY TO EMPLOY LOW-COST TECHNOLOGY AGAINST THE COALITION'S SOPHISTICATED MILITARY ASSETS.

manufactured themselves.<sup>2</sup> One of the systems displayed, the Qasef-1 (Striker-1), is identical to the UAVs documented by CAR in the UAE.

Investigations by CAR provide two reasons for concluding that Houthi forces did not manufacture the Qasef-1 UAV. First, the Qasef-1 appears to be a type within the Ababil-II family of UAVs, produced by Iran's Aircraft Manufacturing Industrial Company (HESA). The UAV is similar to, but seemingly smaller than, the Ababil-CH and is consistent with descriptions and imagery of a UAV that has been referred to as the Ababil-T.<sup>3</sup> The Qasef-1 not only shares near-identical design and construction characteristics with the Iranian UAV, but also features identical serial number prefixes. These features suggest that the Qasef-1 is an Iranian-designed variant of the Ababil-CH or Ababil-T. Second, the interception of six Qasef-1 UAVs after reportedly transiting Oman—a known smuggling route for Iranian materiel support to Houthi and Saleh-aligned forces—also suggests that the Qasef-1 is imported, rather than designed or manufactured in Yemen.<sup>4</sup>

UAE forces report that Houthi and Saleh-aligned forces employ the Qasef-1 to target Coalition MIM-104 'Patriot' surface-to-air missile systems. They do so by crashing the UAVs into the systems' radar sets (specifically the circular main phased arrays)—directing the UAVs by programming their systems with open-source GPS coordinates of the Patriots' positions.<sup>5</sup> While the Coalition deploys Patriot systems to counter missile threats, the destruction of the Patriots' radar systems enables Houthi and Saleh-aligned forces to target Coalition assets with volleys of missile-fire unhindered.

The use of these UAVs illustrates the Houthi and Saleh-aligned forces' ability to employ low-cost technology against the Coalition's sophisticated military assets. Their acquisition of Iranian-designed Qasef-1 UAVs supports allegations that Iran continues to bolster the capacity of Houthi and Saleh-aligned forces through the transfer of new technology and advanced weaponry.<sup>6</sup>



CAR field investigator dismantling a Qasef-1 UAV to document its internal components, February 2017.

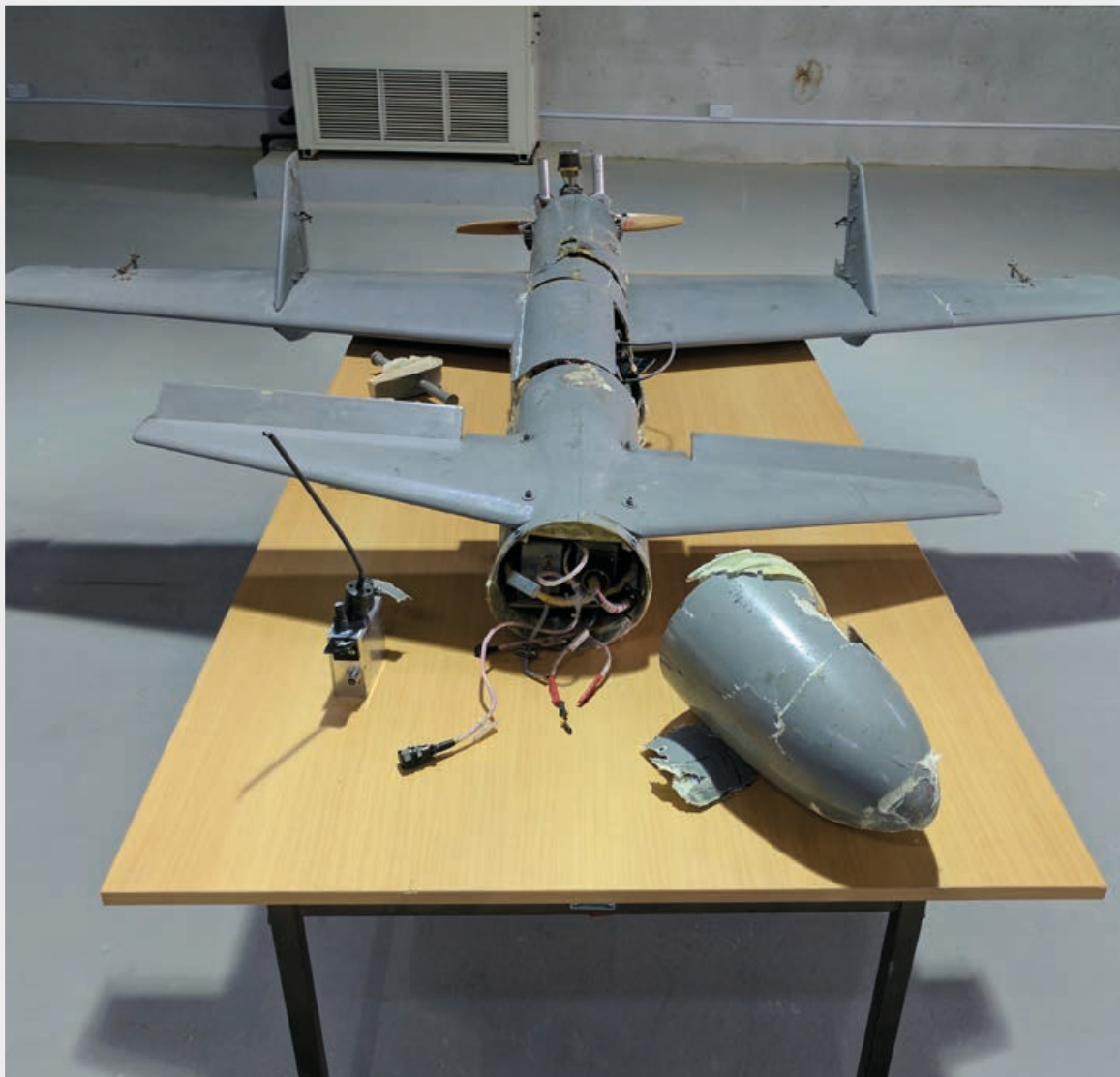
## KEY FINDINGS

- Evidence documented by CAR, in contrast to Houthi statements, suggests that the Qasef-1 UAV is not of indigenous design and construction, but is Iranian-manufactured and has been supplied in batches to Houthi and Saleh-aligned forces in Yemen.
- Houthi and Saleh-aligned forces have used Qasef-1 UAVs to disable Patriot missile defence systems deployed by Coalition forces in Yemen.
- These findings support assertions that Iran continues to provide enhanced military capabilities to Houthi and Saleh-aligned forces.

## DOCUMENTATION

On 16 November 2016, Presidential Guard forces recovered a Qasef-1 after it had reportedly crash-landed near Aden International Airport (Figures 1 and 2). The engine, a DLE-111 two-cylinder petrol model manufactured by the Chinese company Mile

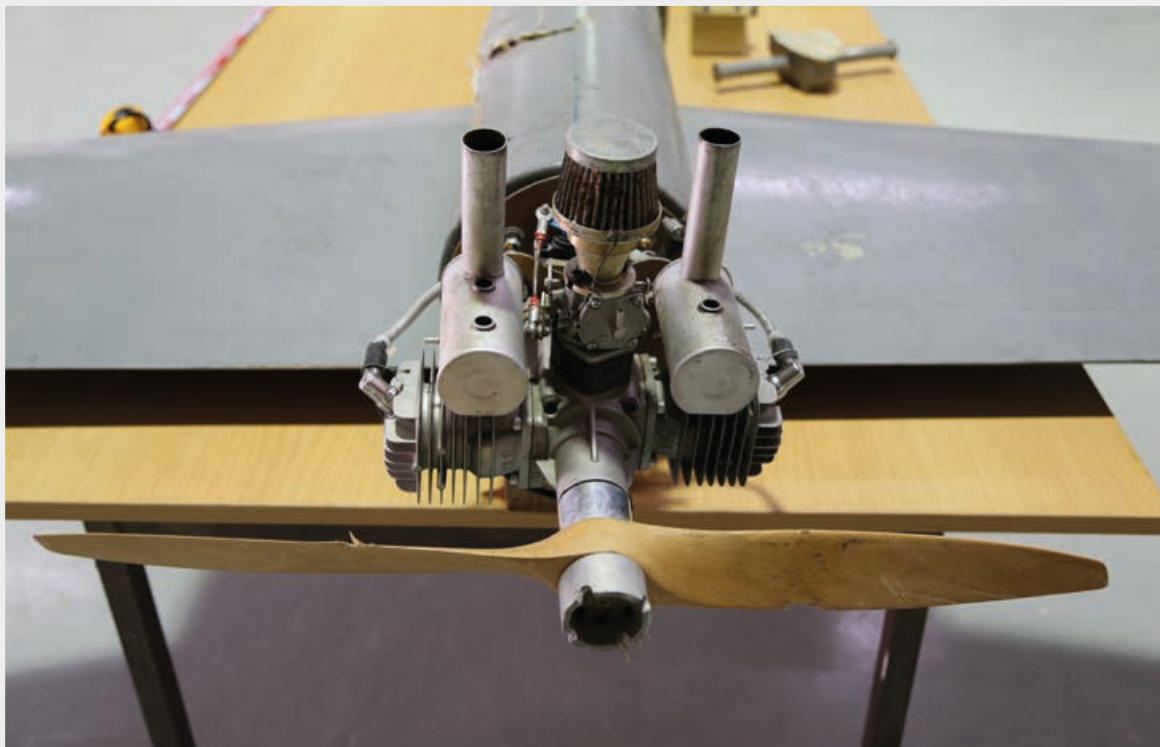
HaoXiang Technology Co. Ltd. (Figures 3 and 4), is identical to the engine of the UAV used in the Marib attack, which CAR documented in October 2016 (Figures 5 and 6).<sup>7</sup>



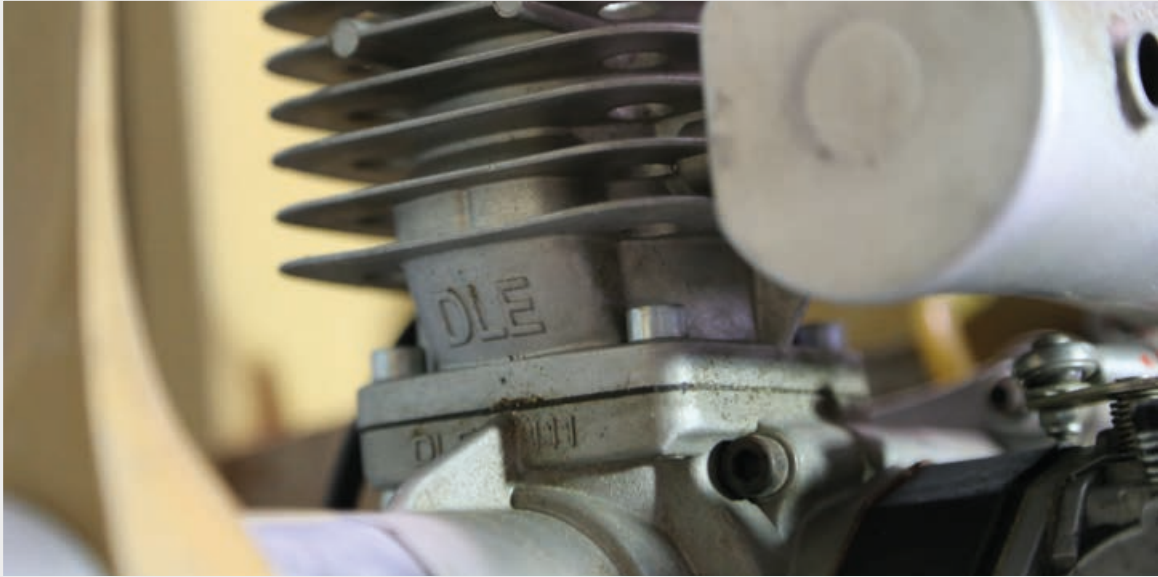
**Figure 1**  
Qasef-1 UAV, February 2017.



**Figure 2**  
Qasef-1 UAV, February 2017.



**Figure 3**  
Chinese-manufactured DLE 111 two-cylinder petrol engine fitted with propellor, February 2017.



**Figure 4**  
Chinese-manufactured DLE 111 two-cylinder petrol engine, February 2017.



**Figures 5 & 6**  
DLE 111 engine from the UAV used in the Marib attack, October 2016.



Propeller blades branded 'Sail' from the Marib seizure, February 2017.

On 27 November 2016, Presidential Guard forces intercepted a truck carrying six partially assembled Qasef-1 UAVs (Figure 7) in Marib Governorate.<sup>8</sup> The fuselage and wings of the UAVs bear printed serial numbers, which correspond to handwritten serial

numbers applied to various internal components. The serial numbers, some of which are consecutive, indicate that the drones were manufactured on the same production line.



**Figure 7**  
Disassembled Qasef-1 UAVs, intercepted in the Marib seizure, February 2017.

The Qasef-1 UAVs appear to have been shipped in two batches. The DLE engine recovered from the Marib attack (Figure 8) and the UAV recovered from the Aden International Airport crash are labelled

with 'A' batch codes (Figures 9-12), whereas the six UAVs intercepted in the Marib seizure bear 'B' batch codes (Figures 13-16).



**Figure 8**  
Engine from the UAV used in the Marib attack with 'A' batch code, October 2016.



**Figures 9-12**

Qasef-1 from the Aden International Airport crash site with 'A' batch code and matching external and internal serial numbers, February 2017.



**Figures 13-16**

Qasef-1 intercepted in the Marib seizure with 'B' batch code and corresponding internal and external serial numbers, February 2017.

The serial number sequences from both the ‘A’ and ‘B’ batches are closely aligned, which suggests the same place and period of manufacture (Table 1). For instance, batches B1, B2, B4, and A5 bear serial

numbers with suffixes within the 33-39 sequence. The serial number prefix ‘22-’ is also identical to the serial prefix found on Iranian-manufactured Ababil-II variants.<sup>9</sup>

**Table 1**

**List of serial and batch numbers on Qasef-1 UAVs recovered in Yemen**

Item	Serial Number	Batch Number	Location Recovered
UAV	22-122-33	B2	Marib Governorate
UAV	22-122-34	B1	Marib Governorate
UAV	22-122-38	B4	Marib Governorate
UAV	22-122-39	A5	Aden Governorate
UAV	22-1721	B3	Marib Governorate
UAV	22-1721-0	B6	Marib Governorate
UAV	22-1722-9	B5	Marib Governorate
UAV Engine	N/A	A7	Marib Governorate

The UAVs’ gyroscopes (Figure 17) are uniformly ‘Model V10’ vertical gyroscopes (manufacturer unknown) with serial numbers ranging from 1233 to 2218. Two examples are only two digits apart in sequence (Table 2). The gyroscopes are the same as

those used in Iranian-manufactured Ababil-3 UAVs. In February 2017, Islamic State forces displayed one example, recovered from an Iranian-backed force in Iraq, which had a serial number close in sequence to the gyroscopes documented by CAR.<sup>10</sup>



**Figure 17**

**Model V10 Vertical Gyroscope from a Qasef-1, which crash-landed near Aden International Airport, February 2017.**



**Table 2****Serial numbers of Model V10 gyroscopes observed in Iranian-manufactured UAVs**

Item	Serial Number	Location Recovered
Qasef-1	1233	Marib, Yemen
Qasef-1	1768	Marib, Yemen
Qasef-1	2076	Marib, Yemen
Qasef-1	2099	Aden, Yemen
Qasef-1	2109	Marib, Yemen
Qasef-1	2216	Marib, Yemen
Qasef-1	2218	Marib, Yemen
Ababil- 3	2301	Baji, Iraq

**IMPACT**

These findings strengthen a body of evidence compiled by CAR, which links weapons captured from Houthi and Salah-aligned forces to transfers from Iranian national stockpiles.<sup>11</sup>

The presence of Iranian-designed and-manufactured UAVs in Yemen, not only confirms

Iran's materiel support to Houthi and Salah-aligned forces, but also its role in enabling the groups to conduct increasingly sophisticated asymmetric operations.

CAR continues to investigate the illicit transfer of military materiel into Yemen.



Servo motor from a Qasef-1 UAV, February 2017.

## ENDNOTES

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- 1 Interviews and intelligence documents provided to CAR by confidential government sources, February and March 2017.
- 2 See Antonopoulos (2017).
- 3 Interviews with UAV experts, February 2017; See IHS Jane's (2016).
- 4 See Bayoumy and Stewart (2016).
- 5 CAR interviews with confidential sources in the UAE and senior members of the UAE military, February and March 2017.
- 6 See Levitt (2016); Discussions with Western diplomats and Yemen experts, February 2017.
- 7 On 22 November 2016, Mile Hao Xiang Technology Co., Ltd responded promptly to a formal trace request issued by CAR on 9 November 2016. This response confirms that: 1) Mile Hao Xiang Technology is unable to keep end-user records for every purchase. It only keeps contact details of official dealers; 2) DLE engines are sold by official dealers and online in shops such as Taobao, Alibaba, and eBay; 3) Mile Hao Xiang Technology confirmed that the serial number CAR documented was on the ignition of the engine but that the company does not keep serial number records; and 4) Mile Hao Xiang Technology believes the engine CAR documented may be counterfeit as genuine DLE engines do not have air intake tubes.
- 8 Interviews and intelligence documents provided to CAR by confidential government sources, February 2017.
- 9 See <http://militaryedge.org/armaments/ababil/>
- 10 See Lost Weapons (2017).
- 11 See also Conflict Armament Research (2016).

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